HIDDEN HILLS SOLAR ELECTRIC GENERATING SYSTEM (HHSEGS)

Final Staff Assessment

California Energy Commission
DOCKETED
11-AFC-2
TN # 68953
DEC 21 2012

CALIFORNIA
ENERGY COMMISSION
Edmund G. Brown, Jr., Governor

DECEMBER 2012
CEC-700-2012-003-FSA

DOCKET NUMBER 11-AFC-02

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INTRODUCTION

This Final Staff Assessment (FSA) contains staff's independent evaluation of the BrightSource Energy, Inc. (Applicant) Hidden Hills Solar Electric Generating System (HHSEGS) Application for Certification (11-AFC-2). The FSA examines engineering, environmental, public health, and safety aspects of the proposed HHSEGS project, based on the information provided by the applicant, government agencies, interested parties and other sources available at the time the FSA was prepared. The FSA includes analyses prepared to satisfy the requirements of the California Environmental Quality Act (CEQA).

The Energy Commission is the CEQA lead agency. In addition to CEQA analyses, the FSA must consider whether the project conforms with all applicable local, state, and federal laws, ordinances, regulations and standards (LORS). The FSA also recommends measures to mitigate significant and potentially significant environmental effects, which take the form of conditions of certification for construction, operation, maintenance, and eventual decommissioning of the project, if approved by the Energy Commission.

This FSA is not the decision document for these proceedings, nor does it contain findings of the Energy Commission related to environmental impacts or the project's compliance with local/state/federal legal requirements. However, the FSA does include "Proposed Findings of Fact" for each of its 21 separate technical sections.

The FSA serves as staff's testimony in evidentiary hearings to be held by the HHSEGS Committee (composed of Commissioner and Presiding Member Karen Douglas, Commissioner and Associate Member Carla Peterman, and Hearing Officer Kenneth Celli), who oversee this case. The Committee will hold evidentiary hearings in January 2013, and will consider the recommendations presented by staff, the applicant, intervenors, governmental agencies, and the public prior to proposing its recommended decision to the full Commission. Energy Commissioners will make a final decision on HHSEGS, including findings, after the Committee's publication of the Presiding Member's Proposed Decision (PMPD).

PROPOSED PROJECT LOCATION, DESCRIPTION AND COMPONENTS

HHSEGS is proposed to be located on approximately 3,097 acres of privately owned land leased in Inyo County, California, adjacent to the Nevada border. The project site is approximately 8 miles directly south of Pahrump, Nevada (with a driving distance of 28 miles), and approximately 45 miles northwest of Las Vegas, Nevada (**Project Description Figure 1**). The project site is currently undeveloped and unoccupied. This rural area is primarily served by State Route (SR) 160, Old Spanish Trail Highway (also known as "Tecopa Road") and various unpaved roads. A sparsely populated residential community, Charleston View, lies immediately south of the proposed project site and Tecopa Road.

The HHSEGS project is being developed by Hidden Hills Solar I, LLC, and Hidden Hills Solar II, LLC. Hidden Hills Solar I, LLC, and Hidden Hills Solar II, LLC, are wholly owned

subsidiaries of Hidden Hills Solar Holdings, LLC, which is in turn a wholly owned subsidiary of BrightSource Energy, Inc., (Applicant).

HHSEGS would comprise two solar fields and associated facilities: the northern solar plant (Solar Plant 1) and the southern solar plant (Solar Plant 2). Each solar plant would generate 270 megawatts (MW) gross (250 MW net), for a total net output of 500 MW. Solar Plant 1 would occupy approximately 1,483 acres (or 2.3 square miles), and Solar Plant 2 would occupy approximately 1,510 acres (or 2.4 square miles). A 103-acre common area would be established on the southeastern corner of the site to accommodate an administration, warehouse, gas metering station, and a 138kV transmission switchyard and maintenance complex. A temporary construction lay-down and parking area on the west side of the proposed site would temporarily occupy approximately 180 acres. The temporary construction laydown area in addition to the entire HHSEGS site would total 3,277 acres.[1]

If permitted, Solar Plant 1 and Solar Plant 2 would take approximately 29 months to construct. Average and peak workforce is estimated at approximately 1087 and 2293 workers, respectively, consisting of construction craft people, supervisory, support, and construction management personnel onsite during construction. The peak construction site workforce level is expected to occur in month 19 of the 29-month construction period. Construction-related truck traffic would be entering and leaving the project on to Tecopa Road by way of what is now known as Topaz Street, at the westernmost boundary of the project site.

Project Features and Facilities

Each solar plant would use heliostats (elevated mirrors guided by a tracking system mounted on a pylon) to focus the sun's rays on a solar receiver steam generator (SRSG) – a solar boiler used to make steam which can then generate electricity – atop a solar "power tower" near the center of each solar field. The solar field and power generation equipment would start each morning after sunrise and, unless augmented by auxiliary boilers, would shut down when insolation (sun ray intensity) drops below the level that would be required to keep the turbines online and producing electricity. Please see the **Project Description** section of this **FSA** for specific discussions on the following project components: Solar Field, Solar Plants, Steam Turbine Generators, Natural Gas Auxiliary Boilers, Boiler Feedwater System, Condensate System, Demineralized Water System and Power Cycle Makeup and Storage. **Project Description Figure 8** illustrates the technology of the proposed HHSEGS.

Water Supply and Use

Groundwater would be drawn daily from six onsite groundwater supply wells that would be drilled and developed to provide raw water for the HHSEGS project; two new wells per power block (primary and backup) and two wells at the administration complex. The wells would supply both solar plants and would be used for the power cycle make-up water, mirror wash water, and other domestic uses. The entire 500-MW net project would require up to 84.5 gallons per minute (gpm) (average) raw water make-up, with 30 to 50 gpm required by each plant, and 3.5 gpm (average) required for potable water use. The total annual water

[1] 3,277 acres would be leased by Applicant on land owned by The Roland John Wiley Trust, The Mary Wiley Trust and Section 20, LLC.

use for HHSEGS would be 140 acre feet[2] per year. The **Water Supply** section of this **FSA** details the various aspects of this critical natural resource.

HHSEGS would generate electricity up to 16 hours a day. However, the water treatment plant would operate continuously in order to minimize water treatment system size and capital costs, and to use off-peak energy at night. A breakdown of the estimated average daily quantity of groundwater required for HHSEGS operation is presented in **Table 1**. The daily water requirements shown are estimated quantities based on HHSEGS operating at full load.

TABLE 1
Average Daily Water Requirements with Both Solar Plants in Operation

Water Use	Average Daily Use (gpm)	Annual Use (ac-ft/yr)
Process and heliostat wash	84.5	135
Potable water service (including Common Area)	3.5	5

ac-ft/yr = acre-feet per year

To reduce the number of truck trips during construction, the applicant proposes to drill a temporary well to be used during construction only, primarily for the onsite concrete batch plant that would be used to serve project construction needs. This temporary well would eliminate the need to bring water to the construction area via tanker truck, and would not increase water usage above the 288 acre-feet per year needed during the 29-month construction period.

Electrical Transmission System

The HHSEGS would interconnect to the Valley Electric Association (VEA) system[3]. The interconnection would require an approximately 10-mile long generation tie line (gen tie line) from the HHSEGS to the proposed Crazy Eyes Tap Substation[4], where the project would interconnect to the VEA electric grid. The gen tie line would originate at the HHSEGS's onsite switchyard, cross the state line avoiding the mesquite vegetation to the south and continue east for approximately 1.5 miles until reaching Tecopa Road. At Tecopa Road, the route would head northeast paralleling Tecopa Road until it reaches the Crazy Eyes Tap Substation, which would be located immediately east of the Tecopa Road/SR 160 intersection. The Crazy Eyes Tap Substation would interconnect to the existing VEA Pahrump Bob Tap 230 kV line. Please see **Project Description Figure 6.**

The bulk of the electric power produced by the facility would be transmitted to the grid. A small amount of electric power would be used onsite to power auxiliaries such as pumps and fans, control systems, and general facility loads including lighting, heating, and air conditioning. Some power would also be converted from alternating current (AC) to direct current (DC) and stored in batteries, which would be used as backup power for the plant control systems and essential uses.

[2] An acre foot of water equals 325,851 gallons.

[3] In January 2013, VEA will become a participating transmission owner (PTO) and will turn operational control of its facilities over to the California Independent System Operator (CAISO).

[4] In the HHSEGS Application for Certification, this substation was referred to as the Tap Substation.

Natural Gas Supply System

A 12-inch diameter natural gas pipeline would be required for the HHSEGS project. Kern River Gas Transmission Company (KRGT) proposes to construct the pipeline from the HHSEGS meter station, to be located in the HHSEGS Common Area, extending 32.4 miles to KRGT's existing mainline system just north of Goodsprings in Clark County, Nevada. The HHSEGS meter station, including pig receiver facilities, would be approximately 300 feet by 300 feet and would be surrounded by a 6-foot tall chain link fence topped with three strands of barbed wire (approximately 7 feet high total). The meter station would be shaded by a canopy to cover the meter runs and associated instrumentation and valves. A data acquisition and control (DAC) building would be located within the meter station. Data acquisition, control, uninterrupted power supply (UPS), and communication equipment would be installed inside the DAC building. Yard lights would be installed on the DAC building and meter building exterior. In addition, the light fixtures would be shielded or hooded and directed downward.

Facilities in Nevada subject to federal analysis

The FSA focuses on the HHSEGS project that would be built in California and its local and regional environmental impacts. Features of the project built in Nevada (e.g., the transmission line and natural gas supply line) may be mentioned to provide informational context. However, projects (or parts of projects) to be located in Nevada are not required to be analyzed under CEQA if they are assessed separately pursuant to federal environmental law (the National Environmental Policy Act, or "NEPA"). The federal Bureau of Land Management (BLM) is preparing NEPA analysis for the transmission and gas line project elements. Accordingly, the FSA does not focus on the parts of the project in Nevada, and proposes no mitigation for those elements of the project.

PROPOSED HHSEGS PROJECT OBJECTIVES

The project objectives of the Hidden Hills Solar Electric Generating System (HHSEGS) are based on applicant's stated project objectives, but modified to allow the reasonable range of alternatives required by CEQA:

- Safely and economically construct and operate a nominal 500-megawatt renewable electrical generation facility resulting in sales of competitively priced renewable energy consistent with the needs of California utility companies;
- Develop a renewable energy facility that will supply electricity for use by retail sellers and publicly owned electric utilities to help satisfy their required California Renewables Portfolio Standard (RPS) program goals;
- Develop a renewable energy facility capable of providing grid support by offering power generation that is flexible;
- Develop a renewable energy facility in an area with high solar insolation (high solar energy intensity);
- Ensure construction and operation of a renewable electrical generation facility that will meet permitting requirements and comply with applicable laws, ordinances, regulations, and standards (LORS);

- Develop a renewable energy facility in a timely manner that will avoid or minimize significant environmental impacts to the greatest extent feasible;
- Obtain site control and use within a reasonable time frame; and
- Develop a renewable energy facility in an area with high solar value and minimal slope.

PUBLIC AND AGENCY INVOLVEMENT

PUBLIC COORDINATION

The Energy Commission collaborated with a number of state and federal agencies in order to facilitate robust public participation in the regulatory review of HHSEGS. To reach this goal, Energy Commission staff conducted ten Workshops during the 180-day discovery phase; and four PSA Workshops between publication of the PSA in late May 2012 and publication of the FSA in October of 2012. These Workshops allowed parties to the proceeding the opportunity to informally discuss several technical issues related to the proposed project; determine if HHSEGS should be approved for construction and operation; and, if approved, under what set of conditions. These workshops helped inform the discovery and analysis process for the proceeding, and provided the public, parties to the proceeding (including applicant and intervenors), as well as local, state, and federal agencies the opportunity to ask questions about, and provide input on, the proposed project. The Energy Commission issued notices for each of these workshops a minimum of ten days prior to each meeting, and posted them accordingly. Moreover, parties to the proceeding and members of the public were also provided opportunities to keep abreast of the proceeding, and make comments, during seven monthly Status Conferences held by the HHSEGS Committee between January and August of 2012.

INITIAL PUBLIC NOTICE AND OUTREACH

On November 3, 2011, the Energy Commission held a publicly-noticed Informational Hearing at the Tecopa Community Center in Tecopa, Inyo County, California. The hearing followed a Site Visit and brief presentation at the proposed project site. **Executive Summary Figures 1 – 5** provide views from various locations on the proposed project site; these pictures were taken during the November 3, 2011, Site Visit and an earlier October 27, 2012, staff field trip and workshop[5].

ENERGY COMMISSION STAFF'S PUBLIC OUTREACH

Energy Commission staff typically provides formal notices to property owners within 1,000 feet of the proposed site and within 500 feet of a linear facility (such as transmission lines, gas lines and water lines). Staff mailed notices on August 19, 2011, informing the public, agencies, and elected officials of the Commission's receipt and availability of the Application for Certification, 11-AFC-2. Following publication of the Preliminary Staff Assessment on May 24, 2012, notices were likewise distributed informing property owners of the PSA (and June 15, 2012 Supplemental Staff Assessment, which contained the preliminary Cultural Resources staff assessment). Each notice contained a link to the Commission-maintained HHSEGS project website (http://www.energy.ca.gov/sitingcases/hiddenhills/index.html).

[5] tn:62873 11/10/2011, M. Monasmith Photos of 10-27-11 Field Trip and 11-3-11 Site Visit: http://www.energy.ca.gov/sitingcases/hiddenhills/documents/2011-10-27_Field_Trip_and_Site_Visit_Photos.pdf

LIBRARIES

On August 19, 2011, Energy Commission staff also sent paper copies of the Hidden Hills Solar Electric Generating System AFC to the following libraries:

Pahrump Community Library
701 East Street
Pahrump, NV 89048

Barstow Branch Library
304 E. Buena Vista Street
Barstow, CA 92311

Inyo County Library
168 North Edwards Street
Independence, CA 93626

Inyo County Library
410 Hot Springs Rd
Tecopa, CA 92389

Likewise, on June 1, 2012, Energy Commission staff distributed copies of the PSA to the same library list (and also distributed copies of the June 15, 2012 Supplemental Staff Assessment, or "SSA"). In addition to the local libraries listed above, copies of the AFC, PSA and SSA were also made available at the Energy Commission's Library in Sacramento, the California State Library in Sacramento, as well as, state libraries in Eureka, Fresno, Los Angeles, San Diego, and San Francisco.

ENERGY COMMISSION'S PUBLIC ADVISER'S OFFICE

The Energy Commission's outreach program is also facilitated by the Public Adviser's Office (PAO). The PAO requested public service announcements at a variety of organizations, distributed notices informing the public of the Commission's receipt of the HHSEGS Application for Certification (AFC), and invited the public to attend the Public Site Visit (of the proposed HHSEGS site) and Informational Hearing/BLM Scoping Meeting on November 3, 2011 in Tecopa (Inyo County), California.

PUBLIC WORKSHOPS

Staff from the Energy Commission organized and conducted numerous Data Request, Data Response and Issues Resolution and PSA Workshops in the following California communities: Bishop, Shoshone and Tecopa (Inyo County), and Sacramento, California, as well as Pahrump, Nevada. A total of ten publicly-noticed workshops conducted during discovery were held on the following days: October 21 and 27, 2011; November 18, 2011, December 1 and 16, 2011; January 18, 2012; February 22, 2012; April 26 and 27, 2012; and May 9, 2012. PSA Workshops were held on June 14 and June 27, 2012, July 3, 2012 and August 28, 2012. During each of these workshops, specific time for public participation was allocated, and public comments were taken. These workshops provided a public forum for the applicant, interveners, staff and cooperating agencies to interact regarding project issues. Specific information related to the HHSEGS proceeding, including details on public participation, as well as ongoing Committee notices and announcements, can be reviewed at the following Energy Commission website:
http://www.energy.ca.gov/sitingcases/hiddenhills/notices/index.html

AGENCY COORDINATION

On August 19, 2011, the Energy Commission staff sent a notice of receipt and a copy of the HHSEGS Application for Certification to all local, state, and federal agencies that may have an interest in the proposed project. Likewise, on June 1, 2012, Energy Commission staff sent a notice of receipt and copy of the HHSEGS Preliminary Staff Assessment to the same

agency list. These notices sought cooperation and or comments from critical regulatory agencies that administer LORS which may be applicable to the proposed project.

These agencies included the U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service (USFWS), U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, Inyo County, California Department of Transportation, State Water Resources Control Board, Lahontan Regional Water Quality Control Board, California Department of Fish and Game (CDFG), and the California Air Resources Board/Big Basin Air Quality Management District, among others. Staff (particularly the Biological Resources staff) worked collaboratively with the CDFG and the USFWS to evaluate the proposed HHSEGS project, and provided input[6] that informed staff's analyses contained within this Final Staff Assessment.

CONSULTATION WITH LOCAL NATIVE AMERICAN COMMUNITIES

Energy Commission staff conducted pre-filing consultation with several local Native American tribes regarding the proposed HHSEGS project on August 2, 2011, at the Pahrump Community Library in Pahrump, Nevada. The meeting was designed to seek comments and input on the proposed project, and served as an early invitation for tribes to consult on the project before it was officially filed with the Energy Commission. Following written and verbal correspondence between staff and tribal representatives, additional meetings occurred with tribal representatives in December, 2011 and January, 2012. Following the January 19, 2012, meeting in Shoshone, California, Energy Commission staff ethnographer, Dr. Thomas Gates, embarked on a series of in-depth meetings and interviews with members of the local Pahrump Paiute tribe to document the stories, songs and history of Native American life for the project site and the larger project area. These accounts are provided in the **Cultural Resources** section of this document.

RESPONSE TO COMMENTS

Thirteen organizations, including public agencies; members of the public; intervenors; and the applicant, BrightSource Energy, LLC, submitted comments on the May 24, 2012, Preliminary Staff Assessment (PSA). A Supplemental Staff Assessment (SSA) containing staff's preliminary **Cultural Resources** analysis was subsequently published on June 15, 2012. The deadline for submitting comments on both the PSA and SSA was July 23, 2012.

Comments were received from three public agencies -- Inyo County (Inyo Co.), U.S. Bureau of Land Management (BLM) and the National Park Service (NPS); and three conservation organizations — the Amargosa River Conservancy (Amarg. River), The Nature Conservancy (TNC), and Basin and Range Watch (Basin & Range Watch). Several Native American organizations also submitted comments, including Richard Arnold (now an Intervenor in the Hidden Hills SEGS proceeding), Pahrump Paiute Tribe (Paiute Tribe) and the Big Pine Paiute Tribe of the Owens Valley (Big Pine Tribe). Intervenors submitting comments (in addition to Richard Arnold) include the Center for Biological Diversity (CBD), Cindy

[6] Several Records of Conversation (ROC) reflect the high-level of information exchange between USFWS and CDFG staff biologists and Energy Commission staff: http://www.energy.ca.gov/sitingcases/hiddenhills/documents/roc/

MacDonald (Cindy Mac) and the Old Spanish Trail Association (OSTA). The final commenter listed in **Table 2** below is the applicant, BrightSource Energy, LLC (BSE). Following submission of the comment letters, staff bracketed each letter in order to highlight the pertinent questions and issues for review. The comment letters can be reviewed in **Appendix RTC**.

Table 2
Response to PSA Comments Matrix

	Inyo Co.	BLM	NPS	Amarg. River	TNC	Basin & Range Watch	Richard Arnold	Paiute Tribe	Big Pine Tribe	CBD	Cindy Mac	OSTA	BSE	TOTALS:
AQ/GHG	3										105		44	**152**
Alts				2		6			1	8	4		62	**83**
Bio	20	1		1	2	15	1	1	2	36	7		176	**262**
Cultural	2		1	1		2	5	7	6	6		7	76	**113**
Haz Mat											6		6	**12**
Land Use	7										10		36	**53**
Proj. Desc	4										10		12	**26**
Socio	40			1		3	3		1	2	13		64	**127**
Soils	1	2									62		12	**77**
TSLN													8	**8**
Traffic	7										3		27	**37**
Public Health											16		6	**22**
Visual	2			1		16		1			13		60	**93**
Waste	3										30		8	**41**
WS/FP											1		7	**8**
Water	11	7		7	21	6		1	1	3	31		79	**167**
Efficiency													10	**10**
Facility Design											18		3	**21**
Geo/Paleo													27	**27**
Noise	1										18			**19**
Reliability													2	**2**
TSE											6		5	**11**
TOTALS:	**101**	**10**	**1**	**13**	**23**	**48**	**9**	**10**	**11**	**55**	**353**	**7**	**730**	**1371**

Environmental Justice

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," focuses federal attention on the environment and human health conditions of minority communities and calls on federal agencies to achieve environmental justice as part of its mission. The order requires the United States Environmental Protection Agency (EPA) and all other federal agencies to develop strategies to address this issue. The agencies are required to identify and address any disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority or low-income populations. Some agencies have also interpreted this order as applying to state agencies that receive federal funding. Energy Commission staff assumes that the order applies, and conducts its analysis accordingly.

Environmental Justice: Guidance Under the National Environmental Policy Act, defines minority individuals as members of the following groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic. The focus of the screening analysis under the guidance is to determine whether there is a minority/low income population adversely affected by a project that is greater than fifty percent or when the minority population percentage is "meaningfully greater" than that of the population in the general population or other appropriate unit of geographic analysis (please see **Socioeconomics Figure 1**). *Final Guidance for Incorporating Environmental Justice Concerns in EPA's Compliance Analyses* (US EPA 1998) also encourages including outreach to community-based organizations and tribal governments early in the screening process, in order to identify the presence of distinct minority communities residing both within, and in close proximity to, the proposed project. It also identifies those minority groups that utilize or are dependent upon natural and cultural resources that could be potentially affected by the proposed action.

In addition to the demographic screening analysis, staff follows the steps recommended by the U.S. EPA's guidance documents in regard to outreach and involvement, and if warranted, a detailed examination of the distribution of impacts on segments of the population. Under this federal approach, staff determined that the minority population identified in **Socioeconomics Figure 1** does not constitute an environmental justice population. Accordingly, no further environmental justice analyses are necessary.

CUMULATIVE EFFECTS

Staff conducted an extensive search of past, present, and reasonably foreseeable "probable" future projects in Inyo County (CA), Pahrump Valley (CA and NV), Mesquite Valley (CA), Ivanpah Valley (CA and NV), and Piute Valley (NV) (see **Cumulative Effects Figure 1**). Staff reviewed project tracking information and available environmental reports and notices through various resources, including websites of local, regional and state jurisdictions and the U.S. Bureau of Land Management (CA and NV). Additionally, staff queried project managers from various California and Nevada public agencies to compile a comprehensive list of past, present and probable future projects that resulted in a full list of cumulative projects. **Table 3** below presents a master list of the projects considered part of the HHSEGS cumulative setting.

The State CEQA Guidelines define cumulative impacts as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." (Cal. Code Regs., tit. 14, § 15355.) The CEQA Guidelines continue: (a) "[t]he individual effects may be changes resulting from a single project or a number of separate projects" and (b) "[t]he cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time." (*Ibid*.)

Accordingly, staff in each technical section of this FSA determined which of the "closely related" projects from the Cumulative Projects list could create impacts specific to their technical area or discipline. Staff developed lists for each discipline, then evaluated whether the cumulative effect(s) were significant, and if so, whether the proposed project's contribution to that combined effect would be "cumulatively considerable."[7]. Therefore, this FSA attempts to analyze the impacts of all aspects and phases of HHSEGS, including the combined effect the proposed project would have in conjunction with other projects.

Table 3
Hidden Hills Master List of Cumulative Projects

Project Name; Agency ID	Location	Ownership	Status	Project Description
St. Therese Mission	881 E. Old Spanish Hwy, approx. 1.5 miles west of CA/NV border along Tecopa Road.	Magnificat Ventures Corporation, Las Vegas, NV	Inyo Co. approved June 2010	17.5 acre environmental park, memorial and internment center
Pahrump Airport	Pahrump, NV	Nye County	EIS in preparation	The Town of Pahrump, Nevada, proposes to lease approx. 650 acres of Bureau of Land Management (BLM) - managed public land to build and operate a new public-use, general aviation airport in the southwest portion of the town.
Element Solar (NVN 089655)	Pahrump Valley, 6 ½ miles north of proposed HHSEGS in NV	First Solar Development	POD	100 megawatt (MW) Photovoltaic (PV) project 2,560 acres land requested
Amargosa Farm (NVN 084359)	80 miles northwest of Las Vegas, in the Amargosa Valley in Nye County, NV	Solar Millennium	On hold	Two 250 MW dry-cooled solar power plants (parabolic solar trough) equipped with thermal energy storage on 4,350 acres of BLM-administered property. http://www.blm.gov/nv/st/en/fo/lvfo/blm_programs/energy/proposed_solar_millenium.html
PSI Amargosa PV Solar Project (NVN 084465)	South of Amargosa Valley, Nye County, NV	Pacific Solar Investments, Inc. (Iberdrola)	Public Scoping	150 MW solar PV project with a developed area of 1,700 acres of BLM-managed lands in Nye County, Nevada. No water or fuel required to operate PV solar systems according to Pacific Solar Investments. http://www.blm.gov/nv/st/en/fo/lvfo/blm_programs/energy/PSI_Amargosa_PV_Solar_Project.html
Silver State South Solar Project (NVN 089530, NVN 085801)	Just south of Primm, NV, on the CA/ NV border	First Solar Development	Record of Decision, 10/12/10	350 MW solar PV project located on approximately 2,900 of public land administered by the Bureau of Land Management (BLM) in Clark County, Nevada near Primm. The project consists of Phases II and III. http://www.blm.gov/nv/st/en/fo/lvfo/blm_programs/energy/nextlight_renewable0.html

[7] "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects. (Cal.Code Regs., tit. 14, section 15064, subd. (h)(1).)

Project Name; Agency ID	Location	Ownership	Status	Project Description
Stateline Solar Farm (CACA 048669)	Just south of Primm, NV, on the CA/ NV border	First Solar Development	DEIS pending	300 MW solar PV project in Eastern San Bernardino County, two miles southwest of the CA/NV border on 2,114 acres of Federal land managed by the BLM. http://www.blm.gov/ca/st/en/prog/energy/fasttrack/stateline/fedstatus.html
Sandy Valley (NVN 090476)	Clark Co., NV, approx. 8 miles southeast of proposed HHSEGS near Highway 160	Bright Sources Energy Solar Partners	POD	750 MW, 170 AFY, 15,190 acres http://wilderness.org/files/Joint-Comments-on-the-Supplement-to-the-Draft-Solar-PEIS.pdf A BrightSource Energy project to use proprietary solar "power tower" technology.
Searchlight Wind Energy (NVN 084626)	Searchlight, NV	Duke Energy	Draft EIS published Jan. 2012	200 MW wind energy facility consisting of up to 140 wind turbine generators (maximum 427.5 ft. tall) located on 18,949 acres of both private and BLM-administered lands in the Eldorado Mountains. http://www.blm.gov/nv/st/en/fo/lvfo/blm_programs/energy/searchlight_wind_energy.html
Southern Owens Valley Solar Ranch	Southern Owens Valley in Inyo County	LADWP	DEIS being prepared	200 MWs of solar photovoltaic electrical energy and associated equipment within a 3,100-acre area in the southern Owens Valley in Inyo County.
Lathrop Wells Solar (NVN 086571)	Amargosa Valley, Nye Co, NV	Abengoa Solar	DEIS pending	Phase I – 250 MW, Phase II – 250 MW. 5,336 acres. CSP/Trough. http://www.blm.gov/nv/st/en/fo/lvfo/blm_programs/energy/Lathrop_Wells_Solar.html
Table Mountain (NVN 073726)	Clark County, NV	Table Mountain Wind, LLC.	Renewal, testing	205 MW, 15 MET towers/turbines, 8,300 acres BLM land, 249 disturbed acres. http://www.blm.gov/pgdata/etc/medialib/blm/nv/energy.Par.56189.File.dat/renewable_energy_project_table_feb2011.pdf
South Solar Ridge (NVN 086782)	Clark/Nye counties, NV	Southwest Solar Land Co (First Solar)	POD	50 MW PV project on 530 acres. http://www.blm.gov/pgdata/etc/medialib/blm/nv/energy.Par.56189.File.dat/renewable_energy_project_table_feb2011.pdf
Hidden Hills Valley Electric Transmission Project (NVN 089669)	Clark County, NV	Valley Electric Association	DEIS pending (BLM lead)	A new 10-acre 230/500 kV Substation located immediately northeast of the existing VEA 138 kV and VEA 230 kV transmission line alignments adjacent to Highway 160. Approximately 9.7 miles of new 230 kV single circuit transmission line from the HHSEGS project site to the new Substation. Approximately 53.7 miles of new 500 kV Transmission Line from the Tap Substation to the existing Eldorado Substation. http://www.blm.gov/nv/st/en/fo/lvfo/blm_programs/energy/hidden_hills_transmission.html
Calnev Pipeline Expansion Project	Counties of San Bernardino, CA and Clark, NV, plus various cities along the Interstate 15 corridor from Colton, CA to Las Vegas, NV	Kinder Morgan Energy Partners, LP	DEIS/DEIR published March 2012	Add an additional refined petroleum products pipeline in CA and Nevada, to expand the capacity of the Calnev Pipeline System. The project would involve the construction, operation, and maintenance of a new 16-inch-diameter, 233-mile long pipeline and ancillary facilities from an existing facility in Colton to McCarran International Airport in Las Vegas.

Alternatives Summary

Section 15126.6(a) of the State CEQA Guidelines indicates that the alternatives analysis must "describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives." CEQA also requires (1) evaluation of a "no-project alternative," (2) identification of alternatives that were initially considered but then rejected

from further evaluation, and (3) identification of the "environmentally superior alternative" among the other alternatives (Cal. Code Regs., tit. 14, §15126.6).

Staff reviewed many potentially feasible off-site alternatives and alternative renewable technologies during the effort to determine the scope and content of the alternatives analysis. That review led to selection by staff of these six project alternatives for CEQA analysis and comparison to the proposed HHSEGS project:

- No-Project Alternative
- Sandy Valley Off-site Alternative (same technology as the proposed project)
- Solar Power Tower with Energy Storage Alternative (at the proposed HHSEGS site)
- Solar Photovoltaic Alternative (at the proposed HHSEGS site)
- Parabolic Trough Alternative (at the proposed HHSEGS site)
- Reduced Acreage Alternative

Staff's alternatives analysis includes an assessment of the potential for each project alternative to attain the basic project objectives and identifies potential feasibility issues.

The primary environmental benefits of the Solar Photovoltaic (PV) Alternative compared to the proposed project are reduced impacts on Water Supply, Visual Resources, and Cultural Resources. The Solar PV Alternative would also reduce the potential for avian species to collide with project structures and eliminate the potential for mortality from exposure to concentrated solar flux. Staff concludes that the Solar PV Alternative would be environmentally superior to the proposed project. A full analysis of the environmentally superior alternative that compares the effects of each of the project alternatives to the proposed HHSEGS project is included in the **Alternatives** section of this final staff assessment.

FINAL STAFF ASSESSMENT CONCLUSIONS

Each technical area section of the FSA contains a discussion of the project setting, impacts, findings of fact, and where appropriate, mitigation measures and conditions of certification. The FSA includes staff's assessment of these aspects of the proposed project:

- the environmental setting of the proposal;
- impacts on public health and safety, and measures proposed to mitigate these impacts;
- environmental impacts, and measures proposed to mitigate these impacts;
- the engineering design of the proposed facility, and engineering measures proposed to ensure construction and operation of the proposed project could be accomplished safely and reliably;
- project closure;
- project alternatives;
- compliance of the project with all applicable laws, ordinances, regulations and standards (LORS) during construction and operation;

- environmental justice for minority and low income populations, when appropriate; and
- proposed conditions of certification.

Staff has prepared its final analyses and made proposed findings and recommendations for all technical areas. These proposed findings followed the publication of staff's Preliminary Staff Assessment (PSA) on May 24, 2012. As indicated above, staff conducted four public PSA workshops in the months following the PSA's release: on June 14, 2012 in Pahrump, Nevada (discussions included Traffic & Transportation, Water Supply, Worker Safety / Fire Protection and Visual Resources); on June 27, 2012 in Bishop, California (discussions included Biological Resources, Socioeconomics, Air Quality and Public Health); July 3, 2012 in Sacramento, California (discussions included Alternatives, Biological Resources, Cultural Resources and Transmission System Engineering); and, August 28, 2012 (joint workshop focused on solar flux / avian impacts). As a result of these PSA Workshops, and PSA Comments received, staff developed additional analyses and recommended mitigation measures in critical technical areas. These new analyses and recommendations include Biological Resources (solar flux impacts detailed in **Appendix BIO-1** and **Appendix BIO-2**), and Worker Safety / Fire Protection and Socioeconomics (Emergency Services impacts and mitigation measures related to Southern Inyo Fire Protection District).

Based upon the information provided, discovery achieved and analyses completed, staff concludes that the HHSEGS project does not comply with all applicable laws, ordinances, regulations and standards (LORS). Specifically, there is non-compliance, or potential non-compliance, for **Biological Resources** (prohibited take of fully protected golden eagle), **Land Use** ((County of Inyo General Plan, Zoning Ordinance and Renewable Energy Ordinance [Title 21])), and **Visual Resources** (several applicable goals and policies of the Inyo County General Plan and Renewable Energy Ordinance, Title 21).

With the implementation of its recommended mitigation measures (described in each technical section's conditions of certification), potential environmental impacts of the project will be mitigated to levels of less than significant, except in four technical areas: Biological Resources, Cultural Resources, Land Use and Visual Resources. Furthermore, in the areas of Biological Resources, Cultural Resources, and Visual Resources, staff concludes that even with implementation of all feasible mitigation measures, impacts on certain environmental resources would remain significant and unavoidable, As indicated in **Table 4**, below, the technical disciplines where issues exist (with LORS compliance and/or significant impacts determinations and mitigation):

> **Biological Resources:** staff concludes that with implementation of proposed conditions of certification, the project could comply with all federal laws, ordinances, regulations, and standards (LORS) protecting Golden Eagle and migratory birds. Most direct, indirect, and cumulative impacts on biological resources would be avoided, minimized, or mitigated to less than significant levels. Desert tortoise is the only state and federally listed endangered species that would be taken by the proposed project; these impacts can be fully mitigated with the mitigation proposed. Waters of the U.S. and waters of the state would be directly impacted by the proposed project, but these impacts would be reduced to less than significant with implementation of conditions of certification.

Feasible mitigation measures are recommended by staff to lessen impacts on avian species from exposure to solar flux and potential collisions with project features. However, impacts on avian species are still considered significant and unavoidable. Staff is undetermined whether the project complies with state law preventing the "take" of "fully protected" species such as golden eagle.

Cultural Resources: Staff concludes there would be significant and unavoidable impacts to several historical resources, including: an archaeological landscape (the Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape); three ethnographic landscapes (the Salt Song Landscape, Pahrump Paiute Home Landscape and Ma-hav Landscape); and, a historic transportation corridor (Old Spanish Trail–Mormon Road Northern Corridor). Feasible mitigation measures for impacts on these historical resources would reduce some of the impacts of the proposed project, but not to a less than significant level.

Land Use: Staff concludes that the HHSEGS project would not be consistent with the County of Inyo General Plan, Zoning Ordinance and Renewable Energy Ordinance; the proposed project conflicts with these applicable land use plans. Staff has determined that the substantial size of the project, the degree of variation from local planning designations, and the presence of other potential impacts is a conflict with these LORS, and therefore causes a significant environmental impact under CEQA Guidelines Appendix G (Land Use and Planning).

Visual Resources: Staff concludes that the proposed project would substantially degrade the existing visual character or quality of the site and its surroundings. After implementing all recommended conditions of certification, the proposed project would still have significant and unavoidable direct and cumulative visual impacts. Staff also concludes that the project would not be consistent with several applicable goals and policies of the Inyo County General Plan and Renewable Energy Ordinance.

Table 4

Summary of HHSEGS FSA Technical Analyses

Technical Area	Complies with LORS	Impacts Fully Mitigated
Air Quality / GHG	Yes	Yes
Alternatives	Not Applicable	Not Applicable
Biological Resources	**Undetermined**	**NO**
Cultural Resources	Yes	**NO**
Efficiency	Not Applicable	Not Applicable
Facility Design	Yes	Yes
Geology and Paleontology	Yes	Yes

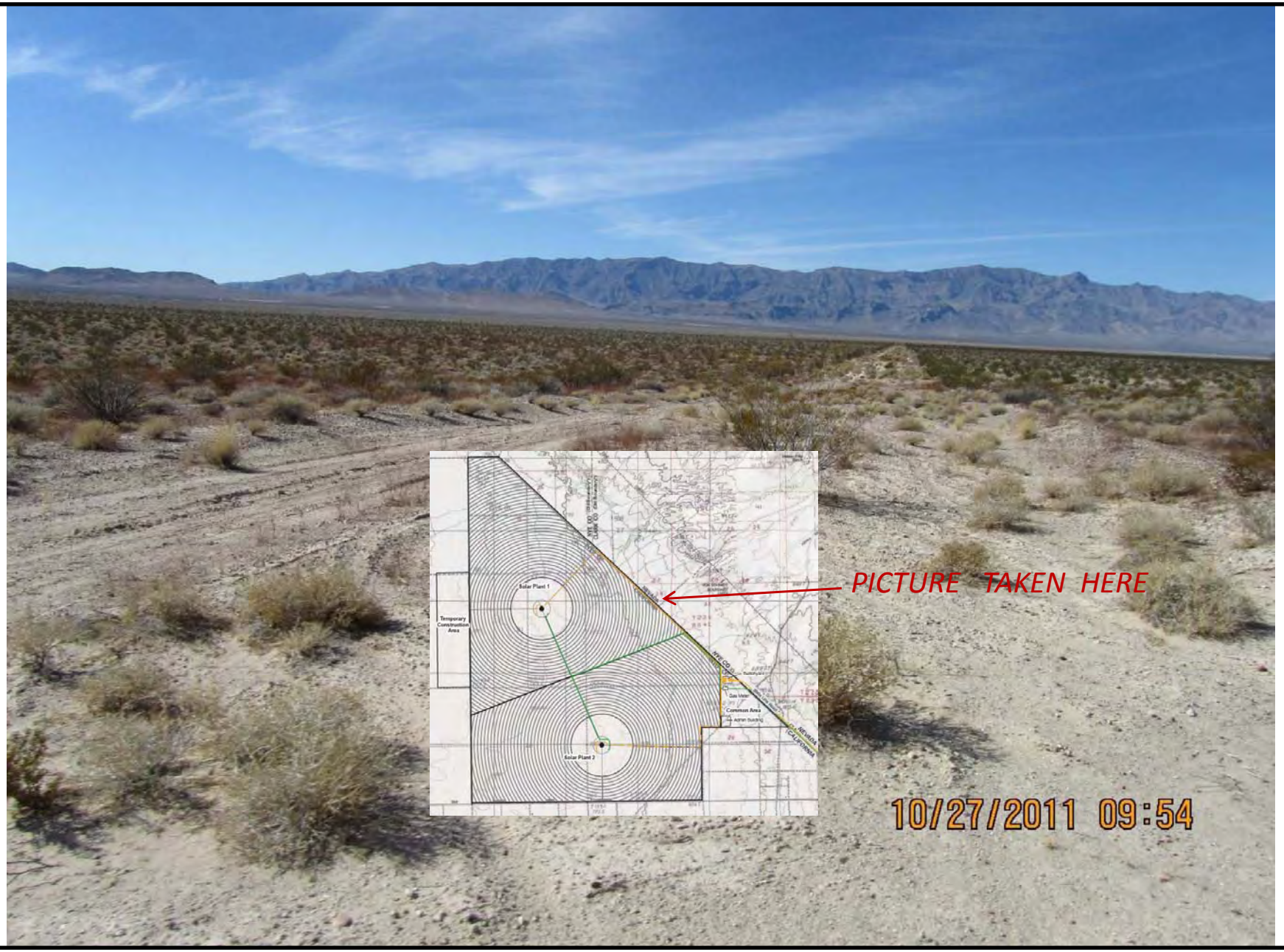
Technical Area	Complies with LORS	Impacts Fully Mitigated
Hazardous Materials Management	Yes	Yes
Land Use	**NO**	**NO**
Noise and Vibration	Yes	Yes
Public Health	Yes	Yes
Reliability	Not Applicable	Not Applicable
Socioeconomics	Yes	Yes
Soils and Surface Water	Yes	Yes
Traffic and Transportation	Yes	Yes
Transmission Line Safety and Nuisance	Yes	Yes
Transmission System Engineering	Yes	Yes
Visual Resources	**NO**	**NO**
Waste Management	Yes	Yes
Water Supply	Yes	Yes
Worker Safety and Fire Protection	Yes	Yes

SUMMARY

Staff has concluded that the proposed Hidden Hills Solar Electric Generating System does not comply with all applicable LORS, and will have significant impacts to the environment after the implementation of all feasible mitigation. If the Commission certifies the project, it must find that the project would not have significant impacts on the environment or make "overriding findings" that the benefits of the project outweigh the unavoidable significant adverse environmental effects that may be caused by the construction and operation of the facility. Moreover, for those areas not in compliance with LORS, the Commission must make specific findings of "public convenience and necessity".

EXECUTIVE SUMMARY - FIGURE 1

Hidden Hills Solar Electric Generating System (HHSEGS) - Looking west from the CA/NV border towards the Project site, with the Nopah Range in the distance. Overgrown road indicates sub-divided parcels for previously planned housing development.

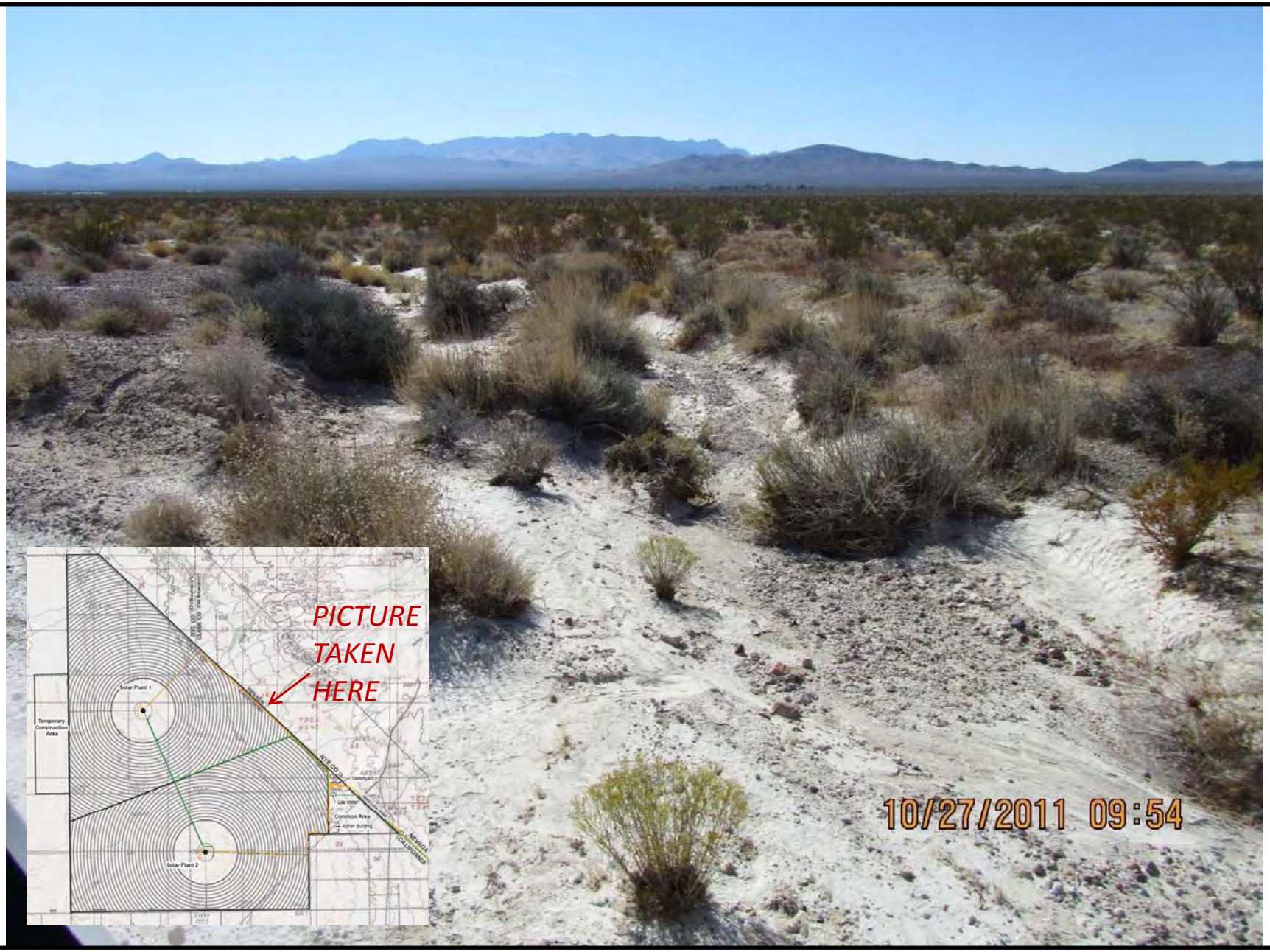


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: tn:62873 M. Monasmith Photos

EXECUTIVE SUMMARY - FIGURE 2

Hidden Hills Solar Electric Generating System (HHSEGS) - Looking south over the Project site with the Charleston View community and the Kingston Mountain Range in the distance. Pictured is a weakly braided ephemeral wash, which appeared on the western border of Solar Plant 1 running along the CA/NV border.

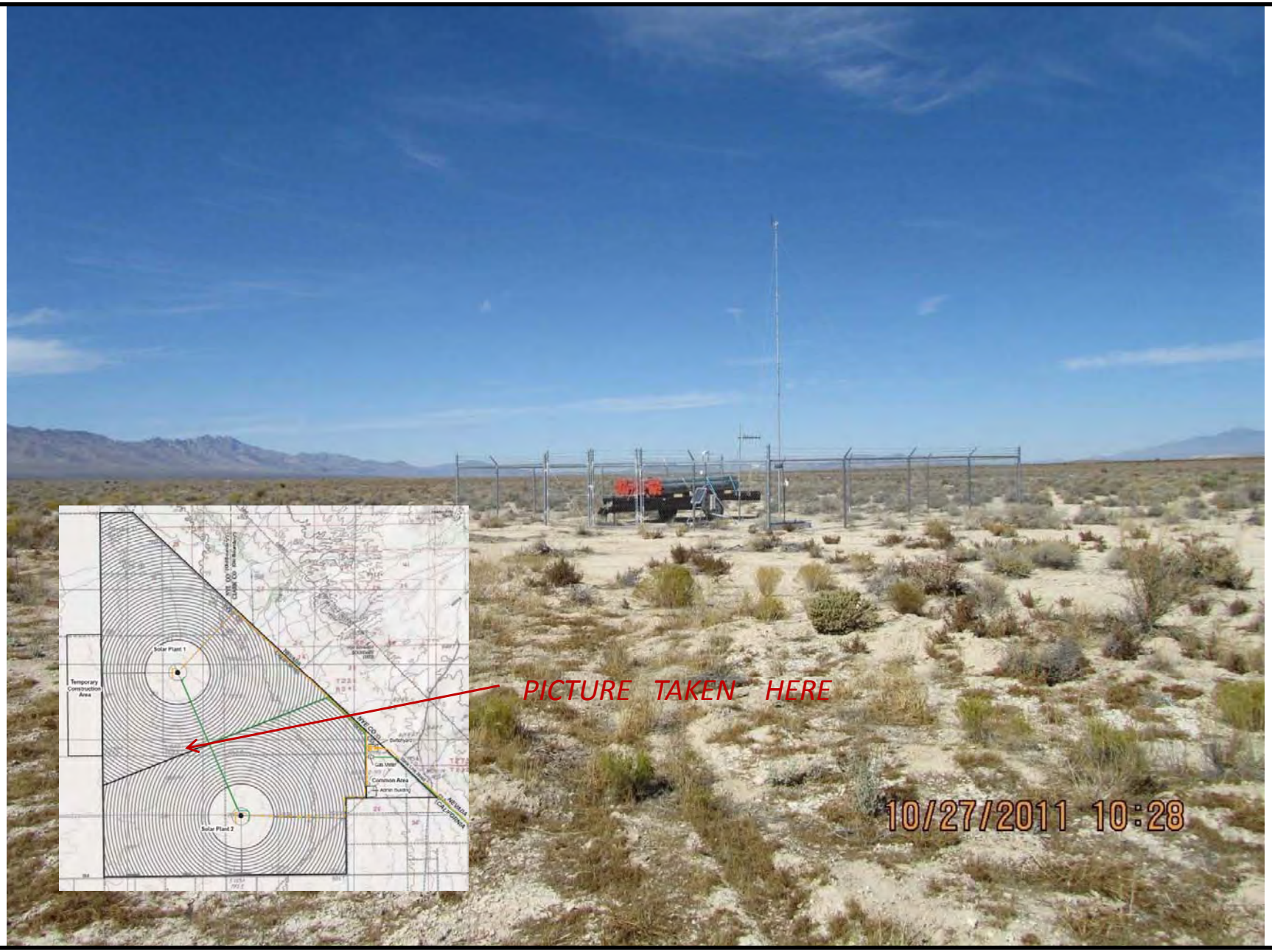


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: tn:62873 M. Monasmith Photos

EXECUTIVE SUMMARY - FIGURE 3

Hidden Hills Solar Electric Generating System (HHSEGS) - Looking north at BrightSource's Meteorological/Weather Station, located along boundary area between Solar Plant 1 and Solar Plant 2.



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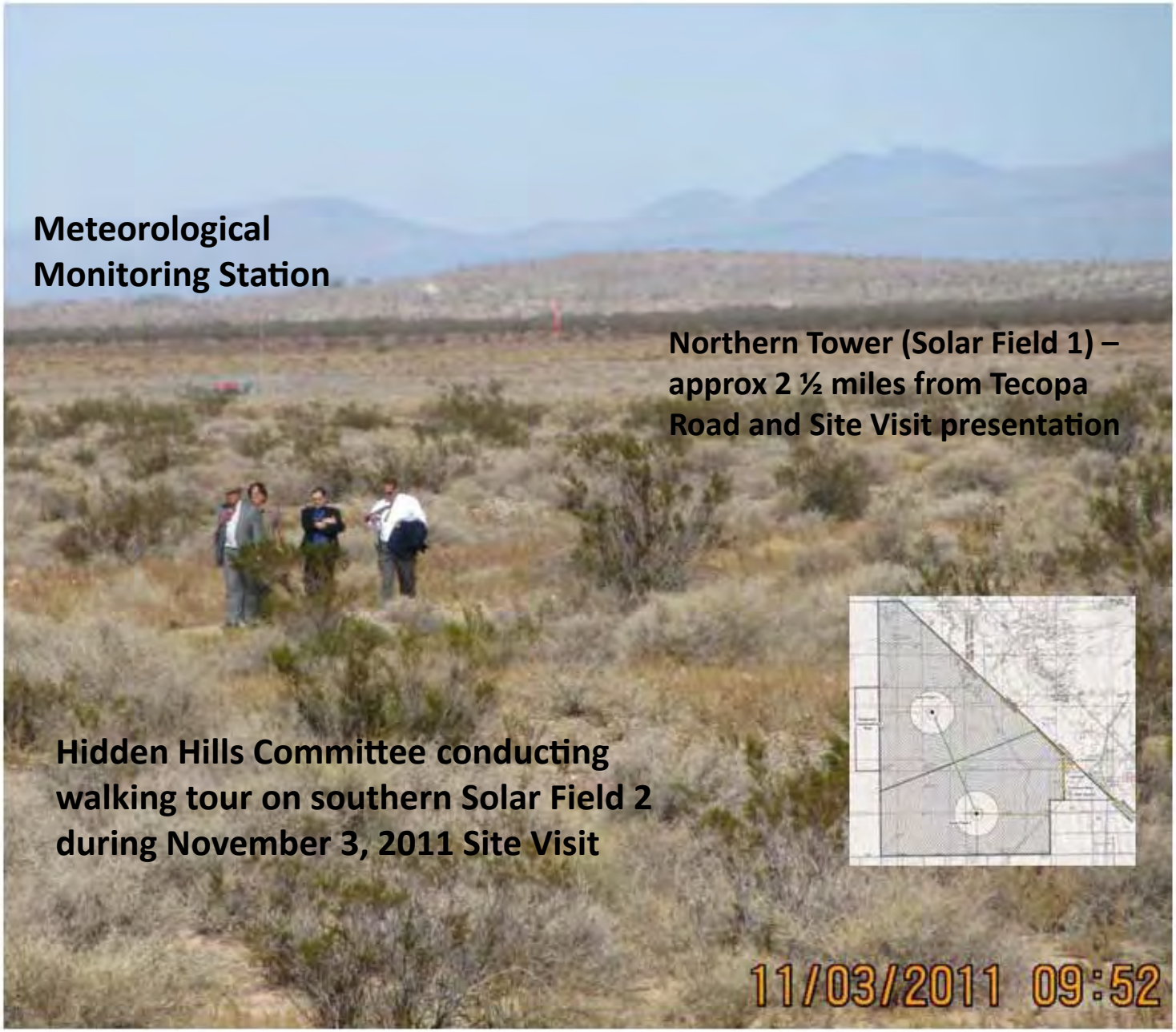
SOURCE: tn:62873 M. Monasmith Photos

EXECUTIVE SUMMARY - FIGURE 4

Hidden Hills Solar Electric Generating System (HHSEGS) - Site Visit November 3rd, 2011



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: tn:62873 M. Monasmith Photos

CUMULATIVE PROJECTS - FIGURE 1

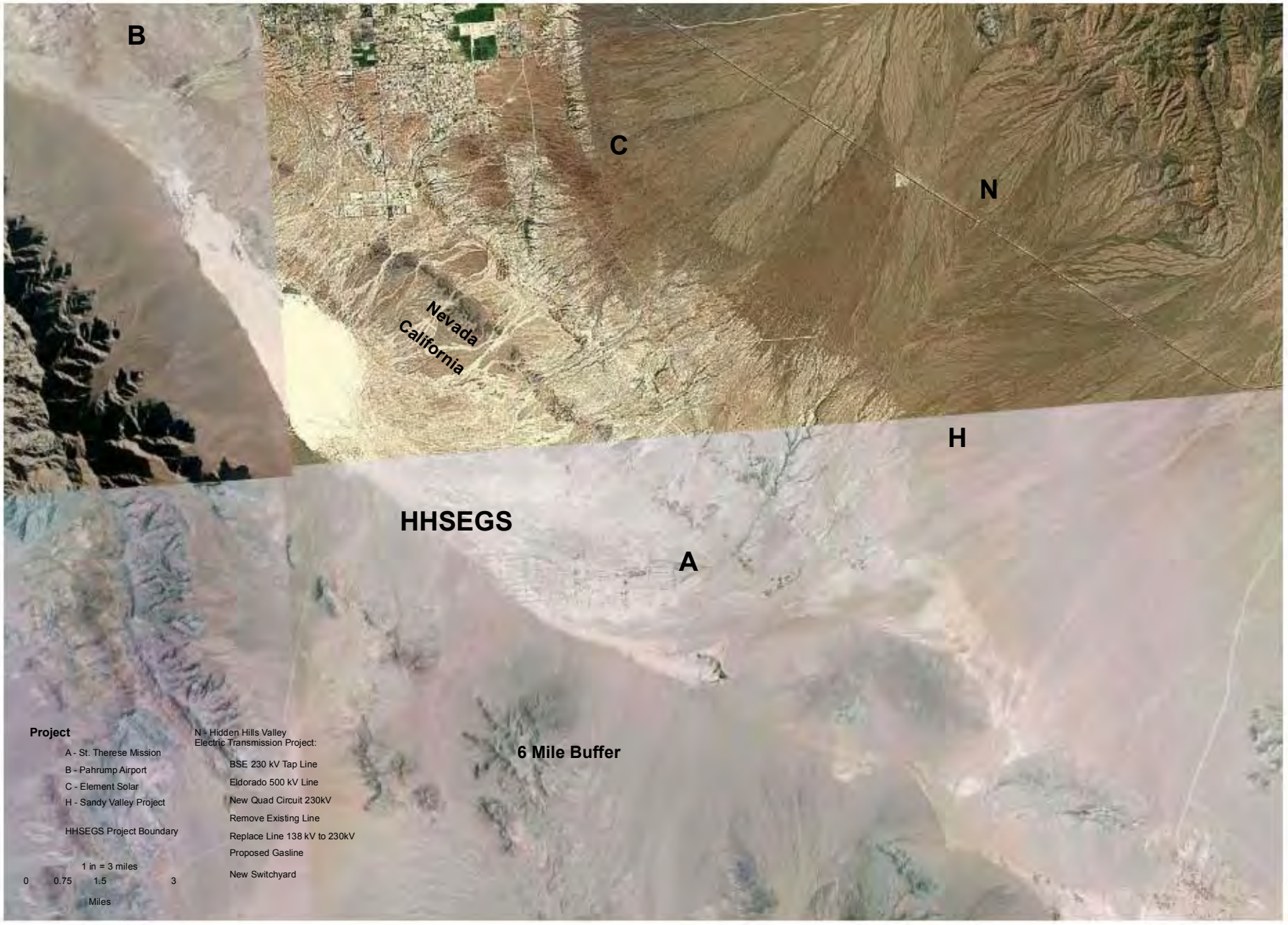
Hidden Hills Solar Electric Generating System (HHSEGS) - Master List of Cumulative Projects

CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: BLM Southern Nevada District - Renewable Energy in Southern Nevada, BLM California - Renewable Energy Priority Projects, and Los Angeles Department of Water and Power.

CUMULATIVE PROJECTS - FIGURE 2

Hidden Hills Solar Electric Generating System (HHSEGS) - Cumulative Projects within a Six Mile Buffer of HHSEGS Boundary



CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: BLM Southern Nevada District - Renewable Energy in Southern Nevada, BLM California - Renewable Energy Priority Projects, and Los Angeles Department of Water and Power.

INTRODUCTION

PURPOSE OF THIS REPORT

This Final Staff Assessment (FSA) is the California Energy Commission staff's independent analysis of the proposed Hidden Hills Solar Electric Generating System (here after referred to as HHSEGS). This FSA is a staff document. It is neither a Committee document, nor a draft decision. The FSA describes the following:

- the proposed project;
- the existing environment;
- whether the facilities can be constructed and operated safely and reliably in accordance with applicable laws, ordinances, regulations and standards (LORS);
- the environmental consequences of the project including potential public health and safety impacts;
- the potential cumulative impacts of the project in conjunction with other existing and known planned developments;
- mitigation measures proposed by the applicant, staff, interested agencies, local organizations and intervenors which may lessen or eliminate potential impacts;
- the proposed conditions under which the project should be constructed and operated, if it is certified; and
- project alternatives.

The analyses contained in this FSA are based upon information from the: 1) Application for Certification (AFC), 2) responses to data requests, 3) supplementary information from local, state, and federal agencies, interested organizations and individuals, 4) existing documents and publications, 5) independent research, and 6) comments at public workshops. The analyses for most technical areas include discussions of proposed conditions of certification. Each proposed condition of certification is followed by a proposed means of "verification." The FSA presents staff's testimony about potential environmental impacts and conformity with LORS, as well as proposed conditions that apply to the design, construction, operation and closure of the facility.

The Energy Commission staff's analyses were prepared in accordance with Public Resources Code section 25500 et seq. and Title 20, California Code of Regulations section 1701 et seq., and the California Environmental Quality Act (CEQA) (Pub. Resources Code, §21000 et seq.)

ORGANIZATION OF THE FINAL STAFF ASSESSMENT

The FSA contains an Executive Summary, Introduction, Project Description and Project Alternatives. The environmental, engineering, and public health and safety analysis of the proposed project is contained in a discussion of 20 technical areas. Each

technical area is addressed in a separate chapter. They include the following: 1) air quality/greenhouse gas; 2) biological resources; 3) cultural resources; 4) facility design; 5) geology and paleontology; 6) hazardous materials management; 7) land use; 8) noise and vibration; 9) power plant efficiency; 10) power plant reliability; 11) public health; 12) socioeconomics; 13) soils and surface water; 14) traffic and transportation; 15) transmission line safety and nuisance; 16) transmission system engineering; 17) visual resources; 18) waste management; 19) water supply; and, 20) worker safety and fire protection; These chapters are followed by a discussion of facility closure, project construction and operation compliance monitoring plans called "General Conditions", and a list of staff that assisted in preparing this report.

Each of the 20 technical area assessments includes a discussion of:

- laws, ordinances, regulations and standards (LORS);
- the regional and site-specific setting;
- project specific and cumulative impacts;
- mitigation measures;
- conclusions and recommendations; and
- conditions of certification for both construction and operation (if applicable).

ENERGY COMMISSION SITING PROCESS

The Energy Commission has the exclusive authority to certify the construction, modification and operation of thermal electric power plants 50 megawatts (MW) or larger. The Energy Commission certification is in lieu of any permit required by state, regional, or local agencies, and federal agencies to the extent permitted by federal law (Pub. Resources Code, §25500). The Energy Commission must review power plant AFCs to assess potential environmental impacts including potential impacts to public health and safety, potential measures to mitigate those impacts [Pub. Resources Code, §25519), and compliance with applicable governmental laws or standards (Pub. Resources Code, §25523 (d)].

The Energy Commission's siting regulations require staff to independently review the AFC and assess whether the list of environmental impacts contained is complete, and whether additional or more effective mitigation measures are necessary, feasible and available [Cal. Code Regs., tit. 20, §§1742 and 1742.5(a)]. In addition, staff must assess the completeness and adequacy of the measures proposed by the applicant to ensure compliance with health and safety standards, and the reliability of power plant operations [Cal. Code Regs., tit. 20, §1743(b)]. Staff is required to develop a compliance plan (coordinated with other agencies) to ensure that applicable laws, ordinances, regulations and standards are met [Cal. Code Regs., tit. 20, §1744(b)].

Staff conducts its environmental analysis in accordance with the requirements of CEQA. No additional Environmental Impact Report (EIR) is required because the Energy Commission's site certification program has been certified by the California Resources Agency as meeting all requirements of a certified regulatory program [Pub. Resources

Code, §21080.5 and Cal. Code Regs., tit. 14, §15251 (j)]. The Energy Commission is the CEQA lead agency.

Staff prepares a FSA that presents for the applicant, intervenors, organizations, agencies, other interested parties and members of the public, the staff's analysis, conclusions, and recommendations. Where it is appropriate, the PSA incorporates comments received from agencies, the public and parties to the siting case, comments made at the workshops, and Preliminary Staff Assessment (PSA) comments.

Staff provided a comment period following publication of the PSA to resolve issues between the parties and to narrow the scope of adjudicated issues in the evidentiary hearings. During the period after the publishing of the PSA, staff conducted three community workshops to discuss its findings, proposed mitigation, and proposed compliance-monitoring requirements. Based on the workshops and written comments, staff refined its analysis, corrected errors, and finalized conditions of certification to reflect areas where agreements had been reached with the parties, and now publishes its Final Staff Assessment (FSA).

The FSA is only one piece of evidence that will be considered by the Committee (consisting of two Commissioners who have been assigned to this project, and a Hearing Officer) in reaching a decision on whether or not to recommend that the full, five-member Energy Commission approve the proposed project. At public hearings that will be conducted following publication of the FSA, all parties will be afforded an opportunity to present evidence and to rebut the testimony of other parties, thereby creating a hearing record on which a decision on the project can be based. The hearing before the Committee also allows all parties to argue their positions on disputed matters, if any, and it provides a forum for the Committee to receive comments from the public and other governmental agencies.

Following the hearings, the Committee's recommendation to the full Energy Commission on whether or not to approve the proposed project will be contained in a document entitled the Presiding Member's Proposed Decision (PMPD). Following publication, the PMPD is circulated in order to receive written public comments. At the conclusion of the comment period, the Committee may prepare a revised PMPD. At the close of the comment period for the revised PMPD, the PMPD is submitted to the full Energy Commission for a decision.

AGENCY COORDINATION

As noted above, the Energy Commission certification is in lieu of any permit required by state, regional, or local agencies, and federal agencies to the extent permitted by federal law (Pub. Resources Code, § 25500). However, the Commission typically seeks comments from and works closely with other regulatory agencies that administer LORS that may be applicable to proposed projects. These agencies may include as applicable the U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, U.S. Bureau of Land Management, California State Lands Commission, State Water Resources Control Board/Regional Water Quality Control

Board, California Department of Fish and Game, and the California Air Resources Board.

OUTREACH

The Energy Commission's outreach program is primarily facilitated by its Public Adviser's Office (PAO). This is an ongoing process that provides a consistent level of public outreach, regardless of outreach efforts conducted by the applicant or other parties.

On June 1, 2012, the Energy Commission staff sent the HHSEGS PSA to public libraries in Pahrump and Las Vegas, Nevada, as well as public libraries in Barstow, Bishop, Independence and Tecopa, California. The documents were also sent to state libraries in Eureka, Fresno, Los Angeles, Sacramento, San Diego, and San Francisco.

The PAO's public outreach work is an integral part of the Energy Commission's AFC review process. The PAO reviewed information provided by the applicant and also conducted its own outreach efforts to identify any "sensitive receptors" (including schools, community, cultural and health facilities, daycare and senior-care centers, as well as environmental and ethnic organizations) within a six-mile radius of the proposed site for the project. If present, these sensitive receptors, especially elementary schools, are contacted and kept informed of Energy Commission proceedings through PAO outreach. The PAO also works with the siting division and the governmental affairs office to identify and contact local elected and appointed officials from the area.

The PAO provided notification by letter and enclosed notice of the November 3, 2011 Informational Hearing and Site Visit, held at the Tecopa Community Center in Tecopa, California. Notices were distributed to local residences and community organizations as well as representatives of environmental, Native American, and certain public interest and regulatory organizations with an expressed or anticipated interest in this project. Also, elected and certain appointed officials from Inyo County (California) and Nye County (Nevada) were similarly notified of the hearing and site visit.

Energy Commission regulations require staff to notice, at a minimum, property owners within 1,000 feet of a project and 500 feet of a linear facility (such as transmission lines, gas lines and water lines). This was done for the HHSEGS project. Staff's ongoing public and agency coordination activities for this project are discussed under the Public and Agency Coordination heading in the **EXECUTIVE SUMMARY** section of the **FSA**.

PROJECT DESCRIPTION

Testimony of Mike Monasmith

INTRODUCTION

The Hidden Hills Solar Electric Generating System (HHSEGS) project is being developed by Hidden Hills Solar I, LLC, and Hidden Hills Solar II, LLC. Hidden Hills Solar I, LLC, and Hidden Hills Solar II, LLC, are wholly owned subsidiaries of Hidden Hills Solar Holdings, LLC, which is in turn a wholly owned subsidiary of BrightSource Energy, Inc., (Applicant). As proposed, HHSEGS would be located on approximately 3,096 acres of privately owned land leased in Inyo County, California, adjacent to the Nevada border. The project site is approximately 8 miles directly southeast of Pahrump, Nevada (with a driving distance of 28 miles), and approximately 45 miles northwest of Las Vegas, Nevada (**Project Description Figure 1**).

As proposed, HHSEGS would comprise two solar fields and associated facilities: the northern solar plant (Solar Plant 1) and the southern solar plant (Solar Plant 2). Each solar plant would generate 270 megawatts (MW) gross (250 MW net), for a total net output of 500 MW. Solar Plant 1 will occupy approximately 1,483 acres (or 2.3 square miles), and Solar Plant 2 will occupy approximately 1,510 acres (or 2.4 square miles). A 103-acre common area would be established on the southeastern corner of the site to accommodate an administration, warehouse, and maintenance complex, an onsite 138 kV switchyard and a natural gas metering station. A temporary construction lay down and parking area on the west side of the proposed project site would temporarily occupy approximately 180 acres (**Project Description Figure 2**). The temporary construction laydown area in addition to the entire HHSEGS site would total 3,277 acres.

PROJECT LOCATION AND JURISDICTION

HHSEGS is located in Township 22 North, Range 10 East, Sections (or portions thereof) 15, 16, 20, 21, 22, 23, 26, 27, and 28[1] on privately owned land. The assessor parcel numbers (APNs) for the site are: 048-110-002; 048-120-010; Book 048, page 30, parcels 03 to 06 and 12 to 14; Book 048, page 62, parcels 03 to 06 and 11 to 14, and all parcels in Book 048 pages 50, 60, 61, and 64 through 71.

The project site is located in the southern portion of Pahrump Valley, an internally drained basin bound by the Resting Spring and Nopah Ranges on the west and northwest, by the Kingston Range on the southwest, and by the Spring Mountains on the east. Pahrump Dry Lake lies about three miles northwest of the HHSEGS site. To the southeast, a low divide separates Pahrump Valley from Sandy Valley while, to the northeast, another low divide separates it from Stewart Valley. To the north, the Last Chance Range separates the Pahrump Valley from the Amargosa Desert.

The project site is bordered by paved Old Spanish Trail Highway (also called Tecopa Road) to the south, unpaved Quartz Street to the west, the California-Nevada border to the east, and an unpaved road along the northern border. Numerous unpaved roads

[1] San Bernardino Base and Meridian

also extend in a north-south and east-west grid pattern across the site from a 1960's housing subdivision that was never constructed. Please see **Project Description Figure 7** to view existing landscape conditions on the proposed project site, The nearest community to the project site is several dozen residences that comprise Charleston View, immediately south of the project site and Tecopa Road . The closest town is Pahrump, Nevada, located approximately 8 miles directly north of the project area (with a driving distance of approximately 28 miles via Tecopa Road and Nevada State Route 160).

Project access would be from Old Spanish Trail Highway (Tecopa Road) to the project entrance road on the east side of the project (**Project Description Figure 4**). The internal roadway and utility corridors for each heliostat field and its power block would contain a 20-foot-wide paved road from the entrance of the solar plant site to the power block, and then around the power block. Within the heliostat fields, 10-foot wide "drive zones" would be located concentrically around the power block to provide access to the heliostat mirrors for maintenance and periodic cleaning. A 12-foot-wide unpaved path would be constructed on the inside perimeter of the project boundary fence for use by HHSEGS personnel to monitor and maintain perimeter security, and for tortoise exclusion fencing. These paths would be grubbed, bladed, and smoothed to facilitate safe use with minimal grading where necessary to cross washes.

State and Federal Jurisdiction

Once offsite, the HHSEGS transmission line and natural gas pipeline are both located wholly within the state of Nevada, primarily on federal land managed by the Bureau of Land Management (BLM). The Energy Commission has exclusive permitting jurisdiction for the siting of thermal power plants of 50 MW or more and related facilities in California. The Energy Commission also has responsibility for ensuring compliance with the California Environmental Quality Act (CEQA) through the administration of its certified regulatory program. The HHSEGS project site is located within California. As such, the Energy Commission has CEQA jurisdiction over the direct, indirect, and cumulative impacts for proposed activities on the HHSEGS project site.

Once the transmission line and the natural gas pipeline exit the eastern border of the project site into Nevada, the those linear portions of the project are considered a federal action requiring review under and compliance with the National Environmental Policy Act of 1969 (NEPA). The NEPA process for the proposed BLM project (Valley Electric Association Hidden Hills Transmission Project) is anticipated to occur within a 12 month timeframe and consist of several steps. At the early stage in BLM's process, they will identify the range or scope of public and agency issues through comments received in meetings and discussions with relevant agencies and the public. Once the BLM has an understanding of the issues, their study team will begin to gather data on resources within the study area. Based on the description of the proposed project and any alternatives to be evaluated; issues identified; and resource data, an Environmental Impact Statement (EIS) team will assess potential impacts that could result from the project and identify measures to mitigate, or reduce those impacts to a less-than-significant level. A Draft EIS for the Valley Electric Association (VEA) Hidden Hills Transmission Project is expected to be published by BLM (Nevada) in late 2012 or early 2013.

The Energy Commission and BLM staff (from Nevada and California) have coordinated several aspects of their respective CEQA and NEPA regulatory review processes, including the technical disciplines of **Biological Resources**, **Cultural Resources** and **Water Supply**. This coordination, particularly for Biological Resources, involves the active participation of several other state and federal agencies, including the California Department of Fish and Game and the US Fish & Wildlife Service.

PROJECT DESCRIPTION, DESIGN AND OPERATION

This section describes HHSEGS's conceptual design and various aspects of its proposed operation, if approved and once constructed.

PROCESS DESCRIPTION

In each solar plant, one Rankine-cycle non-reheat steam turbine would receive live steam from a *solar receiver steam generator* (SRSG*)* located in the power block at the top of the solar power tower (**Project Description Figure 5**). The solar field and power generation equipment would be started each morning after sunrise and insolation build-up, and would shut-down when insolation drops below the level required keeping the turbines online. Natural-gas-fired auxiliary boilers may also be used to extend daily power generation and to pre-warm the SRSG to minimize the amount of time required for startup each morning, to assist during shutdown cooling operation, and to augment the solar operation during the evening shoulder period as solar energy diminishes.

Power Cycle

Solar energy is reflected by the heliostats onto the SRSG where the energy heats water into superheated steam. The steam is then routed via the main steam pipe to the steam turbine generator (STG) where the steam's energy is converted to electrical energy. The solar plant's power cycle is based on a Rankine-cycle steam turbine with three pressure stage casings. Primary thermal input is via an SRSG located at the top of the solar power tower. Live superheated steam enters a high pressure (HP) turbine casing at 2,466 pounds per square inch absolute (psia) and 1,085 degrees Fahrenheit (°F) Following expansion through the HP turbine, the steam is conveyed to the inlet of the intermediate pressure (IP) turbine. Steam enters the IP turbine at 535 psia and 666°F. Upon exiting the IP turbine, the steam travels via the crossover pipe to the inlet of the low pressure (LP) turbine. Steam enters the LP turbine at 78 psia and 310° F and exits at 1.6 psia or 3.25 inches of mercury into the air-cooled condenser.

Condensate is sent from the condenser well through four low-pressure feed water heaters to the deaerator, which also serves for feed water reserve storage and is the point of feed water make-up injection. From the deaerator, high-pressure feed water pumps send feed water through three high pressure feed water heaters and it is returned to the SRSG.

PROJECT FEATURES AND FACILITIES

Each solar plant would use heliostats (elevated mirrors guided by a tracking system mounted on a pylon) to focus the sun's rays on a solar receiver steam generator (SRSG) – a solar boiler that produces steam used to generate electricity – atop a solar power tower near the center of each solar field. The solar field and power generation equipment would start each morning after sunrise and, unless augmented, would shut down when insolation (sun ray and intensity) drops below the level required keeping turbines online and producing electricity. Please see **Project Description Figure 8** for an illustration of HSEGS technology.

Heliostats

Each of the heliostat assemblies is composed of two mirrors, each approximately 12 feet high by 8.5 feet wide with a total reflecting surface of 204.7 square feet. Each heliostat assembly is mounted on a single pylon, along with a computer-programmed aiming control system that directs the motion of the heliostat to track the movement of the sun. Communication between the heliostats and the operations center will be done via surface-mounted anchored cable or wireless remote system. The solar field for each solar plant will consist of approximately 85,000 heliostats, for a total of 170,000.

Solar Plants

The following provides further details regarding the two 270-MW (250-MW net) solar plants.

- The SRSG located at the top of the 590 foot tall solar power tower is approximately 160 feet tall, resulting in an overall power tower height of approximately 750 feet.
- No heliostat will be built closer than 394 feet from the solar power tower location.
- For Solar Plant 1, the distance between the solar power tower and the farthest heliostat in the solar field, approximately 7,660 feet, is in the northwest section of the heliostat array. For Solar Plant 2, the longest distance between the solar power tower and the farthest heliostat in the solar field (approximately 6,523 feet) is in the northeast section of the heliostat array. Generally, this is due to the higher efficiency of heliostats in the northern section in the northern hemisphere. With the sun predominantly in the southern sky, the cosine effect of incidence and reflection angles is less in the northern heliostats than in the southern ones. The converse (lower collection efficiency in the southern section) is also true, and, therefore, the maximum southern arc radius is the shortest.
- The eastern sector heliostat energy collection is more valuable than the western sector collection because afternoon energy collection, during on-peak utility hours, is more valuable than morning energy collection, during part-peak or off-peak hours.

Steam Turbine Generator

The steam turbine system consists of a condensing STG with gland steam system, lubricating oil system, hydraulic control system, and steam admission/induction valving. HP steam from the SRSG super-heater enters the HP steam turbine section through the inlet steam system. The steam expands through multiple stages of the turbine, driving

the generator. On exiting the LP turbine, the steam is directed into the air-cooled condenser.

Natural Gas Boilers

Each solar plant would include a 249 MMBtu/hr natural gas fired auxiliary boiler that would be used to pre-warm the SRSG to minimize the amount of time required for startup each morning, to assist during shutdown cooling operation, and to augment the solar operation during the evening shoulder period as solar energy diminishes. Additionally, each solar plant would include a 15 MMBtu/hr nighttime preservation boiler to maintain system temperatures overnight.

Boiler Feed water System

The boiler feed water system transfers feed water from the deaerator to the SRSG. The System would consist of one turbine driven pump (booster and main), one motor driven backup (booster and main) feed water pump, and one motor driven startup pump. The turbine driven pump is sized for 100% capacity for supplying the SRSG. The startup pump would be sized for 25% capacity and include a variable frequency drive (VFD). The backup pump would be sized for 50% tribune load and include a VFD. The pumps would be multistage, horizontal and would include regulating control valves, minimum flow recirculation control and other associated piping and valves.

Condensate System

The condensate system would provide a flow path from the condensate collection tank to the deaerator. The condensate system would include two 50% capacity multistage vertical, motor-driven condensate pumps with VFDs. The system would also include deep bed condensate polishers with offsite regeneration.

Demineralized Water System

The demineralized water system would consist of ion exchanges. Resin media from the vessels would be regenerated off site by a third party water treatment supplier. Spare resin for the two plants would be stored in the warehouse located in the common area. Demineralized water would be stored in the demineralized water tank.

Power Cycle Makeup and Storage

The power cycle makeup and storage subsystem provides demineralized water storage and pumping capabilities to supply high purity water for system cycle makeup and chemical cleaning operations. Major components of the system are the demineralized water storage tank; demineralized water treatment system, and two 100% capacity, horizontal, centrifugal cycle makeup water pumps.

Water Supply and Use

Groundwater would be drawn daily from six onsite groundwater supply wells that would be drilled and developed to provide raw water for the HHSEGS project; two new wells per power block (primary and backup) and two wells at the administration complex. The wells would supply both solar plants and would be used for the power cycle make-up water, mirror wash water, and other domestic uses. The entire 500-MW net project

would require up to 84.5 gallons per minute (gpm) (average) raw water make-up, with 30 to 50 gpm required by each plant, and 3.5 gpm (average) required for potable water use (please see the **Water Supply** section of this **FSA** for more details).

HHSEGS will generate electricity up to 16 hours a day, with the exception of a scheduled shutdown in late December for maintenance. However, the water treatment plant would operate continuously in order to minimize water treatment system size and capital cost, and to use off-peak energy at night. A breakdown of the estimated average daily quantity of water required for HHSEGS operation is presented in **Table1**. The daily water requirements shown are estimated quantities based on HHSEGS operating at full load.

TABLE 1
Average Daily Water Requirements with Both Solar Plants in Operation

Water Use	Average Daily Use (gpm)	Annual Use (ac-ft/yr)
Process and heliostat wash	84.5	135
Potable water service (including Common Area)	3.5	5

ac-ft/yr = acre-feet per year

To reduce the number of truck trips during construction, the applicant intends to drill a temporary well to be used during construction only, primarily for the onsite concrete batch plant used to serve project construction needs. This temporary well will eliminate the need to bring water to the construction area via tanker truck, and will not increase water usage above the 288 acre-feet per year needed during 29 months of construction, which is expected to take place from the second quarter of 2013 to the fourth quarter of 2015.

Electrical Transmission System

HHSEGS will interconnect to the Valley Electric Association (VEA) system.[2] The interconnection would require an approximately 10-mile-long generation tie-line (gen-tie line) from the HHSEGS to the proposed Crazy Eyes Tap Station,[3] where the project would interconnect to the VEA electric grid. The gen-tie line would originate at the HHSEGS' onsite switchyard, cross the Nevada state line, and continue east for approximately 1.5 miles until reaching Tecopa Road. At Tecopa Road, the route would head northeast paralleling Tecopa Road until it reaches the Crazy Eyes Tap Substation, which would be located immediately east of the Tecopa Road/SR 160 intersection (see (**Project Description Figure 6**)**.** The Crazy Eyes Tap Substation would interconnect to the existing VEA Pahrump-Bob Tap 230-kV line.

The bulk of the electric power produced by the facility would be transmitted to the grid. A small amount of electric power would be used onsite to power auxiliaries such as pumps and fans, control systems, and general facility loads including lighting, heating,

[2] In January, 2013, VEA will become a participating transmission owner (PTO) and will turn operational control of its facilities over to the California Independent System Operator (CAISO).

[3] In the HHSEGS AFC, and in the Preliminary Staff Assessment published on 5/24/2012, this substation was referred to as the "Tap Substation."

and air conditioning. Some power would also be converted from alternating current (AC) to direct current (DC) and stored in batteries, which would be used as backup power for the plant control systems and essential uses. No electrical power would be made available off-site.

Natural Gas Supply System

A 12-inch-diameter natural gas pipeline would be required for the project. The gas pipeline would enter the HHSEGS site in the common area where it would connect with an onsite gas metering station. It would exit the HHSEGS site at the California-Nevada border, extending 32.4 miles to the Kern River Gas Transmission (KRGT) existing mainline system just north of Goodsprings in Clark County, Nevada (see **Project Description Figure 6**).

Plant Cooling Systems

The cycle heat rejection system would consist of an air-cooled steam condenser system. The heat rejection system would receive exhaust steam from the low-pressure section of the steam turbine and feed water heaters and condense it back to water for reuse. The condenser would be designed to normally operate at a pressure of about 3.2 inches of mercury absolute (0.11 millibar absolute). The condenser would remove heat from the condensing steam up to a maximum of 1,140 million British thermal units per hour (MMBtu/hr), depending on ambient temperature and plant load. An auxiliary cooling system would cool the generator, steam turbine generator lubrication oil, boiler feed pump lubricating oil, SRSG circulating water pumps, and other equipment requiring cooling. A maximum of 34 MMBtu/hr would be rejected to the atmosphere via a fin-fan heat exchanger. Above 85°F, the fin-fan heat exchanger would be assisted by wet surface air coolers using intermediate quality deionized water.

Fire Protection

The fire protection system would be designed to protect personnel and limit property loss and plant downtime in the event of a fire. The primary source of fire protection water will be the raw water storage tank. Each solar plant would have a raw water tank with a capacity of 250,000 gallons. A portion of the raw water (100,000 gallons) is for plant use while the majority would be reserved for fire water. An electric jockey pump and electric-motor-driven main fire pump would be provided to increase the water pressure in the plant fire main to the level required to serve all fire fighting systems. In addition, a back-up, diesel-engine-driven fire pump would be provided to pressurize the fire loop if the power supply to the electric-motor-driven main fire pump fails. A fire pump controller would be provided for each fire pump.

The fire pump would discharge to a dedicated underground firewater loop piping system. Normally, the jockey pump would maintain pressure in the firewater loop. Both the fire hydrants and the fixed suppression systems would be supplied from the firewater loop. Fixed fire suppression systems would be installed at determined fire risk areas such as the transformers and turbine lube oil equipment.

Sprinkler systems would also be installed in the administration complex buildings and fire pump enclosure as required by National Fire Protection Association (NFPA), and

local code requirements. Handheld fire extinguishers of the appropriate size and rating would be located in accordance with NFPA 10 throughout the facility. The project site is within the Southern Inyo Fire Protection Department (SIFPD) jurisdiction. Please refer to the **Worker Safety / Fire Protection** section of this **FSA** for more detailed specifics related to all aspects of fire response and emergency services for HHSEGS construction and operation.

HAZARDOUS MATERIALS

There will be a variety of hazardous materials used and stored during construction and operation of the Project. The **Hazardous Materials Management** section of this **FSA** provides additional data on the hazardous materials that will be used during construction and operation, including quantities, associated hazards and permissible exposure limits, storage methods, and special handling precautions. Hazardous materials that will be used during construction include gasoline, diesel fuel, oil, lubricants, and small quantities of solvents and paints. All hazardous materials used during construction and operation will be stored on site in storage tanks, vessels and containers that are specifically designed for the characteristics of the materials to be stored; as appropriate, the storage facilities will include the needed secondary containment in case of tank/vessel failure.

WASTE MANAGEMENT

Waste management is the process whereby all wastes produced at the project site are properly collected, treated (if necessary), and disposed of. Wastes include process and sanitary wastewater, nonhazardous waste, and hazardous waste, both liquid and solid. The **Soils and Surface Water** section of this **FSA** discusses process wastewater and sanitary wastewater. For all other wastes, the **Waste Management** section of this **FSA** will detail the process by which both hazardous and nonhazardous wastes from HHSEGS construction and operation will be appropriately stored, transferred and disposed.

EMISSION CONTROL AND MONITORING

Air emissions from the combustion of natural gas in the auxiliary-boilers at each plant would be controlled using appropriate air emission control devices. The auxiliary boilers are subject to acid rain requirements; however, because of their low emissions, they are eligible to use the low mass emissions (LME) methodology and will not be required to use acid rain continuous emissions monitoring systems (CEMS).

PROJECT CONSTRUCTION AND CLOSURE

The Construction of HHSEGS, from perimeter fencing to site preparation and grading to commercial operation, is expected to take place from the second quarter of 2013 to the fourth quarter of 2015 (29 months total). Major milestones are listed in **Table 2** (although the construction order may change). Construction of the common area facilities would occur concurrently with the construction of the first plant.

Table 2
Project Schedule Major Milestones

Activity	Date
Solar Plant 1	
Fencing and tortoise clearance	Second Quarter 2013
Begin construction	Second Quarter 2013
Startup and commissioning	Second Quarter 2015
Commercial operation	Third Quarter 2015
Solar Plant 2	
Fencing and tortoise clearance	Second Quarter 2013
Begin construction	Third Quarter 2013
Startup and commissioning	Third Quarter 2015
Commercial operation	Fourth Quarter 2015

The construction workforce need would range from a high of 2,293 workers in month 19, a low of 128 workers in the first month, and an average of 1,087 workers during the entire 29-month construction period. A permanent operations workforce of 100 workers would be needed for the project. A comprehensive workforce analysis can be reviewed in the **Socioeconomics** section of this **FSA.**

The nearest residence to the proposed project would be approximately 3,500 feet south of Solar Plant 2, and 950 south of the perimeter. The St. Therese Mission is approximately 1.7 miles from the nearest power block (Solar Plant 2). Noisy construction activities occurring within 500 feet of existing noise sensitive uses would be limited to the hours of 7:00 a.m. to 7:00 p.m. Monday through Saturday. Generally, construction activities would occur from 5:00 a.m. to 3:30 p.m. with a swing shift from 6:00 p.m. to 4:30 a.m. Additional hours may be necessary to make up schedule deficiencies, or to complete critical construction activities (e.g., tower construction, foundation pouring, or working around time-critical shutdowns and constraints). During some construction periods and during the startup phase of the project, some activities would continue 24 hours per day, seven days per week. Specific information on noise impacts can be reviewed in the **Noise and Vibration** section of this **FSA**.

PROJECT CONSTRUCTION

General Grading and Leveling

The surface soil grade of each area would be designed for access of installation equipment and materials during site construction and operations. Most of the natural drainage features would be maintained and any grading required would be designed to promote sheet flow where possible. Heavy to medium grading would be performed within each plant's solar power tower and power block areas, for the switchyard, within the administration complex area, and for the heliostat assembly buildings. The deepest excavations would be restricted to foundations and sumps. Within each of these individual areas, earthwork cuts and fills will be balanced to the degree possible. The earthwork within the power blocks and common area would be excavated and compacted to the recommendations of the associated geotechnical report. At some washes, limited grading may be required. Surface rocks and boulders would need to be

relocated to allow proper installation of heliostats and facilities when they cannot be avoided.

Storm Drainage System

The majority of the project site would maintain the original grades and natural drainage features and, therefore, will require no added storm drainage control. In limited areas, such as the power blocks, switchyard, heliostat assembly buildings and administrative areas, the storm water management system would include diversion channels, bypass channels, or swales to direct run-on flow from up-slope areas and run-off flow through and around each facility. Diversion channels would be designed so that a minimum ground surface slope of 0.5% would be provided to allow positive, puddle-free drainage. To reduce erosion, storm drainage channels may be lined with non-erodible materials such as compacted rip-rap, geo-synthetic matting, or engineered vegetation. The design would be developed for sheet flow for all storm events less than or equal to a 100-year, 24-hour storm event. All surface runoff during and after construction would be controlled in accordance with the requirements of the Drainage, Erosion, and Sedimentation Control Plan, and all other applicable LORS.

Erosion and Sediment Control Measures

Protection of soil resources would be an important factor in the design of the erosion and sedimentation controls. To minimize wind and water erosion, open spaces would be preserved and left undisturbed maintaining existing vegetation to the extent possible with respect to site topography and access requirements. Areas compacted during construction activities would be restored, as appropriate, to approximate preconstruction compaction levels to minimize the opportunity for any increase in surface runoff.
If needed, stone filters and check dams would be strategically placed throughout the project site to provide areas for sediment deposition and to promote the sheet flow of storm water prior to leaving the project site boundary. Native materials (rock and gravel) would be used for the construction of the stone filter and check dams. Diversion berms would be used to redirect storm water around critical facilities (please see the **Soils and Surface Water** section of this **FSA** for more analysis).

Periodic maintenance would be conducted as required after major storm events and when the volume of material behind the check dams exceeds 50% of the original volume. Stone filters and check dams are not intended to alter drainage patterns but to minimize soil erosion and promote sheet flow

Solar Field Preparation

Vegetation clearing, grubbing, and contour smoothing in the solar fields would occur where necessary to allow for equipment access and storm water management. In areas where these activities are not required for access or construction, the vegetation will not be removed but would be mowed (if needed) to a height of approximately 12 to 18 inches.

A linear swath of vegetation along the outer edge of each heliostat field would be cleared, grubbed and smoothed to create an external perimeter path for installation and

maintenance of the tortoise and security fence and associated external perimeter inspection roads. Grading of the roads would be performed in limited areas to afford safe passage of vehicles. To allow for external roads, the setback area from the property line would be a minimum of 8 to 12 feet between the tortoise fence and the property line. Additional setbacks may be required due to installation of gas and electric utilities. Elsewhere, vegetation would remain but would be cut (when necessary) to a height that will allow clearance for heliostat function while leaving the root structures intact. Occasional cutting of the vegetation would be performed as needed to permit unobstructed heliostat mirror movement.

Drive zones would be used for installation of the heliostats and then subsequent washing of the mirrors. The drive zones would be located approximately every 152 feet in a circumferential fashion surrounding the power blocks. The drive zones would be approximately 10 feet wide and would be cleared, grubbed, smoothed, and rolled to permit safe and efficient installation of the heliostats and washing of the mirrors. The shoulders of washes crossed by the drive zones would be graded as necessary to permit safe passage of vehicles for installation and maintenance activities.

Installation of Heliostats

The heliostats will be installed in two steps. Initially, the support pylons would be installed using vibratory technology to insert the pylons into the ground (pre-augering prior to the installation of the pylon may be required). Then, the heliostat assembly (mirrors, support structure and aiming system) would be mounted on the pylon. The siting of pylons would be guided by global positioning system (GPS) technology. Pylons would be delivered to their locations by an all-terrain vehicle. Installation of the heliostat assemblies would be accomplished with a rough terrain crane. The crane would be able to mount heliostat assemblies on several pylons before moving to the next location.

Construction of Power Blocks

Project construction would commence with the building of site roads and the installation of temporary construction facilities including office trailers, parking areas, material lay down areas, a concrete batch plant, and a heliostat assembly facility. The construction of each plant would begin with the excavation and placement of foundations and other underground facilities. Superstructures and equipment would then be placed on the foundations. Major items include the 750-foot-tall solar power tower and SRSG construction, the STG pedestal and STG, and construction of the air-cooled condenser. Once the mechanical equipment is in place, construction would continue with the installation of the piping, electrical equipment, and cables necessary to connect and power the equipment. Upon completion of construction, the checkout, testing, startup and commissioning of the various plant systems would begin resulting in a fully operational solar plant.

Restoration of Temporary Disturbance

As proposed, temporarily disturbed areas will be restored to their preconstruction conditions. Temporary access roads used during construction will also be re-graded and restored to pre-existing function and grade. Approved seed mixes will be applied to

temporarily disturbed areas, as required. No fertilizer will be used during stabilization or rehabilitation activities unless specifically authorized. No vegetation will be restored or encouraged within the solar field because of the fire hazard. Vegetation within the common area will be controlled to prevent containment from being compromised. When construction of storm water management structures is complete, contours will be carefully restored to the extent feasible.

FACILITY CLOSURE

At some point in the future, the project will cease operation, and the facility will close down. At that time, it will be necessary to ensure that the closure occurs in such a way that public health and safety and the environment are protected from adverse impacts. Although the project setting for this project does not appear, at this time, to present any special or unusual closure problems, it is impossible to foresee what the situation will be in 30 years or more when the project ceases operation. Therefore, provisions must be made that provide the flexibility to deal with the specific situations and project setting that exist at the time of closure. Facility closure will be consistent with Laws, Ordinances, Regulations and Standards (LORS) in effect at the time of closure, and are discussed in the **General Conditions** section of this **FSA.**

PROJECT DESCRIPTION - FIGURE 1

Hidden Hills Solar Electric Generating System (HHSEGS) - Vicinity Map

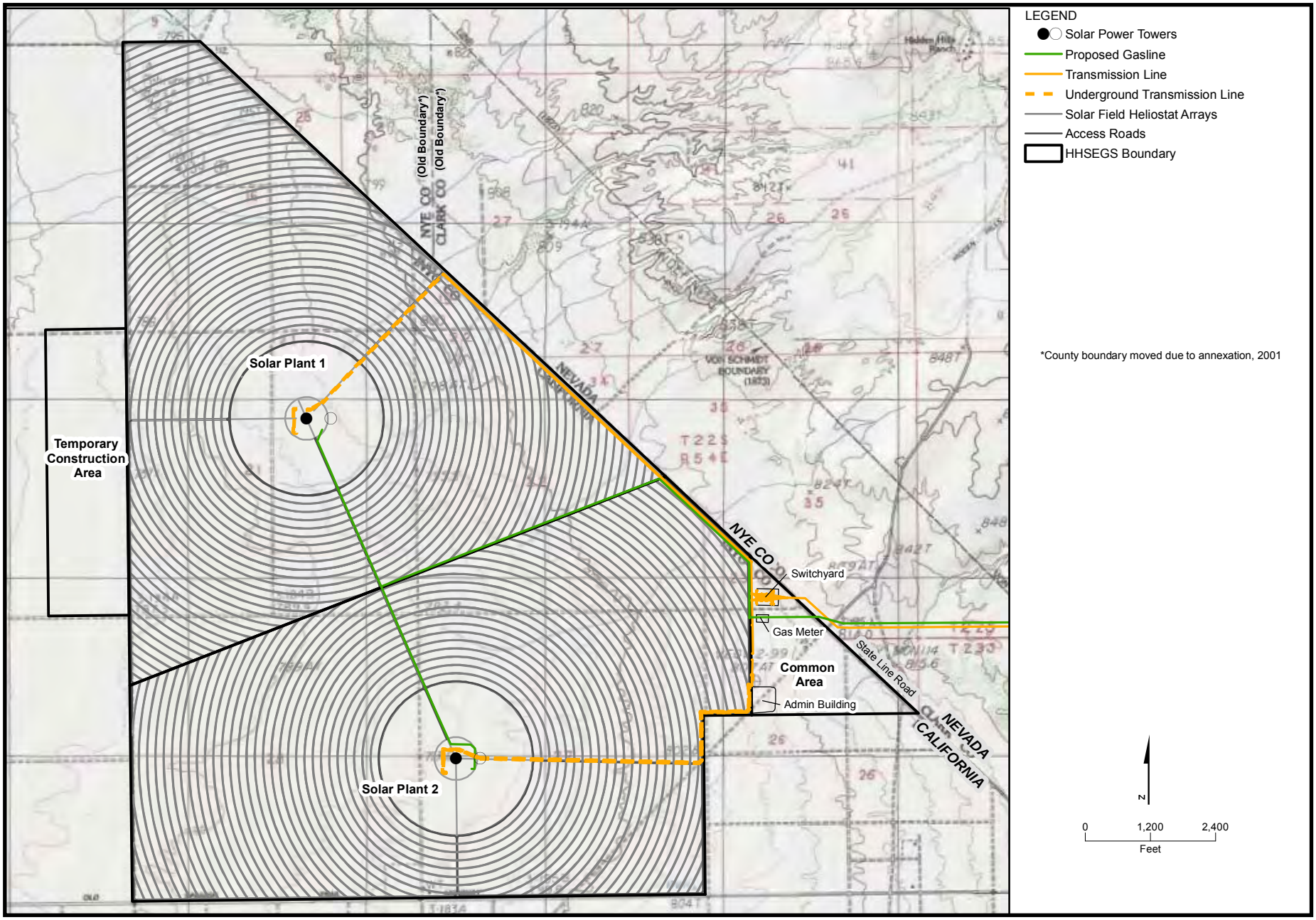
PROJECT DESCRIPTION

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: AFC, August 2011, Figure 2.1-1, CH2MHILL

PROJECT DESCRIPTION - FIGURE 2

Hidden Hills Solar Electric Generating System (HHSEGS) - Site Plan and Linear Facilities

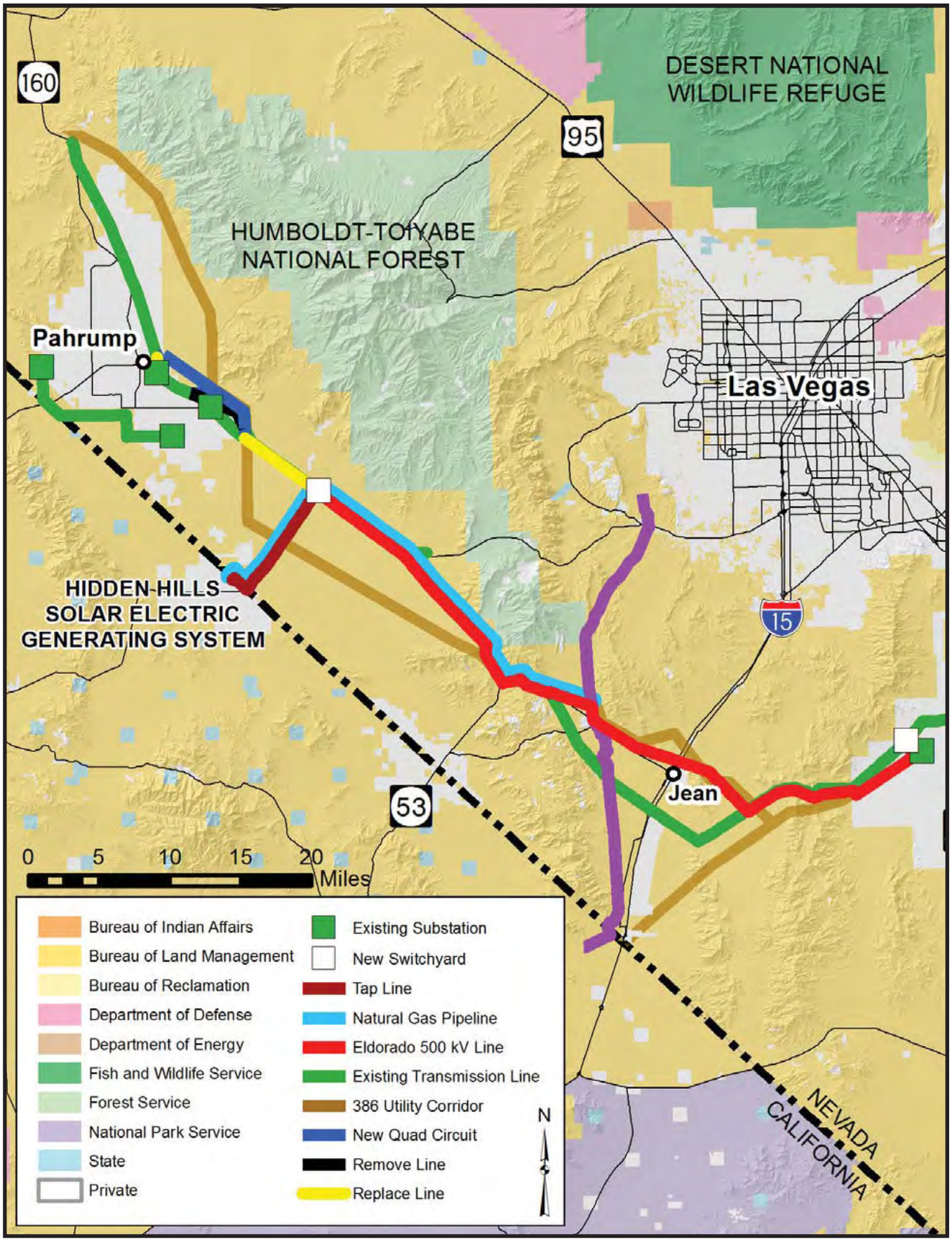


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Figure 2.1-2R1, CH2MHILL

PROJECT DESCRIPTION - FIGURE 3

Hidden Hills Solar Electric Generating System (HHSEGS) - Project Description Map

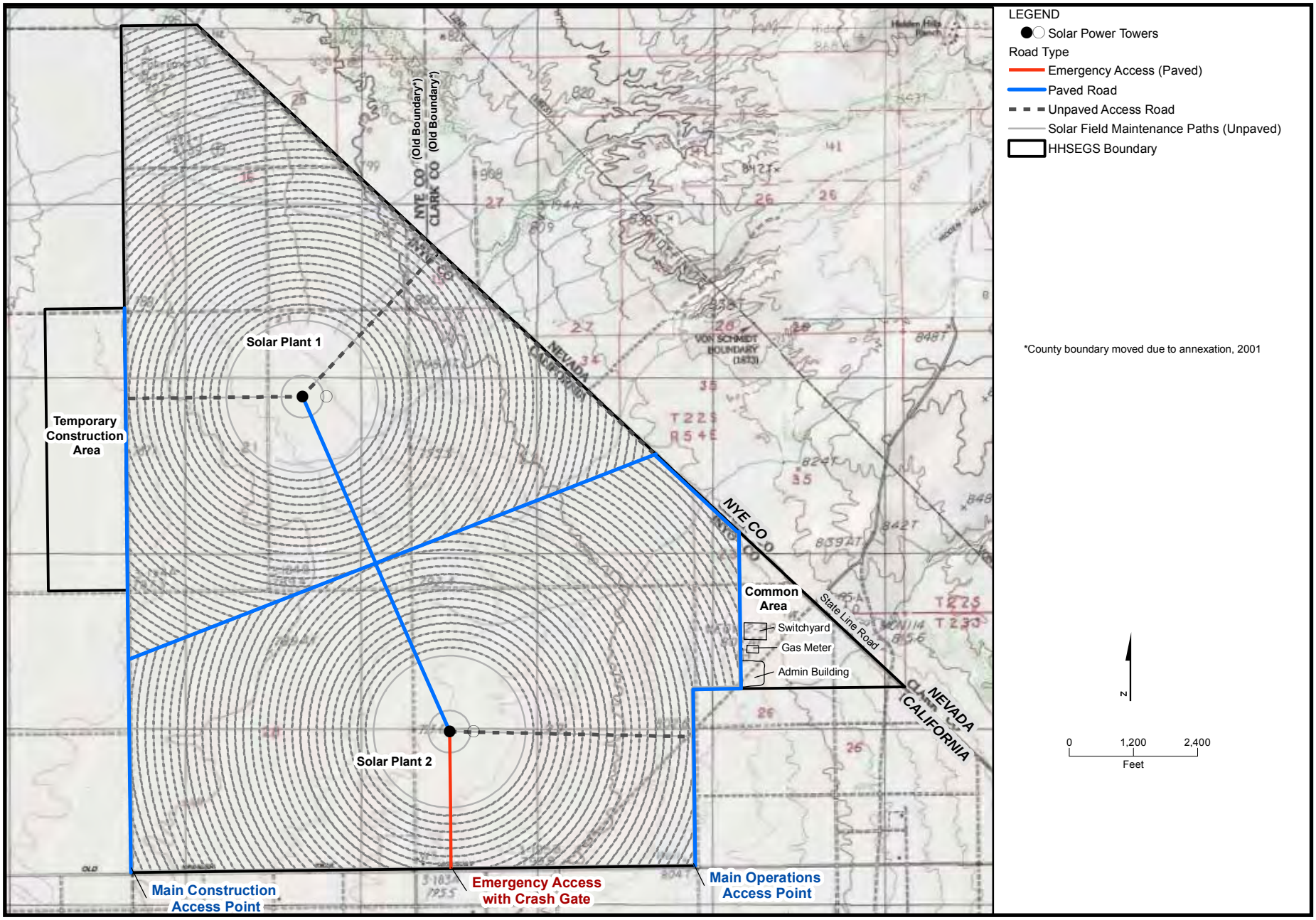


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Bureau of Land Management Draf t EIS, Nov. 2011

PROJECT DESCRIPTION - FIGURE 4

Hidden Hills Solar Electric Generating System (HHSEGS) - Access Roads and Paved Internal



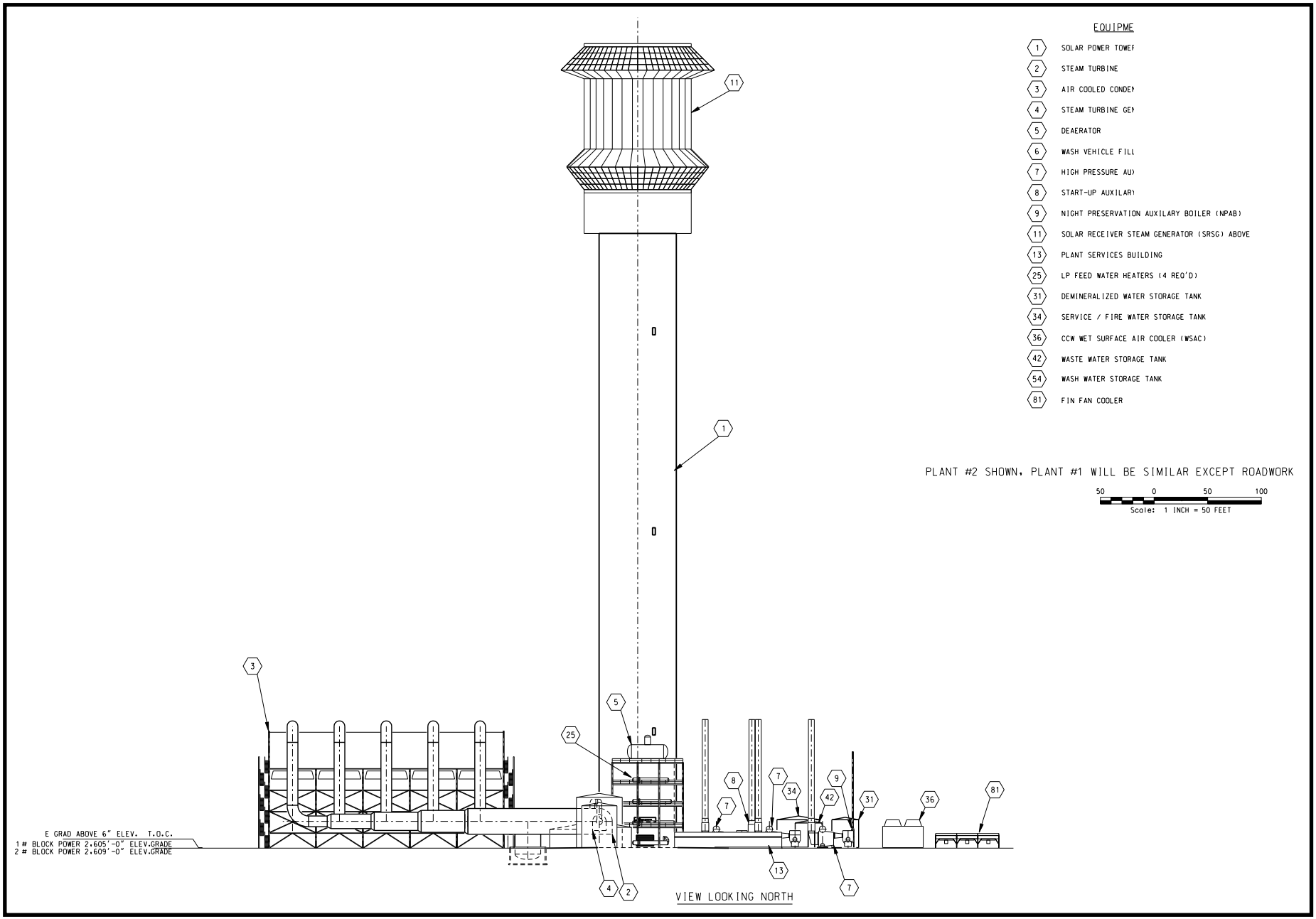
PROJECT DESCRIPTION

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: AFC, August 2011, Figure DR, CH2MHILL

PROJECT DESCRIPTION - FIGURE 5

Hidden Hills Solar Electric Generating System (HHSEGS) - Solar Plant 2 Elevation



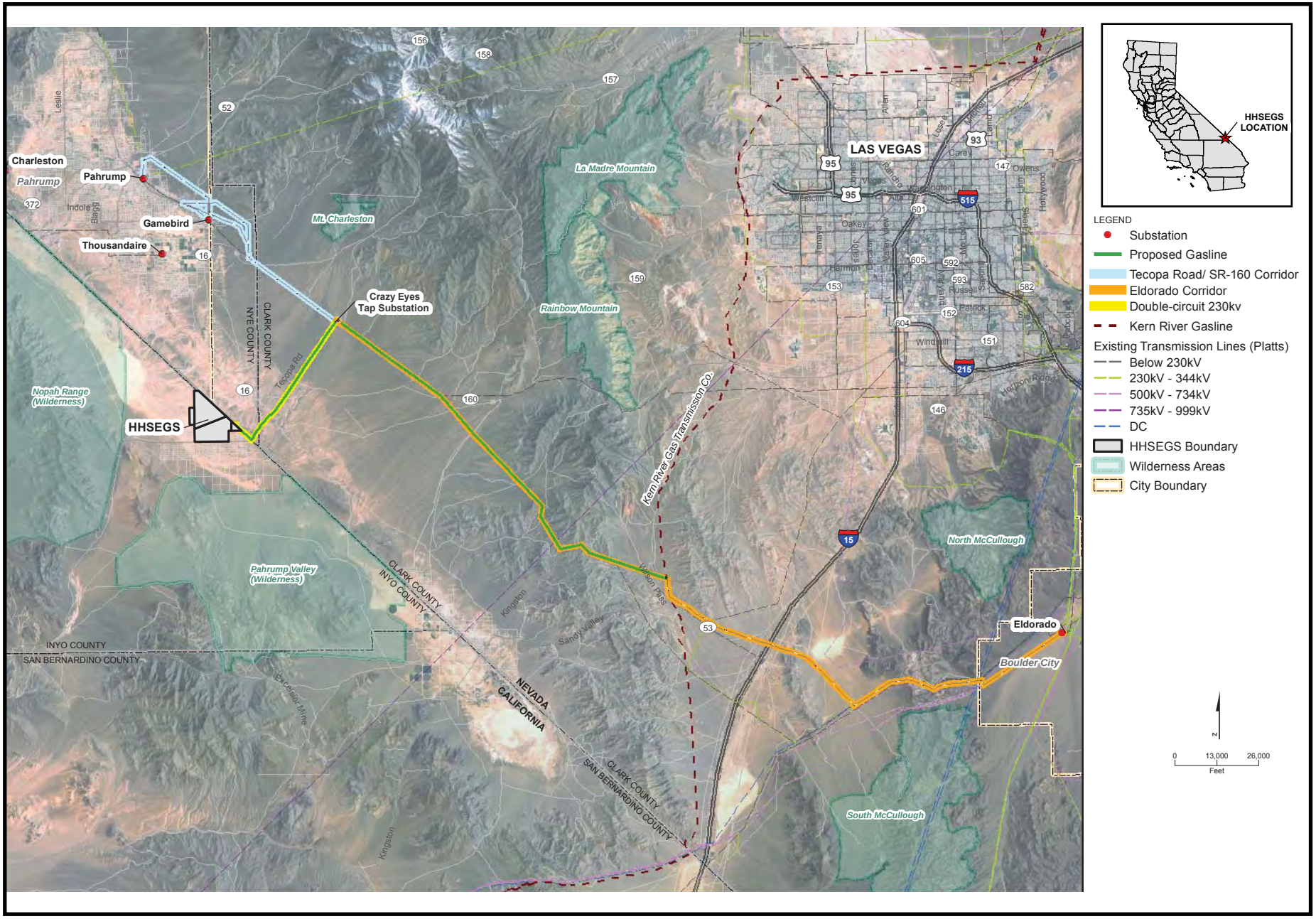
PROJECT DESCRIPTION

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: AFC, August 2011, Figure 2.2-2a, CH2MHILL

PROJECT DESCRIPTION - FIGURE 6

Hidden Hills Solar Electric Generating System (HHSEGS) - Linear Corridors

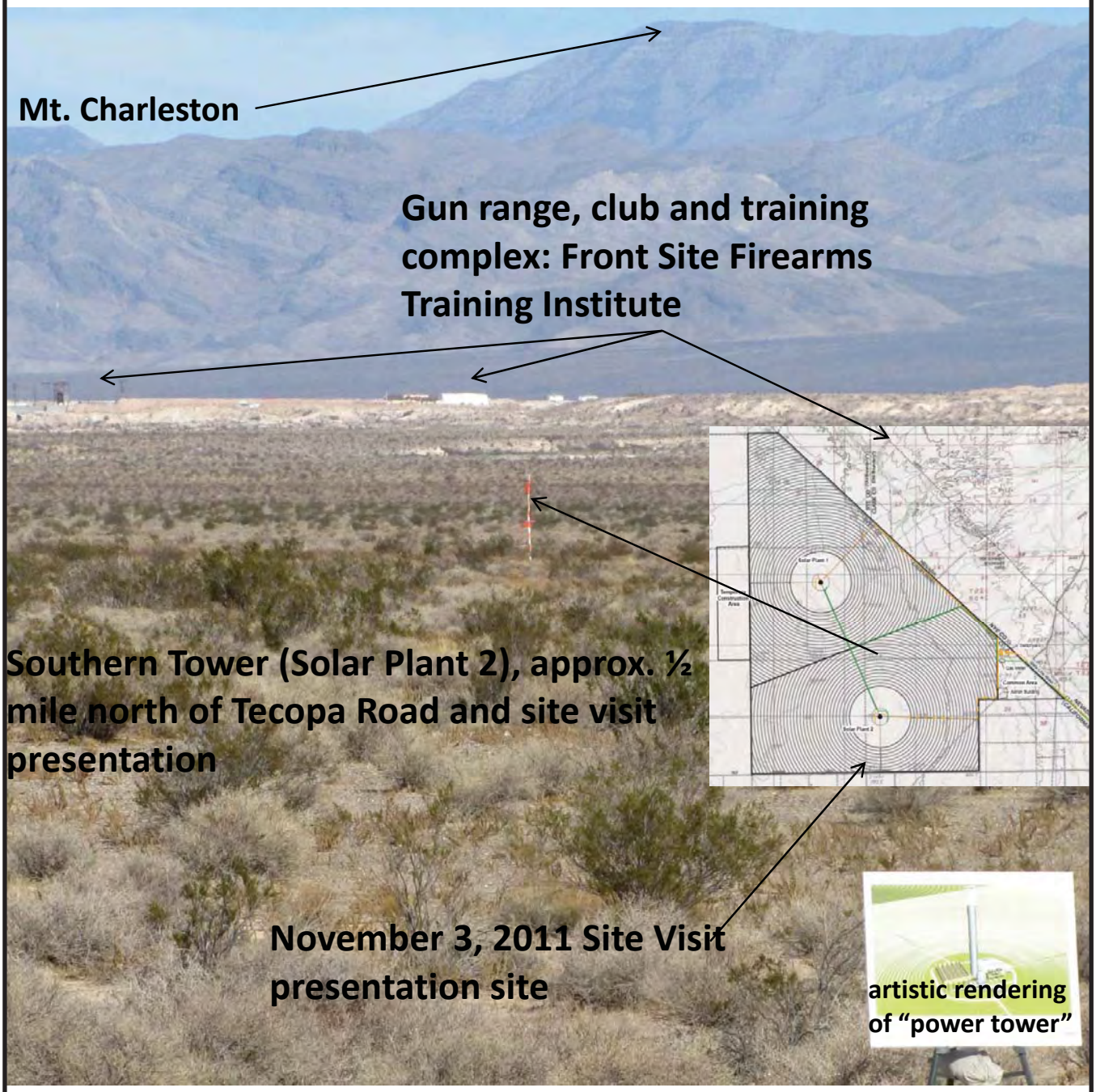


PROJECT DESCRIPTION

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: AFC, August 2011, Figure 2.1-4, CH2MHILL

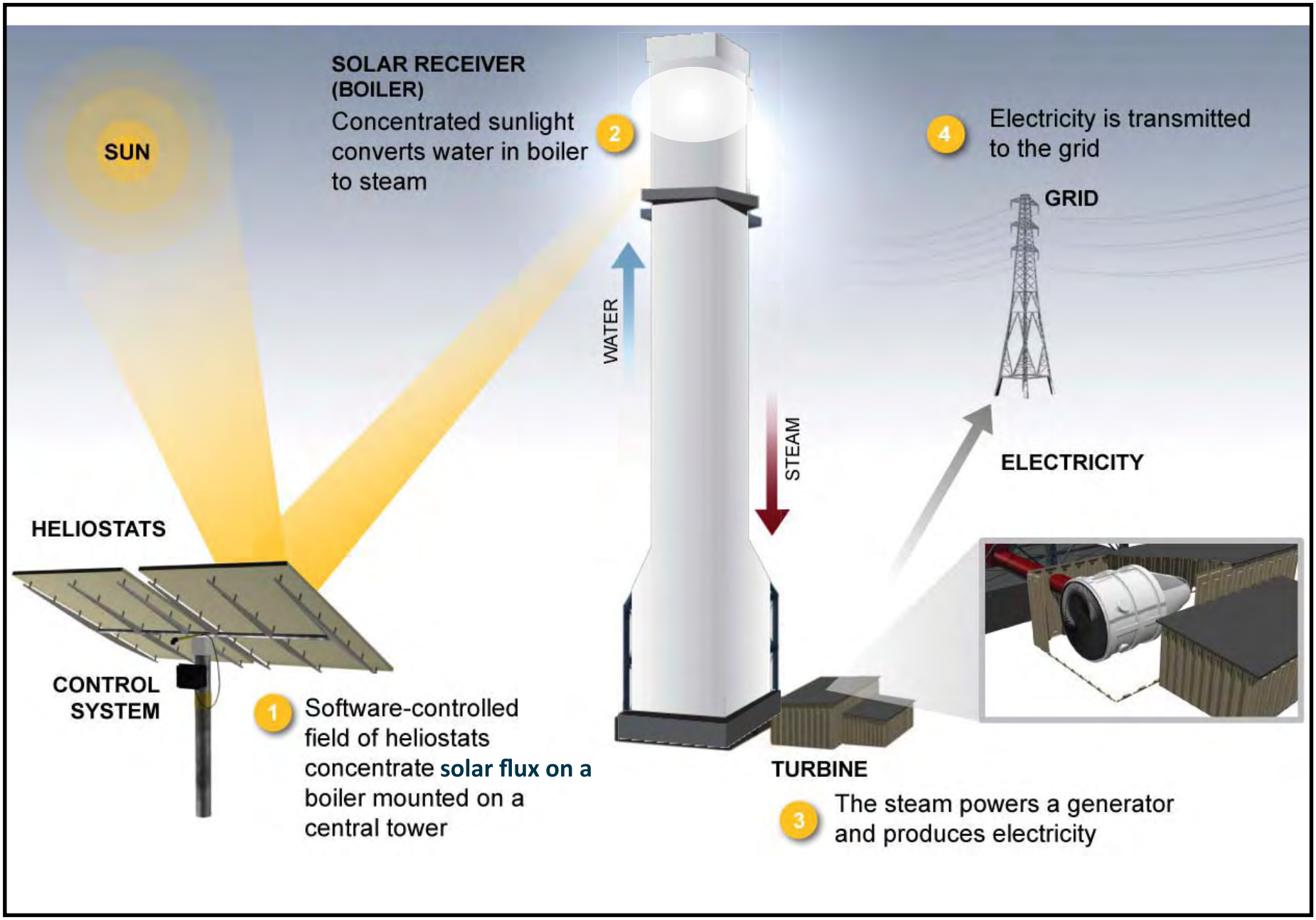
PROJECT DESCRIPTION - FIGURE 7
Hidden Hills Solar Electric Generating System (HHSEGS) - Site View



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: Staff Photo, 11/3/2011

PROJECT DESCRIPTION - FIGURE 8

Hidden Hills Solar Electric Generating System (HHSEGS) - Technology Overview



SOURCE: 11-AFC-2 Hidden Hills TN 68362 BrightSource Energy-submitted Power Point Presentation for August 28, 2012 Joint Workshop, page 11

AIR QUALITY

Testimony of Jacquelyn Leyva

SUMMARY OF CONCLUSIONS

Energy Commission staff (staff) concludes that with the adoption of the attached conditions of certification the proposed Hidden Hills Solar Electric Generating System (HHSEGS) project would comply with all applicable laws, ordinances, regulations, and standards (LORS) and would not result in any significant air quality-related California Environmental Quality Act (CEQA) impacts. With implementation of the conditions of certification referred to herein, the project would comply with LORS and mitigate otherwise adverse impacts for purposes of CEQA. Without adequate fugitive dust mitigation, the project could cause potential localized exceedances of the PM10 National Ambient Air Quality Standards (NAAQS) during construction and operation. This impact would be less than significant with adoption of the proposed construction and operation fugitive dust mitigation measures.

Staff concludes that the project would meet the minor source provisions of the federal New Source Review (NSR) program and thus would not require Prevention of Significant Deterioration (PSD) review or Nonattainment New Source Review.

The HHSEGS project would emit substantially fewer greenhouse gas (GHG)[1] emissions per megawatt-hour produced than fossil-fueled generation resources in California. The project is not subject to the requirements of SB 1368 (Greenhouse Gases Emission Performance Standard; Cal. Code Reg., tit. 20, § 2900 et. seq.) and the Emission Performance Standard; however it would nevertheless meet the Emission Performance Standard.

INTRODUCTION

This analysis evaluates the expected air quality impacts from the emission of criteria air pollutants from both the construction and operation of the HHSEGS project. Criteria air pollutants are air contaminants for which the state and/or federal governments have established an ambient air quality standard to protect public health.

The criteria pollutants analyzed are nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), ozone (O_3), and particulate matter (PM). Toxic air pollutant emissions impacts are analyzed in the **Public Health** section of this FSA. Two subsets of particulate matter are inhalable particulate matter (less than 10 microns in diameter, or PM10) and fine particulate matter (less than 2.5 microns in diameter, or PM2.5). Nitrogen oxides (NOx, consisting primarily of nitric oxide [NO] and NO_2) and volatile organic compound (VOC) emissions readily react in the atmosphere to form ozone and, to a lesser extent, particulate matter. Sulfur oxides (SOx) readily react in the atmosphere to form particulate matter and are major contributors to acid rain. Global

[1] Greenhouse gas emissions are not criteria pollutants; they affect global climate change. In that context, staff evaluates the GHG emissions from the proposed project (Appendix Air-1), presents information on GHG emissions related to electricity generation, and describes the applicable GHG standards and requirements.-

climate change and greenhouse gas (GHG) emissions from the project are discussed in **Appendix Air-1** in the context of cumulative impacts.

In carrying out this analysis, the California Energy Commission (Energy Commission) staff evaluated the following major points:

- whether the HHSEGS project is likely to conform with applicable federal, state, and Great Basin Unified Air Pollution Control District (District) air quality laws, ordinances, regulations and standards (Title 20, California Code of Regulations, section 1744 (b));
- whether the HHSEGS project is likely to cause new violations of ambient air quality standards or contribute substantially to existing violations of those standards (Title 20, California Code of Regulations, section 1743);
- whether mitigation measures proposed for the project are adequate to lessen potential impacts to a level of insignificance (Title 20, California Code of Regulations, section 1742 (b)).

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

The federal, state, and local laws and policies applicable to the control of criteria pollutant emissions and mitigation of air quality impacts for the HHSEGS are summarized in **Air Quality Table 1**. Staff's analysis examines the project's compliance with these requirements and summarizes the applicable LORS.

Air Quality Table 1
Laws, Ordinances, Regulations, and Standards

Applicable LORS	Description
Federal	
40 Code of Federal Regulations (CFR) Part 52	Nonattainment New Source Review (NSR) requires a permit and requires Best Available Control Technology (BACT) and Offsets. Permitting and enforcement is delegated to GBUAPCD with EPA oversight. Prevention of Significant Deterioration (PSD) requires major sources or major modifications to major sources to obtain permits for attainment pollutants. The HHSEGS project is a new source has and is a rule-listed emission source, thus the PSD trigger levels are 100 tons per year for NOx, VOC, SO_2, PM2.5 and CO. This project's proposed emissions are below NSR and PSD applicability thresholds.

Applicable LORS	Description
40 CFR Part 60	**New Source Performance Standards (NSPS), Subpart Dc Standards of Performance for Electricity Steam Generation Units.** Establishes emission standards and monitoring/recordkeeping requirements for units with less than 30 MMBtu/hr heat input. **Subpart Db Standards of Performance for Electricity Steam Generation Units.** Establishes emission standards and monitoring/recordkeeping requirements for units with greater than 100 MMBtu/hr heat input. **Subpart IIII Standards of Performance for Stationary Compression Ignition Internal Combustion Engines.** Establishes emission standards for compressions ignition internal combustion engines, including emergency firewater pump engines.
State	
Health and Safety Code (HSC) Section 40910-40930	Permitting of source needs to be consistent with Air Resource Board (ARB) approved Clean Air Plans.
HSC Section 41700	Restricts emissions that would cause nuisance or injury.
TItle17, California Code of Regulations (CCR),section 93115	**Airborne Toxics Control Measure for Stationary Compression Ignition Engines.** Limits the types of fuels allowed, established maximum emission rates, establishes recordkeeping requirements on stationary compression ignition engines, including emergency firewater pump engines.
Title13 ,CCR, section 2423	**Exhaust Emission Standards and Test Procedures: Heavy-Duty Off-Road Diesel Cycle Engines.** Limits the tier levels of emissions from heavy-duty off-road diesel cycle engines, including emergency backup generators and emergency firewater pump engines.
Assembly Bill 32: Global Warming Solutions Act of 2006 and related GHG reduction regulations	Reduce emissions of GHGs; operator must purchase and surrender GHG allowances, as required.
Local (Great Basin Unified Air Pollution Control District, GBUAPCD)	
Rule 200, 209, 210, 216 Permits Required	Requires a Permit to Construct before construction of an emission source occurs. Prohibits operation of any equipment that emits or controls air pollutant without first obtaining a permit to operate.
Rules 400, 401, and 402 Nuisance, Visible Emissions, Fugitive Dust	Limits the visible, nuisance, and fugitive dust emissions. Applicable to both the construction and operation phases of the project.
Rule 403 – Breakdown	Defines breakdown conditions and describes procedures to be followed by the owner/operator and by the APCO in the event of occurrence of breakdown conditions.

Applicable LORS	Description
Rule 404-A Particulate Matter - Concentration	Limits the particulate matter concentration from stationary source exhausts.
Regulation IX Standard of Performance for New Stationary Source	Incorporates the Federal NSPS (40 CFR 60) rules by reference.
Rule 217– Federal Operating Permits	Requires new or modified major facility or facilities that trigger NSPS, Acid Rain or other federal air quality programs to obtain a Title V federal operating permit.
Regulation III – Permit Fees	Requires facilities subject to this regulation to pay permit fees.
Rule 416 Sulfur Compounds and Nitrogen Oxides	Limits NOx and SO_2 emissions from combustion sources.

SETTING

CLIMATE AND METEOROLOGY

The project would be located in southeastern Inyo County, on the edge of California's eastern border with Nevada at approximately 2,600 feet above sea level. Relatively high daytime temperatures, extremely low relative humidity, large and rapid diurnal temperature changes, occasional high winds, and sand, dust, and thunderstorms characterize the high desert climate. Seasonally, the precipitation totals in the area range from 0.84 inches in February to 0.09 inches in June. The average precipitation in the project area is about 4.7 inches per year, half of which falls from December through March.

The most recent meteorological (weather) data, collected and maintained by the National Weather Service Cooperative Network located in Pahrump, on SR 160 in Nye County, Nevada is located approximately 8 miles "straight line" distance from the project site. The measured wind data are graphically represented by quarterly wind roses, provided in the AFC Figures 5.1-1 thru 5.1-5 (HHSEGS 2011a). Note that the standard convention is for the wind direction to head into the center of the plot. These wind roses show that for most of the year, prevailing winds are from the south through southeast, at an average wind speed of 2.1 meters per second. Mixing heights in the area, which represent the altitudes where different air masses mix together, are estimated to be on average 230 feet (70 meters) above ground in the morning to as high as 5,250 feet (1,600 meters) above ground level in the afternoon. Applicant and staff used supplemental cloud cover data from Henderson Airport in Nevada (located 48 miles east of the proposed site) and upper air data from Elko, NV (located 334 miles north of the proposed site).

The proposed project site is located within California at the California-Nevada border. It is near and generally upwind from Nevada's Clark and Nye Counties. Clark County's Department of Air Quality and Environmental Management, and the Nevada Division of Environmental Protection, Department of Air Quality Management, Bureau of Air Pollution Control ("Nevada DEP") provide air quality management for these two counties, respectively.

Sensitive Receptors

The local population is proximate to the project site, and includes many sensitive subgroups that may be at greater risk from exposure to emitted pollutants. These sensitive subgroups include the very young, the elderly, and those with existing illnesses. In addition, the location of the population in the area surrounding a project site may have a large bearing on health risk. The nearest residence to any power block equipment is approximately 3,500 feet south of the Solar Plant 2 power block and about 950 feet south of the project's southern boundary.

There is also a nearby project called the St. Therese Mission. It is a commercial facility under construction, which is located approximately 0.5 mile southeast of the HHSEGS site. This facility will be treated as a sensitive receptor because it will include a chapel, a garden, a restaurant, a visitor's center that will include a children's playground, and a residential unit. This facility is located within the modeling area for air quality. Impacts are assumed at this site and elsewhere in the modeling domain. For more detailed information on sensitive receptors, please see the **Public Health** section of this **FSA**.

EXISTING AMBIENT AIR QUALITY

The Federal Clean Air Act and the California Clean Air Act both require the establishment of standards for ambient concentrations of air pollutants, called ambient air quality standards (AAQS), set at levels to protect public health and welfare. The state AAQS, established by the California Air Resources Board (ARB), are typically lower (more protective) than the federal AAQS, which are established by the United States Environmental Protection Agency (U.S. EPA). The state and federal ambient air quality standards are listed in **Air Quality Table 2**. As indicated in **Air Quality Table 2**, the averaging times for the various air quality standards, the times over which they are measured, range from one-hour to annual averages. The standards are read as a concentration, in parts per million (ppm), or as a weighted mass of material per a volume of air, in milligrams or micrograms of pollutant in a cubic meter of air (mg/m^3 or $\mu g/m^3$, respectively).

In general, an area is designated attainment of an ambient air quality standard if the concentration of a particular air contaminant does not exceed the respective standard. Likewise, an area is designated non-attainment for an air contaminant if that contaminant standard is exceeded. Where not enough ambient air quality data are available to support designation as either attainment or non-attainment, the area is designated as unclassified. An unclassified area is normally treated the same as an attainment area for regulatory purposes. An area could be in attainment for one air contaminant while non-attainment for another, or attainment for the federal standard and non-attainment for the state standard for the same air contaminant.

HHSEGS is located in the Great Basin Valleys Air Basin (GBVAB) and within the Great Basin Unified Air Pollution Control District (GBUAPCD). This area is designated as moderate nonattainment for the state ozone standard, nonattainment for the state PM10 standard, unclassified for federal ozone standard, and attainment or unclassified for the state and federal CO, NO_2, SO_2, and PM2.5 standards. **Air Quality Table 3** summarizes the area's attainment status for various applicable state and federal standards.

Air Quality Table 2
Federal and State Ambient Air Quality Standards

Pollutant	Averaging Time	Federal Standard	California Standard
Ozone (O_3)	8 Hour	0.072 ppm (147 µg/m^3)	0.070 ppm (137 µg/m^3)
	1 Hour	—	0.09 ppm (180 µg/m^3)
Carbon Monoxide (CO)	8 Hour	9 ppm (10 mg/m^3)	9.0 ppm (10 mg/m^3)
	1 Hour	35 ppm (40 mg/m^3)	20 ppm (23 mg/m^3)
Nitrogen Dioxide (NO_2)	Annual	0.053 ppm (100 µg/m^3)	0.03 ppm (57 µg/m^3)
	1 Hour	100 ppb [b] (188 µg/m^3)	0.18 ppm (339 µg/m^3)
Sulfur Dioxide (SO_2)	Annual	0.030 ppm (80 µg/m^3)	—
	24 Hour	0.14 ppm (365 µg/m^3)	0.04 ppm (105 µg/m^3)
	3 Hour	0.5 ppm (1300 µg/m^3)	—
	1 Hour	75 ppb [c] (196 µg/m^3)	0.25 ppm (655 µg/m^3)
Particulate Matter (PM10)	Annual	—	20 µg/m^3
	24 Hour	150 µg/m^3	50 µg/m^3
Fine Particulate Matter (PM2.5)	Annual	15 µg/m^3	12 µg/m^3
	24 Hour	35 µg/m^3 [a]	—
Sulfates (SO_4)	24 Hour	—	25 µg/m^3
Lead	30 Day Average	—	1.5 µg/m^3
	Calendar Quarter	1.5 µg/m^3	—
Hydrogen Sulfide (H_2S)	1 Hour	—	0.03 ppm (42 µg/m^3)
Vinyl Chloride (chloroethene)	24 Hour	—	0.01 ppm (26 µg/m^3)
Visibility Reducing Particulates	8 Hour	—	In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70%.

[a] To attain this standard, the 3-year average of the 98th percentile of the daily concentrations must not exceed 35 µg/m3.
[b] To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average must not exceed 100 ppb.
[c] To attain this standard, the 3-year average of the 99th percentiles of the daily maximum 1-hour average must not exceed 75 ppb.
ppm= parts per million
Source: ARB 2012a

Ambient air quality monitoring data for ozone, PM10, PM2.5, CO, NO_2, and SO_2, compared to most restrictive applicable standards for the years between 2006 through 2011 (the last year that the complete annual data is currently available) at the most representative monitoring stations for each pollutant are shown in **Air Quality Table 4.** All ozone, PM10, and PM2.5 (up through 2011) data shown are from the Jean, Nevada, monitoring station located approximately 34 miles southeast of the project site. All CO data are from the Barstow, CA monitoring station located approximately 97 miles southwest of the project site. All SOx and NOx data are from the Trona, CA monitoring station located approximately 82 miles west southwest of the project site. Besides the

Jean monitoring station, which provides reasonably near ozone and particulate monitoring data, available monitoring stations for CO, NOx or SOx either are located just under a hundred miles away from the site, or in the case of Las Vegas, are otherwise not representative due to their urban location. Therefore, staff chose the GBVAB monitoring locations located in Barstow and Trona because they best represent the air quality conditions at the site. Staff expects that the background ambient concentrations for both of these pollutants to be relatively low at the project site due to its remote location. However, due to the relatively large distances from the proposed site, there is a reduced overall confidence in the representativeness of data from these monitoring stations.

Air Quality Table 3
Federal and State Attainment Status GBUAPCD [a]

Pollutant	Attainment Status [b]	
	Federal	State
Ozone	Unclassifiable/Attainment	Nonattainment
CO	Attainment	Attainment
NO_2	Attainment	Attainment
SO_2	Attainment	Attainment
PM10	Attainment	Nonattainment
PM2.5	Attainment	Attainment

Source: ARB 2011b, U.S. EPA 2011b.
a. Attainment status for the site area only, not the entire air basin. b. Attainment = Attainment or Unclassifiable.

Air Quality Table 4
Criteria Pollutant Summary Maximum Ambient Concentrations (ppm or µg/m^3)

Pollutant	Monitoring Station Location	Averaging Period	Units	2006	2007	2008	2009	2010	2011	Limiting AAQS
Ozone	Jean, NV	1 hour	ppm	0.092	0.092	0.087	0.082	0.082	.085	0.09
Ozone	Jean, NV	8 hours	ppm	0.083	0.088	0.078	0.079	0.076	.078	0.07
PM10 [a]	Jean, NV	24 hours	µg/m	62	60	96	81.3	49	79	50
PM10 [a, b]	Jean, NV	Annual	µg/m	12.1	12.7	14	12.4	8.5	*	20
PM2.5[c]	Jean, NV	24 hours	µg/m	9	9	13	11	10	12.6	35
PM2.5	Jean, NV	Annual	µg/m	3.52	4.0	4.9	4.0	3.5	*	12
CO	Barstow,	1 hour	ppm	3.5	1.4	1.4	1.2	1.3	4.4	20
CO	Barstow,	8 hours	ppm	1.19	0.7	1.23	0.089	0.089	1.35	9.0
NO_2	Trona, CA	1 hour	ppm	0.050	0.055	0.062	0.049	0.052	0.049	0.18
NO_2	Trona, CA	1 hour (98th	ppm	.042	.046	.043	.039	.043	0.043	.100
NO_2	Trona, CA	Annual	ppm	0.005	0.004	0.004	0.004	0.005	*	0.03
SO_2	Trona, CA	1 hour	ppm	0.033	0.014	0.036	0.011	*	0.001	0.25
SO_2	Trona, CA	24 hours	ppm	0.004	0.005	0.005	0.003	0.003	0.006	0.04
SO_2	Trona, CA	Annual	ppm	0.000	0.000	0.000	0.001	0.001	0.001	0.03

Source: ARB 2012, U.S. EPA 2012 Notes: * insufficient data available to determine the value.
a. Exceptional PM concentration events, such as those caused by windstorms are excluded in the data presented.
b. Annual average data is federal data and may not exactly represent California annual average.
c. The U.S. EPA database used for retrieval of the PM2.5 data did not allow direct determination of the calculated 98th percentile, which is the basis of the standard, so the closest proxy (third highest values) are presented.

Ozone

The area is considered "unclassified/attainment" for the federal 8-hour ozone standard and nonattainment for the state 8-hour ozone standard. The ambient data shown in **Air Quality Table 3** indicates that 8-hour concentrations near the site (Jean, Nevada) exceed the recently revised federal 8-hour ozone standard (0.075 ppm). However, the values shown are peak values that correspond to the state standard. The federal standard is the fourth highest 8-hour concentration in a year averaged over three years.

In a letter dated October 12, 2011, the California Air Resources Board proposed to U.S. EPA that the southern portion of Inyo County be designated attainment for the new federal 8-hour ozone standard (ARB 2011c) due to a design value which was measured during 2008 to 2010 at a fourth highest value equal to 0.072 ppm (averaged over the 3-year period) compared to the federal standard of 0.075 ppm. In April 2012 the U.S. EPA classified Inyo County as "unclassifiable/attainment" for the federal 8-hour ozone standard.[2]

Ozone is not directly emitted from stationary or mobile sources, but is formed as the result of chemical reactions in the atmosphere between directly emitted nitrogen oxides (NOx) and hydrocarbons (volatile organic compounds [VOC]), which are called ozone precursors. These can transform to ozone in the presence of sunlight. The maximum 1-hour ozone concentrations monitored near the site in Jean, Nevada, have been relatively stable over the past ten years and are just over California's 1-hour standard for most years from 2006 to 2011. The maximum 8-hour ozone concentrations also have been relatively stable over the past years and are somewhat closer to their standard than the 1-hour ozone levels.

Staff notes that in the area of the project site at the far southeastern end of the GBVAB, there is the potential for ozone and ozone precursor transport from the Las Vegas area. The main geographical locations of the ozone precursor emissions for ozone levels observed in this region are primarily from pollutant transport from distant urban areas.

Nitrogen Dioxide

The entire air basin is classified attainment of the state 1-hour and federal short-term and annual nitrogen dioxide (NO_2) standards. The NO_2 levels monitored in Jean, Nevada, are no more than 35 percent of the most stringent California NO_2 ambient air quality standard. Most of the NOx typically emitted from combustion sources is in the form of nitric oxide (NO), while the balance is NO_2. NO is oxidized in the atmosphere to form NO_2, but some level of photochemical activity is needed for this conversion. The highest concentrations of NO_2 typically occur during the fall. The winter atmospheric conditions can trap NO emissions near the ground but lacking substantial photochemical activity (sun light), the oxidation rate of NO to NO_2 and NO_2 levels remain relatively low. In the summer, the conversion rates of NO to NO_2 are high, but the relatively high temperatures and windy conditions disperse pollutants, preventing the accumulation of NO_2 at levels that might approach the 1-hour federal ambient air quality standard.

[2] http://www.epa.gov/airquality/ozonepollution/designations/2008standards/final/region9f.htm

Carbon Monoxide

The area is classified attainment of the state and federal 1-hour and 8-hour carbon monoxide (CO) standards. The highest concentrations of CO occur when low wind speeds and a stable atmosphere trap the pollution emitted at or near ground level. These conditions occur frequently in the wintertime late in the afternoon, persist during the night and may extend one or two hours after sunrise.

Particulate Matter (PM10)

The area is nonattainment for the state PM10 standard and attainment/unclassified for the federal standard. PM10 can be emitted directly as fugitive dust or combustion particulates, or it can be formed many miles downwind from emission sources when various precursor pollutants interact in the atmosphere. Gaseous emissions of pollutants like NOx, SOx and VOC from combustion sources, and ammonia (NH_3) from human and animal wastes or combustion NOx control equipment can, given the right meteorological conditions, form particulate matter known as nitrates (NO_3), sulfates (SO_4), and organic compounds. These pollutants are secondary particulates because they are not directly emitted but are formed through complex chemical reactions between directly emitted pollutants in the atmosphere.

Fine Particulate Matter (PM2.5)

Fine particulate matter, or PM2.5 (particulate matter less than 2.5 microns in diameter), is derived either mainly from the combustion of materials, or from precursor gases (SOx, NOx, and VOC) through complex reactions in the atmosphere. PM2.5 consists mostly of sulfates, nitrates, ammonium, elemental carbon, and a small portion of organic and inorganic compounds. A small percentage of PM2.5 emissions come from fugitive dust sources and motor vehicles combustion sources from the construction vehicles.

The Great Basin Valleys Air Basin in southeastern Inyo County where the proposed project site is located is classified as attainment or unclassified for both the state and the federal PM2.5 air quality standards, but as noted previously the area is not in attainment of the state PM10 standard. This divergence indicates that the ambient PM10 levels are most likely due to localized fugitive dust sources, such as vehicles travel on unpaved roads, agricultural operations, or wind-blown dust.

Sulfur Dioxide

The entire air basin is attainment for the state and federal SO_2 standards.
Sulfur dioxide is typically emitted from the combustion of fuels containing sulfur. Sources of SO_2 emissions within the GBVAB come from a wide variety of fuels: gaseous, liquid and solid; however, the total SO_2 emissions within the eastern GBVAB are limited due to the limited number of major stationary sources and California's and U.S. EPA's substantial reduction in motor vehicle fuel sulfur content. The project area's SO_2 concentrations are well below the state and federal ambient air quality standards.

Nitrates and Sulfates

PM nitrate (mainly ammonium nitrate) forms in the atmosphere from the reaction of NOx and ammonia. NOx from combustion sources is mainly in the form of nitric oxide (NO). NO converts to NO_2 primarily by reacting with ozone in the ambient air and sunlight. The

formed NO_2 can convert back to NO, which sustains the ozone formation reactions. NO_2 can also form organic nitrates, or can be reduced to nitric acid by available hydroxyl radicals in the ambient air. Nitric acid reacts with ammonia in ambient air to form ammonium nitrate. Ammonium nitrate, in its particulate form, can remain suspended in the ambient air and/or be transported long distances downwind as PM2.5. Ammonium nitrate, under certain conditions of heat and humidity, breaks down to NOx and starts a new ozone cycle.

PM sulfate (mainly ammonium sulfate) forms in the atmosphere from the oxidation of SO_2 and subsequent neutralization by ammonia in the atmosphere. This oxidation of SO_2 depends on many factors, which include the availability of sulfur, hydroxyl, hydroperoxy and methylperoxy radicals, and atmospheric humidity. Given the low SO_2 and humidity levels in the site vicinity, PM sulfate levels would be low.

Summary

In summary, staff recommends the background ambient air concentrations in **Air Quality Table 5** for use in the modeling and impacts analysis. The recommended background concentrations are the maximum criteria pollutant concentrations from the past three years of available data collected at the monitoring stations staff selected as the most representative of the proposed project area.

Air Quality Table 5
Staff Recommended Background Concentrations (µg/m^3)

Pollutant	Averaging Time	Recommended Background	Limiting Standard	Percent of Standard
NO_2	1 hour	117	339	35%
	1 hour Federal	80.8	188	43%
	Annual	7.5	57	13%
PM10	24 hour	**96**	**50**	**192%**
	Annual	14	20	70%
PM2.5	24 hour	13	35	37%
	Annual	4.9	12	41%
CO	1 hour	1,750	23,000	8%
	8 hour	1,333	10,000	13%
SO_2	1 hour	93.6	655	14%
	24 hour	13.1	105	12%
	Annual	2.7	80	3%

Source: AFC Table 5.1-34 (HHSEGS 2011a); updated with ARB 2012.
Note that an exceedance is not necessarily a violation of the standard, and that only persistent exceedances lead to designation of an area as nonattainment.

Where possible, staff prefers that the recommended background concentrations come from nearby monitoring stations with similar land use characteristics. For this project, the monitoring station located in Jean, NV (ozone, PM10, and PM2.5 [up to 2011]) is located reasonably close to the project site and should be representative of the project site. The Barstow (CO) monitoring station is in a more populated area, and should be conservative compared to the project site. The Trona (NO_2 and SO_2) monitoring station, while located in a more remote area, has two very large nearby emission sources of SOx (Searles Valley Minerals and Ace Cogeneration Company) so this monitoring

station location should provide representative or conservative SO_2 background concentrations for the project site.

The background 24-hour concentrations for PM10 are above the most restrictive existing ambient air quality standards, while the background concentrations for the other pollutants and averaging times are all below the most restrictive existing ambient air quality standards.

In accordance with applicable EPA modeling protocols, the pollutant modeling analysis includes the pollutants listed above in **Air Quality Table 5**.

PROJECT DESCRIPTION

The proposed HHSEGS would comprise two solar fields and a common area. The applicant has identified the northern solar plant as Solar Plant 1 and the southern plant as Solar Plant 2. Each solar plant would generate 270 megawatts (MW) gross (250 MW net), for a total net output of 500 MW. Each would have a central tower surrounded by distributed field of heliostat (mirror) arrays. The heliostats focus solar energy on the power tower receivers located at the top of the tower. HHSEGS Solar Plants 1 and HHSEGS Solar Plant 2, would occupy approximately 1,483 acres (or 2.3 square miles) and 1,510 acres (2.4 square miles) respectively. Both solar plants would share a common administration building, an operation and maintenance building, and a substation and would cover approximately 103 acres. The HHSEGS total project footprint amounts to approximately 3,097 acres (approximately 4.84 square miles). Another 180 acres would be needed during the construction period for lay down and staging activities. The temporary construction lay down area in addition to the entire HHSEGS site would total 3,277 acres.

Each plant would have five emitting sources, consisting of two natural-gas-fired boilers, two diesel fuel-fired emergency engines, and a wet surface air cooler. Additionally, the common area would contain diesel fuel-fired emergency equipment consisting of a small emergency generator and a fire pump. Two types of boilers would be used at each power block. Each boiler would be equipped with low-NOx burners and flue gas recirculation (FGR) for NOx control; CO would be controlled using good combustion practices; and particulate and VOC emissions would be minimized through the use of natural gas as the fuel. Specifications for the new boilers are summarized in the project operation section of this FSA.

Each plant would use one 249 million British Thermal Units per hour (MMBtu/hr) natural-gas-fired auxiliary boiler to facilitate daily start up by preheating the solar boiler and steam turbine generator piping before sufficient solar energy is available. This would enhance project efficiency by allowing solar flux to maximize output more quickly than if solar heating alone were used to heat the entire system. During cloudy days or in case of an emergency shutdown, these boilers would also keep the system hot to facilitate plant restart.

Additionally, one small (15 MMBtu/hr) natural-gas-fired boiler, called a nighttime preservation boiler, would be used at each plant to provide steam to keep the steam turbine generators and boiler pump gland systems under vacuum overnight and during

other shutdown periods when solar heat is not available. Using these small boilers would be more efficient than allowing these systems to cool and then using the larger startup boilers to reestablish the vacuums in the morning.

On an annual basis, heat input from natural gas would be limited to less than 10 percent of the heat input from the sun. To save water in the site's desert environment, each solar plant would use a dry air-cooled condenser for steam condensing. A partial dry-cooling system (wet surface air cooler –WSAC) would provide auxiliary equipment cooling. Groundwater would be drawn daily from three wells located onsite; one at each power block and a third at the administration complex. Groundwater would be treated in an onsite treatment system for use as boiler make-up water and to wash the heliostats.

The HHSEGS would interconnect to the Valley Electric Association (VEA) system[3]. The interconnection would require an approximately 10-mile long generation tie line (gen tie line) from the HHSEGS to the proposed Crazy Eyes Tap Substation[4], where the project would interconnect to the VEA electric grid. The gen tie line would originate at the HHSEGS's onsite switchyard, cross the state line avoiding the mesquite vegetation to the south and continue east for approximately 1.5 miles until reaching Tecopa Road. At Tecopa Road, the route would head northeast paralleling Tecopa Road until it reaches the Crazy Eyes Tap Substation, which would be located immediately east of the Tecopa Road/SR 160 intersection. The Crazy Eyes Tap Substation would interconnect to the existing VEA Pahrump Bob Tap 230 kV line. (CH2 2012q)

A 12-inch diameter natural gas pipeline would be required for the HHSEGS project. Kern River Gas Transmission Company (KRGT) proposes to construct the pipeline from the HHSEGS meter station, to be located in the HHSEGS Common Area, extending 32.4 miles to KRGT's existing mainline system just north of Goodsprings in Clark County, Nevada. The HHSEGS meter station, including pig receiver facilities, would be approximately 300 feet by 300 feet and would be surrounded by a 6-foot tall chain link fence topped with three strands of barbed wire (approximately 7 feet high total). The meter station would be shaded by a canopy to cover the meter runs and associated instrumentation and valves. A data acquisition and control (DAC) building would be located within the meter station. Data acquisition, control, uninterrupted power supply (UPS), and communication equipment would be installed inside the DAC building. Yard lights would be installed on the DAC building and meter building exterior. In addition, the light fixtures would be shielded or hooded and directed downward (CH2 2012q).

The transmission and natural gas pipeline alignments would be located primarily in Nevada on federal land managed by the U.S. Bureau of Land Management (BLM), except for small segments of the transmission line (both options) in the vicinity of the Eldorado Substation located within the city limits of Boulder City, Nevada, which is located south of Las Vegas (see **Project Description Figure 3**). This assessment is limited to include only the portion of the transmission line system and natural gas pipeline linears to be located in California. Environmental aspects of the parts of these

[3] In January 2013, VEA will become a participating transmission owner (PTO) and will turn operational control of its facilities over to the California Independent System Operator (CAISO).

[4] In the HHSEGS Application for Certification, this substation was referred to as the Tap Substation.

linears located in Nevada would be assessed by the U.S. Bureau of Land Management (BLM).

Following completion of project licensing and close of financing, HHSEGS would be constructed in approximately 29 months with the following schedule:

- Begin construction: Second quarter 2013
- Startup and testing: Second quarter 2015 for Solar Plant 1; third quarter 2015 for Solar Plant 2
- Commercial operations: third quarter 2015 for Solar Plant 1; fourth quarter 2015 for Solar Plant 2

Project steam cycle cooling for each solar plant would use an air-cooled condenser (ACC) or dry cooling for each of the plants. Water consumption would be, therefore, minimal—mainly to provide water for washing heliostats and for boiler make up. Process wastewater would be treated onsite. Domestic wastewater would be disposed of in a septic tank and an onsite leach field. Therefore, no industrial wastewater or sewer pipeline would be constructed.

The project would include other operating emission sources for operation and maintenance of the facility. Each plant would include a diesel-fired 200-horsepower (hp) fire pump engine (2 total at the HHSEGS project site) along with a 200-hp fire pump in the common area. One 3,633-hp emergency generator engine would be located at HHSEGS Solar Plant 1 and another at HHSEGS Solar Plant 2, along with one smaller 398-horsepower emergency generator engine at the common area (3 total at the HHSEGS project site). Additionally, the applicant has proposed that the facility would have engines for the mirror washing equipment that would be EPA-certified, non-road or on-road engines[5] to power mirror-washing trailers and dedicated pickup trucks for personnel transport within the plants. These would create both tailpipe and fugitive dust emissions during operation.

PROJECT CONSTRUCTION

Construction of the common area facilities would occur concurrently with the construction of the first solar plant.

There would be an average daily workforce, during the peak 12-month period of approximately 1,749[6] construction craft people, supervisory, support, and construction management personnel onsite. The peak construction site workforce of 2,293 is expected to occur in month 19 (see Updated Workforce Analysis, CH2 2012jj, Section 1.0 page 1-1).

Generally, construction activities would occur from 5:00 a.m. to 3:30 p.m. with a swing shift during heliostat assembly from 6:00 p.m. to 4:30 a.m. Additional hours may be necessary to make up schedule deficiencies, or to complete critical construction activities (e.g., tower construction, foundation pouring, or working around time-critical

[5] Data Response, Set 2A in response to Staff's Data Request Set 2A filed on January 9, 2012

[6] See CH2M 2012jj "Updated Workforce Analysis" Section 2.0 Air Quality Table AQ-1.

shutdowns and constraints). During some construction periods and during the startup phase of the project, some activities would continue 24 hours per day, 7 days per week.

Air Quality TABLE 6
Project Schedule Major Milestones

Activity	Date
Solar Plant 1 and Common Area	
Fencing and tortoise clearance	Second Quarter 2013
Begin construction	Second Quarter 2013
Startup and commissioning	Second Quarter 2015
Commercial operation	Third Quarter 2015
Solar Plant 2	
Fencing and tortoise clearance	Second Quarter 2013
Begin construction	Third Quarter 2013
Startup and commissioning	Third Quarter 2015
Commercial operation	Fourth Quarter 2015

Air Quality Table 7 presents the applicant's estimate of direct onsite and offsite (delivery and employee vehicle) construction emissions for NOx, VOC, SOx, CO, PM10 and PM2.5.

Air Quality Table 7
HHSEGS Construction Emissions

Solar Facility Construction	Daily Emissions (lbs/day) [a, b]					
	NOx	SOx	CO	VOC	PM10	PM2.5
Maximum Daily Onsite Emissions	384.4	0.65	192.3	29.3	190.8	37.7
Maximum Daily Offsite Emissions[C]	313.0	0.6	436.6	58.5	13.4	10.3
Maximum Daily Emissions	697.4	1.25	628.9	87.8	204.2	48.0
	Annual Emissions (tons/year) [a]					
Maximum Annual Onsite Emissions	34.2	0.06	17.5	2.62	12.6	2.7
Maximum Annual Offsite Emissions[d]	11.6	0.01	24.2	3.0	0.6	0.4
Maximum Annual Emissions	45.8	0.07	41.7	5.6	13.2	3.1

Source: AFC (HHSEGS 2011a), supplemental data submitted April 2, 2012 (CH2 2012p) and updated workforce analysis submitted Oct. 2012 (CH2 2012jj)

Notes:

a. Onsite emissions include fugitive dust, construction equipment, and concrete batch plant
b. Max daily onsite emissions occur during month 8 and 9, with the maximum daily offsite emissions occur during Month 19. Values in the table are now representative of the maximum daily emission, which occur during month 8.
c. Maximum Daily Offsite Emissions are from month 8 and 9 of the updated Construction Traffic Assumptions document submitted on October 2, 2012, Air Quality Section 2.2 Table AQ-3.
d. Maximum Daily Annual Offsite Emissions can be found in the updated Construction Traffic Assumptions document submitted on October 2, 2012, Air Quality Section 2.2 Table AQ-4.

On October 1, 2012, staff received applicant document titled, “Updated Workforce Analysis (Air Quality, Socioeconomics, Traffic and Transportation, and Worker Safety & Fire Protection). Staff has reviewed the information, noted the changes to construction emissions, and reflected the new values are in **Air Quality Table 7** above.

These emission estimates appear reasonable in terms of the onsite equipment, fugitive dust, the concrete batch plant and offsite vehicle use and the offsite vehicle fugitive dust emissions. However, staff recommends additional mitigation measures, specifically the use of CEC-approved soil binders on unpaved roads and other inactive disturbed surfaces during construction, to ensure fugitive dust emissions and associated impacts comply with the applicable standards. Please see the **Soil and Surface Water** section of this **FSA** for more details.

PROJECT OPERATION

The HHSEGS facility would be a nominal 500 Megawatt (MW) heliostat mirror and power tower thermal solar electrical generating facility comprising two plants, HHSEGS Solar Plant 1 (250 MW), and HHSEGS Solar Plant 2 (250 MW) (HHSEGS 2011a). The direct air pollutant emissions from solar power generation are minimal; however, the facility would start-up each day with the assist of natural gas-fueled boilers associated with each plant and there are other equipment and maintenance activities necessary to operate and maintain the facility.

The HHSEGS onsite stationary and mobile emission sources are as follows:

- Each solar plant would include two gas-fired boilers.
- One auxiliary boiler (249 MMBtu) would provide steam prior to sunrise to expedite the process of bringing the solar plants online. During cloudy days or in case of an emergency shutdown, this boiler would also keep the solar generating system hot to facilitate plant restart. The boiler would have a nominal steam production rate of 174,000 lb/hr at 770°F and 655 psia.
- One night preservation boiler would provide steam to the steam turbine generator (STG) and boiler feedwater pump and systems overnight and during other shutdown periods when steam is not available from the solar receiver steam generator (SRSG). The night preservation boiler would have a nominal steam production rate of 10,000 lb/hr at 680°F and 145 psia.
- Each auxiliary boiler would have a maximum of no more than 1,208 equivalent full-load hours of use per year and each nighttime preservation boiler would have a maximum of 5,003 equivalent full-load hours of use per year;
- One 200-bhp diesel-fired emergency fire water pump engine (one for each plant) and one 200-bhp diesel-fueled emergency fire pump, to be located in the common area, would operate in a non-emergency mode for no more than 50 hours per year or no more than required by National Fire Protection Association, whichever is greater;
- One 3,633-bhp diesel-fired emergency generator engine (two for the entire HHSEGS project), and one 398-bhp diesel-fueled emergency generator for the common area would operate in non-emergency mode no more than 50 hours per year;

- Onsite diesel-fueled maintenance vehicles used for mirror washing and other maintenance/operation support activities.

The following assumptions were used to develop the hourly, daily, and annual emissions estimate for HHSEGS operation:

A. Maximum Hourly Emissions

- All boilers are operating.
- All diesel engines operate for one-half hour of duration for readiness testing.

B. Maximum Daily Emissions

- The auxiliary boilers operate up to five equivalent full load hours and up to a total of 7.5 hours per day at low loads, including startup.
- The nighttime preservation boilers operate up to 12 equivalent full-load hours per day during summer months and up to 16 equivalent full-load hours per day during winter months, with an additional hour of low-load operation during startup each day.
- Each emergency generator engine operates half an hour per test.
- Each emergency fire pump engine operates half an hour per test

C. Maximum Annual Emissions

- Each auxiliary boiler was modeled assuming 1,100 full-load hours and 865 startup hours of operation per year.
- Each nighttime preservation boiler was modeled assuming 4,780 full-load hours and 345 startup hours of operation per year.
- Each emergency generator engine was modeled assuming it would operate 50 hours per year for readiness testing purposes.
- Each emergency fire pump engine was modeled assuming it would operate 50 hours per year for readiness testing purposes.

The HHSEGS onsite stationary sources, onsite mobile equipment, and offsite vehicle emissions, including fugitive PM10 emissions, are summarized in **Air Quality Table 8**.

Staff has received the applicants document titled, “Updated Workforce Analysis (Air Quality, Socioeconomics, Traffic and Transportation, and Worker Safety & Fire Protection), which was received by Energy Commission staff docketed October 1, 2012. Staff reviewed the information and found that both the air quality impacts discussed in the AFC and boiler optimization emissions are unchanged. The operations phase of the project remains unchanged because the operations workforce would be slightly reduced.

The direct stationary source emissions from this project are well below the PSD and/or nonattainment NSR permitting applicability thresholds; therefore, the U.S. Environmental Protection Agency (U.S. EPA) and GBUAPCD consider the facility to be a minor stationary source and not expected to create significant impacts.

Air Quality Table 8
HHSEGS Operation - Maximum Hourly, Maximum Daily, and Annual Emissions

	Maximum Hourly Emissions (lbs/hr)					
Emission Source	NOx	SOx	CO	VOC	PM10	PM2.5
Boilers	5.8	1.1	10.2	2.8	2.6	2.6
Emergency Generator Engines	39.8	0.04	22.0	1.4	1.3	1.3
Emergency Fire Pump Engines	2.0	0.01	1.7	0.1	0.1	0.1
WSACs	-	-	-	-	-	<0.01
Maintenance Vehicles (mirror washing)	0.2	0.06	0.01	0.01	0.01	0.01
Maintenance Vehicles (fugitive dust)	-	-	-	-	1.7	0.2
Employee and Delivery Vehicles (offsite)	3.62	0.03	19.15	1.88	1.40	0.37
Total Maximum Hourly Emissions	51.42	1.24	53.06	6.19	7.11	4.59
Emission Source	Maximum Daily Emissions (lbs/day)					
Boilers	74.3	7.4	132.5	36.2	19.6	19.6
Emergency Generator Engines	39.8	0.04	22.0	1.4	1.3	1.3
Emergency Fire Pump Engines	2.0	0.01	1.7	0.1	0.1	0.1
WSACs	-	-	-	-	0.4	0.4
Maintenance Vehicles (mirror washing)	4.1	1.1	1.6	1.9	0.1	0.1
Maintenance Vehicles (fugitive dust)	-	-	-	-	34.6	3.5
Employee and Delivery Vehicles (offsite)	20.5	0.2	101.9	10.0	7.4	2.0
Total Maximum Daily Emissions	140.7	8.75	259.7	49.6	63.5	27
Emission Source	Annual Emissions (tons/year)					
Boilers	6.3	0.8	11.8	3.0	2.0	2.0
Emergency Generator Engines	2.0	0.01	1.1	0.07	0.06	0.06
Emergency Fire Pump Engines	0.1	0.01	0.1	0.01	0.01	0.01
WSACs	-	-	-	-	0.03	0.03
Maintenance Vehicles (mirror washing)	0.7	0.2	0.03	0.3	0.02	0.02
Maintenance Vehicles (fugitive dust)					6.3	0.6
Employee and Delivery Vehicles (offsite)	1.8	0.0	17.1	1.7	1.2	0.3
Total Annual Emissions	10.9	1.02	30.13	5.08	9.62	3.02

Source: supplemental data responses submitted April 1, 2012 table 5.1-27R and table 5.1-26R (CH2 2012p)

INITIAL COMMISSIONING

Initial commissioning refers to a period of approximately 60 days prior to beginning commercial operation when the equipment undergoes initial tuning and performance tests. Staff does not expect substantial change of emissions from the facility commissioning compared to that of full operation.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Staff assessed three kinds of primary and secondary[7] impacts: construction, operational, and cumulative. Construction impacts result from the emissions occurring during site preparation and construction of the project. Operational impacts result from the emissions of the proposed project during normal operation, which includes all of the

[7] Primary impacts potentially result from facility emissions of NOx, SOx, CO and PM10/2.5. Secondary impacts result from air contaminants that are not directly emitted by the facility but formed through reactions in the atmosphere that result in ozone, and sulfate and nitrate PM10/PM2.5.

onsite auxiliary equipment (boilers, emergency generator, fire pump engine, etc.) and the maintenance vehicle emissions. Cumulative impacts result from the proposed project's incremental effect, together with other closely related past, present and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed project. (Pub. Resources Code § 21083; Cal. Code Regs., tit. 14, §§ 15064(h), 15065(c), 15130, and15355.)

METHOD AND THRESHOLD FOR DETERMINING CEQA SIGNIFICANCE

Energy Commission staff used two main CEQA significance criteria in evaluating this project. First, all project emissions of nonattainment pollutants and their precursors (PM10, NOx, VOC and SO_2) are considered cumulative, CEQA-significant impacts that must be mitigated. Second, any AAQS violation caused by unmitigated project emissions is considered CEQA-significant and must be mitigated. Potentially significant CEQA impacts are deemed to be mitigated to be less than CEQA-significant with the application of appropriate mitigation measures.

For construction emissions, CEQA mitigation is limited to controlling both construction equipment tailpipe emissions and fugitive dust emissions through best practices, to reduce impacts to less than significant.

For operating emissions, when analyzing renewable projects with very low direct criteria pollutant emissions from stationary sources associated with electric generation that: 1) are located in areas with generally good air quality; and 2) are non-attainment of ambient air quality standards primarily or solely due to pollutant transport, the mitigation that is considered is limited to feasible emission controls. These feasible emission controls are applied to both the stationary sources (such as requiring BACT) and the on-site, non-stationary emission sources (such as maintenance vehicles) including associated fugitive dust emission sources.

The ambient air quality standards that staff uses as a basis for determining project CEQA significance are health-based standards established by the ARB and U.S. EPA. They are set at levels to adequately protect the health of all members of the public, including those most sensitive to adverse air quality impacts such as the aged, people with existing illnesses, children, and infants, including a margin of safety.

Impacts from Closure and Decommissioning

Impacts from closure and decommissioning, as a one-time limited duration event, are evaluated with the same methods and thresholds as construction emissions as discussed above.

DIRECT/CUMULATIVE IMPACTS AND MITIGATION

While the emissions are the actual mass of pollutants emitted from the project, the impacts are the concentration of pollutants from the project that reach the ground level. When emissions are released at a high temperature and velocity through a relatively tall stack, the pollutant concentrations would be substantially diluted by the time they reach ground level. The emissions from the proposed project, both stationary source and

onsite mobile source emissions, are analyzed by the use of air dispersion models to determine the probable impacts at ground level.

Air dispersion models provide a means of predicting the location and ground level magnitude of the impacts of a proposed new emissions source. These models consist of several complex series of mathematical equations, which are repeatedly calculated by a computer for many ambient conditions to provide theoretical maximum offsite pollutant concentrations short-term (1-hour, 3-hour, 8-hour, and 24-hour) and annual periods. The model results are generally described as maximum concentrations expected outside the project's boundary and are often described as a unit of mass per volume of air, such as micrograms per cubic meter ($\mu g/m^3$).

The applicant has used the U.S. EPA-approved ARMS/EPA Regulatory Model (AERMOD version 1135) air dispersion model to estimate the direct impacts of the project's NOx, PM10, CO, and SOx emissions resulting from project construction and operation. Additionally, boiler emission fumigation impacts during inversion breakup conditions were determined using the U.S. EPA approved SCREEN3 (version 96043) model.

Staff revised the background concentrations provided by the applicant, replacing them with the available highest ambient background concentrations for the last three years from representative monitoring sites show in **Air Quality Table 5**. Staff added the modeled impacts to these background concentrations, then compared the results with the ambient air quality standards for each respective air contaminant to determine whether the project's emission impacts would cause a new violation of the ambient air quality standards or would contribute to an existing violation.

The inputs for the air dispersion models include stack information (exhaust flow rate, temperature, and stack dimensions), specific boiler emission data and meteorological data, such as wind speed, atmospheric conditions, and site elevation. For this project, the meteorological data used as inputs to the model included hourly wind speeds and directions measured at the Pahrump, Nevada, meteorological site during 2006 and 2011, which is the closest complete meteorological data source to the project site, and supplemented cloud cover data to fill missing information was done by using the Henderson Airport meteorological site. Concurrent upper air data from Elko, Nevada was also used.

Additionally, the applicant obtained hourly ozone and NO_2 ambient data from the Jean Nevada and Trona, CA monitoring stations for 2006 through 2011 that was used in a more refined NO_2 impact modeling analysis using the Ozone Limiting Method (OLM), available with AERMOD that integrates with the downwind plume stoichiometry.

Proposed Project

Construction Impacts Analysis

The HHSEGS project would be constructed in two phases over approximately 29 months. Construction generally consists of two major activities: site preparation, and construction and installation of major equipment and structures. In addition to fugitive dust emissions resulting from the site preparation, emissions from construction

equipment exhausts, such as vehicles and internal combustion engines, would also occur during the project construction phase.

Using estimated peak hourly, daily, and annual construction equipment exhaust and fugitive dust emissions, the applicant performed a modeling analysis. **Air Quality Table 9** presents the results of the applicant's modeling analysis.

Air Quality Table 9
Maximum Project Construction Impacts

Pollutants	Avg. Period	Impacts ($\mu g/m^3$)	Background [a] ($\mu g/m^3$)	Total Impact[a] ($\mu g/m^3$)	Standard ($\mu g/m^3$)	Percent of Standard
NO_2	1-hr	133.5	117	251	339	74%
	1-hr (98th percentile)	88.0	80.8	169	188	90%
	Annual	3.7	7.5	11	57	19%
PM10	24-hr	29.3	96	125	50	250%
	Annual	1.4	14	15.4	20	77%
PM2.5	24-hr[b]	5.1	13	18	35	46%
	Annual[c]	0.3	4.9	5.2	12	43%
CO	1-hr	66.8	1,750	1,817	23,000	8%
	8-hr	28.3	1,333	1,361	10,000	13%
SO_2	1-hr	0.2	93.6	94	196	48%
	3-hr	0.2	23.4	24	1300	2%
	24-hr	0.05	13.1	13.1	105	12.5%
	Annual	0.01	2.7	2.7	80	3.4%

Source: HHSEGS DResponse set 1A table DR8-4 2011.
Note:
a. Total concentrations shown in this table are the sum of the maximum predicted impact and the maximum measured background concentration. Because the maximum impact would not occur at the same time as the maximum background concentration, the actual maximum combined impact would be lower.
b Background concentration shown is the three-year average of the 98th percentile values, in accordance with the form of the federal standard. Table 5.1F-8, footnote c.
c. Background value shown is the three-year average of the annual arithmetic mean, in accordance with the form of the standard.

This modeling analysis indicates that the project would not create new exceedances and, with the exception of 24-hour PM10 impacts, would not contribute to existing exceedances for any of the modeled air pollutants. Staff notes that the maximum local background 24-hour measurements of PM10, which exceed the state 24-hour PM10 standard with or without the proposed project, may be substantially impacted by wind-blown dust. However, in light of the existing PM10 and ozone non-attainment status for the project site area with regard to state standards, staff considers the construction NOx, VOC, and PM emissions to be potentially CEQA significant and, therefore, staff is recommending that the off-road equipment and fugitive dust emissions be mitigated.

The modeling analysis shows that, after implementation of the recommended fugitive dust mitigation measures, the project's construction is not predicted to cause violations of state or federal AAQS.

Construction Impacts Mitigation

To mitigate the impacts due to construction of the facility, the following mitigation measures have been proposed:

A. All unpaved roads and disturbed areas in the project and for the portion of the linear construction sites located in California would be watered until sufficiently wet to ensure that no visible dust plumes leave the project site.

B. Vehicle speeds would be limited to10 miles per hour within the construction site on unpaved non-stabilized roads.

C. All construction equipment vehicle tires would be washed or cleaned free of dirt prior to entering or leaving the project site.

D. Gravel ramps would be provided at the tire washing/cleaning station.

E. All entrances to the construction site would be graveled or treated with water or dust soil stabilization compounds.

F. Construction areas adjacent to any paved roadway would be provided with sandbags to prevent run-off to the roadway.

G. All paved roads within the construction site would be swept twice daily when construction activity occurs.

H. At least the first 500 feet of any paved public roadway, accessed from the construction site or from unpaved roads en route to the construction site and construction staging areas would be swept regularly on days when construction activity occurs.

I. All soil storage piles and disturbed areas that remain inactive for longer than 10 days would be covered or treated with appropriate dust suppressant compounds.

J. All vehicles that are used to transport solid bulk material on public roadways and that have potential to cause visible emissions would be provided with a cover, or the materials would be sufficiently wetted and loaded onto the trucks in a manner to provide at least two feet of freeboard.

K. Wind erosion control techniques such as windbreaks, water, chemical dust suppressants, and vegetation would be used on all construction areas that may be disturbed. Any windbreaks used would remain in place until the soil is stabilized or permanently covered with vegetation.

L. Construction equipment would be shut down when not in use in order to avoid excessive idling emissions.

M. Construction equipment would use low sulfur, low aromatic diesel fuel.

N. Construction equipment would be maintained as specified by OEM (original equipment manufacturers) specifications. .

O. Construction equipment used would meet state and federal emission most current standards when available.

Staff recommends the implementation of mitigation measures contained in conditions of certification **AQ-SC1** to **AQ-SC5**, which incorporate the applicant's proposed measures with revisions and additions recommended by staff to further reduce the impacts from the construction of the proposed project. Specific recommendations from staff include a more aggressive dust control requirement to use CPM approved polymer based, or equivalent, soil stabilizers on the site's unpaved roads and inactive disturbed surfaces during construction.

AQ-SC1 would require the project owner to designate and retain an on-site AQCMM who shall be responsible for directing and documenting compliance with conditions of certification **AQ-SC3**, **AQ-SC4** and **AQ-SC5.**

The AQCMM would have overall responsibility for directing and documenting The project's compliance with **AQ-SC3** through **AQ-SC5** which are mitigation measures for the site during project construction. Types of actions that can be taken and have been approved by the Energy Commission for other desert projects include but are not limited to:

- Monitoring construction activities for visible dust plumes that have the potential to be transported offsite and within 400 feet of offsite structures not owned by the Owner or 200 feet from the centerline of a linear facility (e.g., pipeline).
- Within 15 minutes of determination of non-compliant dust conditions (associated with construction activity), direct the more intensive application of existing mitigation measures.
- Within 30 minutes of determination of continuing non-compliant dust conditions (associated with construction activity), direct the more intensive application of additional mitigation measures.
- Within 60 minutes of determination of continuing non-compliant dust conditions (associated with construction activities), direct a temporary shutdown of the activity causing the emissions. Activity would not resume until effective mitigation has been implemented or site conditions have changed, such that non-compliant dust conditions would not resume upon restart of the activity.
- Respond to direction from the CPM or BLM Authorized Officer regarding Owner appeals to AQCMM directives.
- Submit related compliance and mitigation measures to the CPM via the Monthly Compliance Report.

The construction of the project would cause particulate matter emissions that would add to existing violations of the state's ambient PM10 air quality standards. Therefore, if unmitigated, the project's construction PM10 emission impacts would be significant. However, staff believes that the implementation of proposed specific mitigation measures during construction of the facility as identified in the conditions of certification would mitigate these short-term impacts of PM10 emissions to a level of less than significant.

Operational Impacts

The following section discusses the project's direct construction/operating ambient air quality impacts, as estimated by the applicant, and evaluated by staff. Additionally, this section discusses Energy Commission staff recommended mitigation measures.

Operational Modeling Analysis

The applicant has provided a modeling analysis using the EPA-approved AERMOD model to estimate the impacts of the project's NOx, PM10, CO, and SOx emissions resulting from project operation and mirror washing activities (CH2 2012p). Similar to the assessment of construction impacts, staff added the modeled impacts to the available highest ambient background concentrations recorded during the previous three years from nearby monitoring stations to assess the project operational impacts. The modeling results, staff recommend backgrounds and total impacts are shown in **Air Quality Table 10**.

This modeling analysis indicates, with the exception of 24-hour PM10 impacts, that the project would not create new exceedances or contribute to existing exceedances for any of the modeled air pollutants. Staff notes that the maximum local background 24-hour measurements of PM10 may be substantially impacted by wind-blown dust. However, in light of the existing PM10 and ozone non-attainment status of state ambient air quality standards for the project site area, staff considers the operating NOx, VOC, and PM emissions to be potentially CEQA significant and, therefore, staff is recommending that the stationary equipment, the off-road maintenance equipment, and fugitive dust emissions be mitigated. The modeling analysis shows that, after implementation of the recommended fugitive dust mitigation measures, the project's operation is not predicted to cause violations of the state or federal AAQS.

Chemically Reactive Pollutant Impacts

The project would have direct emissions of chemically reactive pollutants (NOx, SOx, and VOC), but may also have indirect emission reductions associated with the reduction of fossil-fuel fired power plant emissions due to the project's effect of displacing the need for fossil-fuel power plant operation. The exact nature and location of such reductions are speculative as the overall magnitude and downwind impact of those upwind emission reductions are unknown. Staff's impact analysis has not considered these potential reductions as an offset source for the project's emissions, so the discussion below focuses only on the direct emissions from the project.

Air Quality Table 10
Project Operation with Mirror Washing Emissions Impacts

Pollutants	Avg. Period	Impacts ($\mu g/m^3$)	Background [a] ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	Standard ($\mu g/m^3$)	Percent of Standard
NO_2	1-hr	184	--	230[e]	339	68%
	1-hr federal[d]	141	--	166[d]	188	88%
	Annual	0.1	7.5	7.6	57	13%
Pollutants	**Avg. Period**	**Impacts ($\mu g/m^3$)**	**Background [a] ($\mu g/m^3$)**	**Total Impact ($\mu g/m^3$)**	**Standard ($\mu g/m^3$)**	**Percent of Standard**
PM10	24-hr	**1.1**	**96**	**97.1**	**50**	**194%**
	Annual	0.03	14	14	20	70%
PM2.5 [c]	24-hr [b]	1.1	13	14	35	40%
	Annual	0.03	4.9	4.9	12	40%
CO	1-hr	261.7	1,750	2,011	23,000	9%
	8-hr	64.3	1,333	1,397	10,000	14%
SO2	1-hr	19.0	93.6	112	665	17%
	24-hr [b]	0.5	13.1	13.6	105	23%
	Annual	0.01	2.7	2.7	80	16%

Source: supplemental info from CH2 2012p.
Notes:

a Background values have been adjusted per staff recommended background concentrations shown in **Air Quality Table 5**.

b Maximum 24-hour hour PM2.5 and SO_2 concentrations occur under fumigation conditions.

c PM2.5 impacts were not remodeled to include maintenance emissions like the other pollutants, the results presented are stationary source emission only from the original AFC modeling analysis. With the maintenance PM2.5 emission the PM2.5 results would be higher than shown but lower than the PM10 results as the PM2.5 emissions are less than the PM10 emissions. Therefore, the PM2.5 impacts with maintenance emissions would not create new exceedances of the ambient air quality standards.

d The total impact for the 1-hour NO_2 federal standard is calculated based on three-year average of 98th percentile of annual distribution of daily maximum paired-sum of project impact and background.

e From applicant value. Includes concurrent 1-hr NO2 modeled impact which were included in the total impact value. See Table 5.1-38 from supplemental data responses submitted April 1, 2012 (CH2 2012p)

Ozone Impacts

There are air dispersion models that can quantify ozone impacts, but they are used for regional planning efforts where hundreds or even thousands of sources are input into the modeling to determine ozone impacts. There are no regulatory agency models approved for assessing single source ozone impacts. However, because of the known relationship of NOx and VOC emissions to ozone formation, it can be said that the emissions of NOx and VOC from the HHSEGS project do have the potential (if left unmitigated) to contribute to higher ozone levels in the region, which are already designated nonattainment for the state ozone standard.

PM2.5 Impacts

While some PM2.5 would be directly emitted, some PM2.5 forms from precursor emissions and is classified as secondary particulate matter. The process of gas-to-particulate conversion, which occurs downwind from the point of emission, is complex and depends on many factors, including local humidity and the presence of air

pollutants. The basic process assumes that the SOx and NOx emissions are converted into sulfuric acid and nitric acid first and then the acids react with ambient ammonia to form sulfate and nitrate. The sulfuric acid reacts with ammonia much faster than nitric acid and converts completely and irreversibly to particulate form. Nitric acid reacts with ammonia to form both a particulate and a gas phase of ammonium nitrate. The particulate phase would tend to fall out; however, the gas phase can revert back to ammonia and nitric acid. Thus, under the right conditions, ammonium nitrate and nitric acid establish a balance of concentrations in the ambient air. There are two conditions that are of interest, described as *ammonia rich* and *ammonia poor*. The term ammonia rich indicates that there is more than enough ammonia to react with all the sulfuric acid and to establish a balance of nitric acid-ammonium nitrate. Further ammonia emissions in this case would not necessarily lead to increases in ambient PM2.5 concentrations. In the case of an ammonia poor environment, there is insufficient ammonia to establish a balance and thus additional ammonia would tend to increase PM2.5 concentrations.

The northeastern San Bernardino County portion of the Great Basin Valleys Air Basin has not undergone the rigorous secondary particulate studies that have been performed in other areas of California, such as the San Joaquin Valley, that have more serious fine particulate pollution problems. However, due to the limited agricultural activity in the area the project site area would likely be characterized as ammonia poor, and the HHSEGS project is not a notable source of ammonia emissions. Therefore, the small amount of operating NOx and SOx emissions generated by this project would have a low potential to create secondary particulate.

Impact Summary

The applicant is proposing to mitigate the project's stationary source NOx, VOC, SO_2, and PM10/PM2.5 emissions through the use of boiler emission controls (Low NOx burner and flue gas recirculation) and natural gas fuel for the boilers, and use emergency engines that meet the highest available EPA/ARB Tier emission standards fueled with California 15 ppm sulfur diesel fuel. Additionally, staff recommends additional mitigation, specified in conditions of certification **AQ-SC6** and **AQ-SC7,** to reduce maintenance vehicle emissions, both tailpipe emission and fugitive dust emissions that could contribute to further ozone and PM10 violations. With the applicant proposed and staff recommended emission mitigation, it is staff's belief that the project would not cause CEQA significant secondary pollutant impacts.

Operations Mitigation

Applicant's Proposed Mitigation

Emission Controls

As discussed in the air quality section of the AFC (HHSEGS 2011a), the applicant proposes the following emission controls on the stationary equipment associated with the HHSEGS operation:

Auxiliary Boilers (Startup Boilers)

The applicant's proposed mitigation for each auxiliary boiler includes Low-NOx burners and 20 percent flue gas recirculation (for NOx), good combustion practices (for CO),

and to operate each exclusively on pipeline quality natural gas (for VOC, PM and SOx) to limit boiler emission levels. The AFC (HHSEGS 2011a), and Determination of Compliance (DOC) conditions (GBUAPCD 2012a) provide the following emission limits, for each of the auxiliary boilers:

- NOx: 9.0 ppmvd at 3% O_2 (one-hour average), 2.74 lb/hour
- CO: 25 ppmvd at 3% O_2 (one-hour average), 4.55 lb/hour
- VOC as CH_4: 12.6 ppmvd, 1.34 lb/hour
- PM10/PM2.5: 1.25 lb/hour
- SO_2: 1.7 ppmvd, 0.52 lb/hour

Nighttime Preservation Boilers

The applicant's proposed mitigation for each preservation boiler includes Low-NOx burners and 20 percent flue gas recirculation (for NOx), good combustion practices (for CO), and to operate each exclusively on pipeline quality natural gas (for VOC, PM and SOx) to limit boiler emission levels. The supplemental data responses submitted by the applicant on April 2, 2012 (CH2 2012p), and final FDOC conditions would require the following emission limits for each of the nighttime preservation boilers:

- NOx: 9.0 ppmvd at 3% O_2 (one-hour average), 0.17 lb/hour
- CO: 50 ppmvd at 3% O_2 (one-hour average), 0.55 lb/hour
- VOC: 12.6 ppmvd, 0.08 lb/hour
- PM10/PM2.5: 0.08 lb/hour
- SO_2: 1.7 ppmvd, 0.03 lb/hour

Emergency Backup Engines

The applicant's proposed controls for each emergency generator engine is to purchase a new engine meeting current emission standard requirements (currently, Tier 2) for 3,633 bhp engines. The specific emission levels for the selected engine are currently unknown but they would be no higher than following Tier 2 emission standards:

- NOx: 4.8 grams per brake horsepower (including non-methane hydrocarbons - NMHC/VOC)
- CO: 2.6 grams per break horsepower
- VOC: 0.16 grams per break horsepower
- PM10: 0.15 grams per break horsepower
- SO_2: 15 ppm sulfur content fuel

Fire Water Pump Engines

The applicant has proposed use of Tier 3 Engines that would have emission rates no greater than the following standards:

- NOx: 3.0 grams per break horsepower (including NMHC/VOC)

- CO: 2.6 grams per break horsepower
- VOC: (see NOx above)
- PM10: 0.15 grams per break horsepower
- SO_2: 15 ppm sulfur content fuel

Maintenance Vehicles

The applicant has proposed to use on-road or certified off-road vehicles and engines for mirror washing and other maintenance activities to minimize emissions for this emission source.

Delivery and Employee Vehicles

The applicant has not proposed any specific emission controls for this emission source.

Emission Offsets

The applicant has not proposed any emission offsets and the stationary source emissions for HHSEGS as currently proposed by the applicant would be well below District offset thresholds.

Adequacy of Proposed Mitigation

Staff concurs with the District's determination that the project's stationary source proposed emission controls/emission levels for criteria pollutants meet regulatory requirements and that the proposed stationary source emission levels are reduced adequately.

Staff Proposed Mitigation

As mentioned earlier in the discussions of the ozone and PM10 impacts, staff believes that the project's ozone precursors and PM10 emissions, if unmitigated, could cause CEQA significant impacts. Additionally, staff believes a solar renewable project, which would have a 30 to 40-year life, located in an ozone and PM10 nonattainment area and just downwind of other ozone and PM10 nonattainment areas, should address its contribution to the potentially ongoing nonattainment of the PM10 and ozone standards. Therefore, staff recommends the following additional mitigation measures:

- Require the use of new model year vehicles for onsite maintenance, or equivalently low emitting vehicles as long as those vehicles can be demonstrated to have a similar or lower emission profile than new model year vehicles
- Limit vehicle speeds within the facility to no more than ten miles per hour on unpaved areas that have not undergone soil stabilization, and up to 25 miles per hour, or greater with CPM approval as long as there is no conflict with **BIO-7(3)**, on stabilized unpaved roads as long as no visible dust plumes are observed, to address fugitive PM emissions from the site;
- Apply and maintain water or other non-toxic soil binder[8] to the onsite unpaved roads to create a durable stabilized surface;

[8] The soil stabilizer product used will require prior approval by the Energy Commission.

- Additional ongoing operations fugitive dust emissions control techniques such as windbreaks, trackout controls, etc. should be identified in a fugitive dust control plan and used on areas that could be disturbed by vehicles or wind. Any windbreaks used would remain in place until the soil or road is stabilized.

Staff further recommends that onsite maintenance vehicles and ongoing fugitive dust emissions control are subject to conditions of certification **AQ-SC6** and **AQ-SC7**, respectively. Staff also proposes condition of certification **AQ-SC8** to ensure that the license is amended as necessary to incorporate changes to the air quality permits and **AQ-SC9** to require submittal of Quarterly Operation Reports.

Staff believes that the implementation of these recommended additional CEQA mitigation measures would reduce the potential of adverse impacts from the facility on ozone and PM10 to levels less than significant.

Staff has considered the presence of minority populations near to the site (see **Socioeconomics Figure 1**)**.** The demographic analysis indicates no environmental justice population. Moreover, since the staff-proposed mitigation measures reduce the project's air quality impacts to a level that is less than significant, there is no environmental justice issue for air quality.

Closure and Decommissioning Impacts and Mitigation

Eventually the facility would close, either at the end of its useful life or due to some unexpected situation such as a natural disaster or catastrophic facility breakdown. When the facility closes, all sources of air emissions would cease to operate and thus impacts associated with those emissions would no longer occur. The only other expected emissions would be equipment exhaust and fugitive particulate emissions from any dismantling activities. These activities would be of much a shorter duration than construction of the project, equipment are assumed to have much lower comparative emissions due to technology advancement during the intervening years, and fugitive dust emissions would be required to be controlled in a manner at least equivalent to that required during construction. Therefore, while there would be adverse CEQA-related air quality impacts during decommissioning they are expected to be less than significant. At the time of decommissioning, the applicant will be required to obtain Energy Commission approval of a plan to control wind-blown dust emission until a natural crust is developed.

CUMULATIVE IMPACTS

Cumulative impacts are defined as "two or more individual effects which, when considered together, are considerable or . . . compound or increase other environmental impacts." (CEQA Guidelines, § 15355) A cumulative impact consists of an impact that is created as a result of a combination of the project evaluated in the EIR together with other projects causing related impacts." (CEQA Guidelines, § 15130(a)(1).) Such impacts may be relatively minor and incremental, yet still be significant because of the existing environmental background, particularly when one considers other closely related past, present, and reasonably foreseeable future projects.

This air quality analysis is concerned with *criteria* air pollutants. Such pollutants have impacts that are usually (though not always) cumulative by nature. However, a new source of pollution may contribute to existing violations of criteria pollutant standards because of the existing background sources or foreseeable future projects. Air districts attempt to attain the criteria pollutant standards by adopting attainment plans, which comprise a multi-faceted programmatic approach to such attainment. Depending on the air district, these plans typically include requirements for air offsets and the use of Best Available Control Technology (BACT) for new sources of emissions, and restrictions of emissions from existing sources of air pollution.

Much of the preceding discussion is concerned with cumulative impacts. The "Existing Ambient Air Quality" subsection describes the air quality background in southeastern Inyo County portion of the Great Basin Valleys Air Basin, including a discussion of historical ambient levels for each of the assessed criteria pollutants. The "Construction Impacts and Mitigation" subsection discusses the project's contribution to the local existing background caused by project construction. The "Operation Impacts and Mitigation" subsection discusses the project's contribution to the local existing background caused by project operation. The following subsection includes two additional analyses:

- a summary of projections for criteria pollutants by the air district and the air district's programmatic efforts to abate such pollution;
- an analysis of the project's *localized cumulative impacts*, the project's direct operating emissions combined with other local major emission sources;

Summary of Projections

The southeastern Inyo County portion of the GBVAB is designated as non-attainment for state PM10 and ozone ambient air quality standards and attainment/unclassified for the federal PM10 and ozone ambient air quality standards. PM2.5, CO, NO_2, and SO_2 are all considered to be attainment or unclassified for the federal and state standards.

Ozone

A portion of Inyo County in the Mojave Desert is non-attainment for the state standard, north and west of the project site. With respect to state standards, the entire GBUAPCD is classified as nonattainment for the 8-hour ozone standard, with the exception of Alpine County; and either unclassified (Alpine and Inyo counties) or nonattainment (Mono County) for the 1-hour state ozone standard.

On May 21, 2012, in the Federal register (Vol 77, No. 98)the US EPA redesignated all of Inyo County as unclassifiable/attainment for the federal 8-hour ozone standard. Thus, currently there is no requirement for the GBUAPCD to prepare a federal attainment plan for the 8-hour federal ozone standard.

Particulate Matter

The District is nonattainment for the state 24-hour PM10 air quality standard. California has adopted standards that are far more stringent than federal requirements for PM10. Currently, virtually all air districts in the state (the lone exception being Lake County) are designated nonattainment of the state PM10 standard. There is no legal requirement for

air districts to provide plans to attain the state PM10 standard, so air districts have not developed such plans.

In 1997, the federal government adopted PM2.5 standards, as did the state in 2003. The EPA has determined that the area is unclassified, or attainment for both the annual and the 24-hour federal PM2.5 standard.

As a solar power generation facility, the direct air pollutant emissions from power generation are negligible and the emission sources are limited to auxiliary equipment and maintenance activities. With the mitigation required by the recommended staff conditions and District conditions, the project will not have a CEQA significant impact on particulate matter emissions.

Summary of Conformance with Applicable Air Quality Plans

The applicable air quality plans do not outline any new control measures applicable to the proposed project's operating emission sources. Therefore, compliance with existing District rules and regulations would ensure compliance with those air quality plans.

Localized Cumulative Impacts

Since HHSEGS air quality impacts can be reasonably estimated through air dispersion modeling (see the "Operational Modeling Analysis" subsection) the project's contribution to localized cumulative impacts can be estimated. To represent *past* and, to an extent, *present projects* that contribute to current ambient air quality conditions, the Energy Commission staff recommends the use of ambient air quality monitoring data (see the "Environmental Setting" subsection), referred to as the *background*. The staff takes the following steps to estimate what are additional appropriate "present projects" that are not represented in the background and "reasonably foreseeable projects":

- First, the Energy Commission staff (or the applicant) works with the air district to identify all projects that have submitted, within the last year of monitoring data, new applications for an authority to construct (ATC) or permit to operate (PTO) and applications to modify an existing PTO within six miles of the project site. Based on staff's modeling experience, beyond six miles there is no significant concentration overlap for non-reactive pollutant concentrations between two stationary emission sources.
- Second, the Energy Commission staff (or the applicant) works with the air district and local counties to identify any new area sources within six miles of the project site. As opposed to point sources, area sources include sources like agricultural fields, residential developments or other such sources that do not have a distinct point of emission. New area sources are typically identified through draft or final Environmental Impact Reports (EIRs) that are prepared for those sources. The initiation of the EIR process is a reasonable basis on which to determine what is "reasonably foreseeable" for new area sources.
- The data submitted, or generated from the applications with the air district for point sources or initiating the EIR process for area sources, provides enough information to include these new emission sources in air dispersion modeling. Thus, the next

step is to review the available EIR(s) and permit application(s), then determine what sources must be modeled and how they must be modeled.

- Sources that are not new, but may not be represented in ambient air quality monitoring are also identified and included in the analysis. These sources include existing sources that are co-located with or adjacent to the proposed source (such as an existing power plant). In most cases, the ambient air quality measurements are not recorded close to the proposed project, thus a local major source might not be well represented by the background air monitoring data. When these sources are included, it is typically a result of there being an existing source on the project site and the ambient air quality monitoring station being more than two miles away.
- The modeling results must be carefully interpreted so that they are not skewed towards a single source, in high impact areas near that source's fence line. It is not truly a cumulative impact of the HHSEGS if the high impact area is the result of high fence line concentrations from another stationary source which is not providing a substantial contribution to the determined high impact area.

Once the modeling results are interpreted, they are added to the background ambient air quality monitoring data and thus the modeling portion of the cumulative assessment is complete. Due to the use of air dispersion modeling programs in staff's cumulative impacts analysis, the applicant must submit a modeling protocol, based on information requirements for an application, prior to beginning the investigation of the sources to be modeled in the cumulative analysis. The modeling protocol is typically reviewed, commented on, and eventually approved in the Data Adequacy phase of the licensing procedure. Staff typically assists the applicant in finding sources (as described above), characterizing those sources, and interpreting the results of the modeling. However, the actual modeling runs are usually left to the applicant to complete. There are several reasons for this: modeling analyses take time to perform and require substantial expertise, the applicant has already performed a modeling analysis of the project alone (see the "Operational Modeling Analysis" subsection), and the applicant can act on its own to reduce stipulated emission rates and/or increase emission control requirements as the results warrant. Once the cumulative project emission impacts are determined, the necessity to mitigate the project emissions can be evaluated, and the mitigation itself can be proposed by staff and/or the applicant (see the "Mitigation" subsection).

The applicant, in consultation with the district, has conducted a survey of stationary sources that are either under construction, or have received permits to be built or operate in the near future and that have the potential for emissions of criteria air contaminants within six miles of the project site. The survey results indicate that no such sources exist within 6-miles from the project boundaries[9] of the proposed project site (CH2 2012p).

The Applicant requested information for a cumulative impact analysis from the GBUAPCD, Nevada's Clark County Department of Air Quality and Environmental Management, and the Nevada Division of Environmental Protection, Department of Air Quality Management, Bureau of Air Pollution Control ("Nevada DEP"). The request

[9] Staff assumes that impacts from projects beyond six miles would not affect the modeling analysis on a cumulative basis. This is in the CA Energy Commission's "Siting Rules and Regulations of Practice and Procedure and Power Plant Siting Regulations, April 2007"; Title 20, California Code of Regulations, Chapter 5, Appendix B, section 8, (I)(iii).

letters and any agency responses received before the AFC was filed were included in Attachment 5.1G-1 to Appendix 5.1G of the AFC. To summarize, the GBUAPCD responded that:

> *"[t]here are no facilities in the District, other than the St. Therese project, within 6 miles of the perimeter of the Hidden Hills Ranch project." Nevada DEP responded with a list of active permits in the general project area. Attachment 5.1G-1 includes the list provided by Nevada DEP and a description of the analysis used to determine that none of the projects on the list provided by Nevada DEP is within 6 miles of the project site. The Clark County response to the request for information regarding potential sources to be included in a cumulative impact analysis was received on August 25, 2011, after the AFC had been filed, and was docketed on August 29. Clark County responded: We have five permitted sources in, or near, that hydrographic area, but, none of these are within the 6 miles perimeter of the site you have identified. In fact, it appears the closest permitted source is over 20 miles away. Our search of our records did not indicate any proposed authority to construct projects within the area for which we have received an application.*

No additional cumulative air quality impact modeling analysis was performed, and no CEQA significant cumulative air quality impacts are expected. after implementation of staff's recommended project mitigation measures. However, staff is aware of a tremendous potential development of wind and solar in the desert southwest of the United States, and in the area where HHSEGS would be located. While the number of renewable project filings is much larger than what would eventually be built and operated in the desert southwest, staff believes it is appropriate to construct and operate all desert renewable projects with best practices to reduce any potential cumulative effects, including criteria pollutants and their contributions to region ozone and particulate matter and haze. Staff recommends conditions of certification **AQ-SC1** and **AQ-SC-7** as best practices for the construction and operation of the HHSEGS desert solar project.

Staff has considered the minority population surrounding the site (see **Socioeconomics Figure 1**). Since the project's cumulative CEQA air quality impacts have been mitigated to be less than significant, there is no environmental justice issue for air quality.

COMPLIANCE WITH LORS

The Great Basin Unified Air Pollution Control District issued the Final Determination of Compliance (FDOC) for the HHSEGS on August 1, 2012 and the FDOC was docketed by the Energy Commission on August 8, 2012 (GBUAPCD 2012b). The FDOC finds compliance e with all District rules and regulations. The District's conditions are presented below in the "**AQ-x**" series of conditions of certification.

FEDERAL

The district is responsible for issuing the federal New Source Review (NSR) permit, the federal Title V permit, and has been delegated enforcement of the applicable New Source Performance Standard (Subparts, Dc, Db, and IIII). The applicant would be required to submit a Title V permit application to the district within 12 months of

commencing operation. Additionally, this project would not require a PSD permit from U.S. EPA, because the project would be below the 250 tons per year (TPY) threshold for criteria pollutants and less than 100,000 tpy of GHG pollutants.

STATE

The project would comply with Section 41700 of the California State Health and Safety Code, which restricts emissions that would cause nuisance or injury, with the issuance of the District's Final Determination of Compliance and the Energy Commission's affirmative finding for the project. In the FDOC, the district concluded that the project would comply with this requirement as the screening health risk assessment they performed found risks to be below a Prioritization Score of 1.0, or below the need for any additional analysis or action. For additional information on health risks, refer to the Public Health portion of the FSA.

The fire pump and emergency generator engines are also subject to the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines (17 CCR §93115). This measure limits the types of fuels allowed, established maximum emission rates and establishes recordkeeping requirements. This measure would also limit the engine's testing and maintenance operation to 50 hours per year. The engines would also meet the current Tier standards of 13 CCR, §2423 - Exhaust Emission Standards and Test Procedures: Heavy-Duty Off-Road Diesel Cycle Engines.

LOCAL

The District rules and regulations specify the emissions control and offset requirements for new sources such as the HHSEGS. The emitting equipment would be well controlled; however, Best Available Control Technology (BACT), and emission reduction credits (ERCs) are not required by District rules and regulations based on the permitted stationary source emission levels for this project. Compliance with the District's new source requirements would ensure that the project would be consistent with the strategies and future emissions anticipated under the District's air quality attainment and maintenance plans.

The applicant provided an air quality permit application to the GBUAPCD in September 2011 and the District issued the FDOC on August 1, 2012. This Final Determination of Compliance (FDOC) evaluated whether and under what conditions the proposed project would comply with the District's applicable rules and regulations, as described below.

Regulation II – New Source Review

Rule 216 – New Source Review

This rule requires implementation of BACT for any emission source unit that emits or has the potential to emit 250 lbs/day or more, and emission offsets if total facility emissions exceed annual thresholds. The district permits limit the emissions from each source to less than 250 lbs/day, so BACT is not applicable; and the permits limit the total site annual emission below offset thresholds, so offsets are not required.

Regulation II – Permits

Rule 200 and 209A – Permit to Construct and Permit to Operate

Rule 200 establishes the emission source requirements that must be met to obtain a Permit to Construct. Rule 209A prohibits use of any equipment or the use of which may emits air contaminants without obtaining a Permit to Operate. The applicant has submitted all required applications; therefore, the applicant is in compliance with these rules.

Rule 217 – Federal Operating Permit Requirement

Rule 217 requires certain facilities to obtain Federal Operating Permits. The auxiliary boilers, by providing steam to a steam turbine having a capacity greater than 25 megawatts of electrical output, trigger Title IV – Acid Deposition Control for this project. Title V permitting is thereby also required for the proposed project. The applicant would be required to submit an application for a Title V permit to the district to comply with this rule.

Regulation IV – Prohibitions

Rule 400 - Visible Emissions Opacity Limit

This rule limits visible emissions from emissions sources, including stationary source exhausts and fugitive dust emission sources. Compliance with this rule is expected.

Rule 401 - Fugitive Dust

This rule limits fugitive emissions from certain bulk storage, earthmoving, construction and demolition, and manmade conditions resulting in wind erosion. With the implementation of recommended staff condition **AQ-SC3** and **AQ-SC7,** the facility would comply with this rule.

Rule 402- Nuisance

This rule restricts discharge of emissions that would cause injury, detriment, annoyance, or public nuisance. The facility would comply with this rule (identical to California Health and Safety Code 41700).

Rule 403 - Breakdown

This rule sets forth procedures that must be followed in the event of an unforeseeable failure or breakdown of air pollution control equipment. The facility would comply with this rule.

Rule 404-A - Particulate Matter Concentration

Rule 404.A limits particulate matter (PM) emissions to less than 0.3 grains per standard cubic foot of gas at standard conditions. In the DOC, the District has determined that the estimated PM emission concentrations of the proposed boilers and engines are less than permit limits. These proposed emission rates are well below the limits established by this rule, therefore compliance is expected.

Rule 404-B – Oxides of Nitrogen

This rule applies to fuel-burning equipment with a maximum heat input rate in excess of 1.5 billion Btu/hr (gross) (1500 MMBtu/hr HHV). All of the fuel burning equipment proposed for installation at HHSEGS has a maximum heat input rate below this threshold, so this rule is not applicable to the project.

Rule 416 – Sulfur Compounds and Nitrogen Oxides

This rule prohibits emissions from a single source in excess of the following:

- Sulfur compounds as SO2: 0.2 percent by volume
- NOx, calculated as NO2: 140 lb/hr from any new boiler

These proposed emission rates are well below the limits established by this rule, therefore compliance is expected.

Regulation IX – Standards of Performance for New Stationary Sources

This regulation incorporates the Federal NSPS (40 CFR 60) rules by reference. The district evaluated compliance with Subpart Db that applies to the HHSEGS auxiliary boiler and Subpart Dc that applies to the nighttime preservation boilers and has provided conditions they believe ensure compliance with these regulations.

The requirements of Subpart Db, Standards of Performance for Industrial-Commercial-

Institutional Steam Generating Units, are applicable to the startup boilers. For natural-gas fired units, Subpart Db includes the following emission limits:

- NOx: 0.20 lb/MMBtu (24-hour average basis)
- SO2: 0.20 lb/MMBtu

The requirements of Subpart Dc, Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units, are applicable to the nighttime preservation boilers. For these small natural-gas-fired units, Subpart Dc includes the following emission limit:

- SO2: 0.5 lb/MMBtu

The PM limits of Subpart Dc do not apply to boilers with a heat input capacity below 30 MMBtu/hr, such as the nighttime preservation boilers.

Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines would be applicable to the emergency engines and the fire pump engines.

Both the proposed Tier II and Tier III Emergency IC Engine (large generators) and the Fire Pump engines, respectively, meet the emission limit requirements of the NSPS ((Subpart IIII).

NOTEWORTHY PUBLIC BENEFITS

Renewable energy facilities, such as the HHSEGS, would help meet California's mandated renewable energy goals. These goals are part of a comprehensive strategy to reduce the state's greenhouse gas emissions by replacing megawatts (mw) from fossil-fueled generation, thereby reducing the contribution of such emissions to climate change.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

There have been public agency comments on staff's air quality section from Inyo County, comments from Intervener Cindy MacDonald and public comments from Basin and Range Watch that were submitted following the publication of the Preliminary Staff Assessment (PSA) in a manner that require a technical response. Some comments resulted in text changes and others are responded to in **Appendix 1 - PSA Response to Comments, Air Quality**. The applicant has also provided comments (CH2 2012q) that have been addressed by staff. Some of these comments resulted in minor text modifications, as staff deemed appropriate. The appendix describes how staff responded to these comments.

CONCLUSIONS

Staff makes the following conclusions about the HHSEGS:

- The project will not exceed PSD emission levels during direct source operation and the facility is not considered a major stationary source with potential to cause significant air quality impacts. However, without adequate fugitive dust mitigation, the project would have the potential to cause localized exceedances of the PM10 NAAQS during construction and operation. Recommended conditions of certification **AQ-SC1** through **AQ-SC4**, for construction, and **AQ-SC7**, for operation, would mitigate these potentially significant impacts.
- The project would comply with applicable district rules and regulations, including New Source Review requirements; staff recommends the inclusion of the Districts DOC conditions as conditions of certification **AQ-1** through **AQ-33** for the Hidden Hills Power Plants, and **AQ-1**, **AQ-3** though **AQ-8** and **AQ-34** through **AQ-44** for the facility's common area.
- Staff concludes the project's construction activities would likely contribute to significant adverse PM10 and ozone impacts without additional mitigation. Staff recommends **AQ-SC1** to **AQ-SC5** to mitigate potential impacts.
- Staff concludes the project's operation would not cause new violations of any NO_2, SO_2, PM2.5 or CO ambient air quality standards; therefore, the project's direct operational NOx, SOx, PM2.5 and CO emission impacts are not significant.
- Staff concludes the project's direct and indirect (or secondary) emissions contribution to existing violations of the ozone and PM10 ambient air quality standards are likely significant if unmitigated. Therefore, staff recommends **AQ-SC6** to mitigate the onsite maintenance vehicle emissions and **AQ-SC7** to mitigate the

operating fugitive dust emissions to ensure that the potential ozone and PM10 CEQA impacts are mitigated to less than significant over the life of the project.

STAFF PROPOSED FINDINGS OF FACT

Based on the staff's analysis, we recommend the following findings:

1. The HHSEGS project would be located in the Great Basin Valleys Air Basin under the local jurisdiction of the Great Basin Unified Air Pollution Control District.

2. The HHSEGS project area is designated as nonattainment for the state ozone standard, attainment/unclassified for federal ozone standards, nonattainment for the state 24-hour PM10 standard, and attainment or unclassified for the state and federal CO_2, NO_2, SO_2, and PM2.5 standards.

3. The project would not cause new violations of any NO_2, SO_2, PM2.5, or CO ambient air quality standards. Therefore, the NO_x, SO_x, PM2.5, and CO emission impacts are not significant.

4. The project's NO_x and VOC emissions could contribute to existing violations of the state's ozone standard during construction and operation. However, the required mitigation would reduce the project's impacts to a level that is less than significant.

5. The project's PM10 emissions could contribute to existing violations of the state 24-hour PM10 air quality standard during construction and operation. However, the required mitigation set forth in conditions **AQ-SC1** though **AQ-SC7** would reduce the project's impacts to a level that is less than significant.

6. The Great Basin Unified Air Pollution Control District has issued a Final Determination of Compliance (FDOC) finding that HHSEGS would comply with all applicable district rules and regulations for project operation. The district's proposed FDOC conditions are included herein as conditions of certification **AQ-1** through **AQ-33** for each of the two Hidden Hills Power Plants and **AQ-1** though **AQ-8**, and **AQ-34** through **AQ-44** for the common area.

7. The cumulative air quality impacts analysis demonstrates that the project would not result in a significant cumulative impact.

8. Implementation of the conditions of certification listed below would ensure that the HHSEGS facility would not result in any significant direct, indirect, or cumulative adverse impacts to air quality.

MITIGATION MEASURES/ PROPOSED CONDITIONS OF CERTIFICATION

STAFF CONDITIONS OF CERTIFICATION

Staff conditions **AQ-SC1** through **AQ-SC9** are all CEQA-only mitigation measures associated with construction and operation of the proposed facility.

AQ-SC1 Air Quality Construction Mitigation Manager (AQCMM): The project owner shall designate and retain an on-site AQCMM who shall be responsible for directing and documenting compliance with conditions of certification **AQ-SC3**, **AQ-SC4** and **AQ-SC5** for the project site and the portions of the linear facility constructed in California. The on-site AQCMM may delegate responsibilities to one or more AQCMM Delegates. The AQCMM and AQCMM Delegates shall have full access to all areas of construction on the project site and linear facilities located in California, and shall have the authority to stop any or all construction activities as warranted by applicable construction mitigation conditions. The AQCMM and AQCMM Delegates may have other responsibilities in addition to those described in this condition. The AQCMM shall not be terminated without written consent of the Compliance Project Manager (CPM).

Verification: At least 60 days prior to the start of ground disturbance, the project owner shall submit to the CPM for approval, the name, resume, qualifications, and contact information for the on-site AQCMM and all AQCMM Delegates.

AQ-SC2 Air Quality Construction Mitigation Plan (AQCMP): The project owner shall provide an AQCMP, for approval, which details the steps that will be taken and the reporting requirements necessary to ensure compliance with conditions of certification **AQ-SC3**, **AQ-SC4,** and **AQ-SC5**.

Verification: At least 60 days prior to the start of any ground disturbance, the project owner shall submit the AQCMP to the CPM for approval. The AQCMP shall include effectiveness and environmental data for the proposed soil stabilizer. The CPM will notify the project owner of any necessary modifications to the plan within 15 business days from the date of receipt.

AQ-SC3 Construction Fugitive Dust Control: The AQCMM shall submit documentation to the CPM in each Monthly Compliance Report (MCR) that demonstrates compliance with the following mitigation measures for the purposes of preventing all fugitive dust plumes from leaving the project boundary. Any deviation from the following mitigation measures shall require prior CPM notification and approval.

A. The main access roads through the facility to the power block areas will be paved prior to initiating construction in the main power block area, and delivery areas for operations materials (chemicals, replacement parts, etc.) will be paved prior to taking initial deliveries.

B. All unpaved construction roads and unpaved operational site roads, as they are being constructed, shall be stabilized with a non-toxic soil stabilizer or soil weighting agent that can be determined to be both as efficient or more efficient for fugitive dust control as ARB-approved soil stabilizers, and shall not increase any other environmental impacts including loss of vegetation. All other disturbed areas in the project and linear construction sites shall be watered as frequently as necessary during grading and stabilized with a non-toxic soil stabilizer or soil weighting agent to comply with the dust mitigation objectives of condition of certification **AQ-SC4**. The frequency of watering can be reduced or eliminated during periods of precipitation.

C. No vehicle shall exceed 10 miles per hour on unpaved areas within the construction site, with the exception that vehicles may travel up to 25 miles per hour on stabilized unpaved roads as long as such speeds do not create visible dust emissions.

D. Visible speed limit signs shall be posted at the construction site entrances and along traveled routes.

E. All construction equipment vehicle tires shall be inspected and washed as necessary to be cleaned free of dirt prior to entering paved roadways.

F. Gravel ramps of at least 20 feet in length must be provided at the tire washing/cleaning station.

G. All unpaved exits from the construction site shall be graveled or treated to prevent track-out to public roadways.

H. All construction vehicles shall enter the construction site through the treated entrance roadways, unless an alternative route has been submitted to and approved by the CPM.

I. Construction areas adjacent to any paved roadway shall be provided with sandbags or other equivalently effective measures to prevent run-off to roadways, or other similar run-off control measures as specified in the Storm Water Pollution Prevention Plan (SWPPP), only when such SWPPP measures are necessary so that this condition does not conflict with the requirements of the SWPPP.

J. All paved roads within the construction site shall be swept at least twice daily (or less during periods of precipitation) on days when construction activity occurs to prevent the accumulation of dirt and debris.

K. At least the first 500 feet of any paved public roadway exiting the construction site or exiting other unpaved roads en route from the construction site or construction staging areas shall be swept at least twice daily (or less during periods of precipitation) on days when construction activity occurs or on any other day when dirt or runoff

resulting from the construction site activities is visible on the public paved roadways.

L. All soil storage piles and disturbed areas that remain inactive for longer than 10 days shall be covered, or shall be treated with appropriate dust suppressant compounds.

M. All vehicles used to transport solid bulk material on public roadways and that have potential to cause visible emissions shall be provided with a cover, or the materials shall be sufficiently wetted and loaded onto the trucks in a manner to provide at least one foot of freeboard.

N. Wind erosion control techniques (such as windbreaks, water, chemical dust suppressants, and/or vegetation) shall be used on all construction areas that may be disturbed. Any windbreaks installed to comply with this condition shall remain in place until the soil is stabilized or permanently covered with vegetation.

Verification: The AQCMM shall provide the CPM a MCR (**COMPLIANCE-6**) to include:

A. a summary of all actions taken to maintain compliance with this condition;

B. copies of any complaints filed with the district in relation to project construction; and

C. any other documentation deemed necessary by the CPM, and AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner's discretion.

AQ-SC4 Dust Plume Response Requirement: The AQCMM or an AQCMM Delegate shall monitor all construction activities for visible dust plumes. Observations of visible dust plumes that have the potential to be transported: (A) off the project site and within 400 feet upwind of any regularly occupied structures not owned by the project owner, or (B) 200 feet beyond the centerline of the construction of linear facilities indicate that existing mitigation measures are not resulting in effective mitigation. The AQCMP shall include a section detailing how the augmented mitigation measures will be accomplished within the time limits specified in steps 1 through 3, below. The AQCMM or Delegate shall implement the following procedures for augmented mitigation measures in the event that such visible dust plumes are observed:

Step 1: The AQCMM or Delegate shall direct more intensive application of the existing mitigation methods within 15 minutes of making such a determination.

Step 2: The AQCMM or Delegate shall direct implementation of augmented methods of dust suppression if Step 1, specified above, fails to result in adequate mitigation within 30 minutes of the original determination.

Step 3: The AQCMM or Delegate shall direct a temporary shutdown of the activity causing the emissions if Step 2, specified above, fails to

result in effective mitigation within one hour of the original determination. The activity shall not restart until the AQCMM or Delegate is satisfied that appropriate additional mitigation or other site conditions have changed so that visual dust plumes will not result upon restarting the shutdown source. The owner/operator may appeal to the CPM any directive from the AQCMM or Delegate to shut down an activity, if the shutdown shall go into effect within one hour of the original determination, unless overruled by the CPM before that time.

Verification: The AQCMM shall provide the CPM a MCR (**COMPLIANCE-6**) to include:

A. a summary of all actions taken to maintain compliance with this condition;

B. copies of any complaints filed with the District and provided to the project owner in relation to project construction; and

C. any other documentation deemed necessary by the CPM and AQCMM to verify compliance with this condition.

AQ-SC5 Diesel-Fueled Engine Control: The AQCMM shall submit to the CPM, in the MCR, a table that demonstrates compliance with the AQCMP mitigation measures for purposes of controlling diesel construction-related combustion emissions. Any deviation from the AQCMP mitigation measures requires prior CPM notification and approval.

All off-road diesel construction equipment with a rating of 50 hp or greater used in the construction of this facility shall be powered by the cleanest engines available that also comply with the California Air Resources Board's (ARB's) Regulation for In-Use Off-Road Diesel Fleets (California Code of Federal Regulations Title 13, Article 4.8, Chapter 9, Section 2449 et.seq.) and shall be included in the Air Quality Construction Mitigation Plan (AQCMP) required by **AQ-SC2**. The AQCMP measures shall include the following, with the lowest-emitting engine chosen in each case, as available:

a. All off-road vehicles with compression ignition engines shall comply with the California Air Resources Board's (ARB's) Regulation for In-Use Off-Road Diesel Fleets.

b. To meet the highest level of emissions reduction available for the engine family of the equipment, each piece of diesel-powered equipment shall be powered by a Tier 4 engine (without add-on controls) or Tier 4i engine (without add-on controls), or a Tier 3 engine with a post-combustion retrofit device verified for use on the particular engine powering the device by the ARB or the US EPA. For PM, the retrofit device shall be a particulate filter if verified, or a flow-through filter, or at least an oxidation catalyst. For NOx, the device shall meet the latest Mark level verified to be available (as of January 2012, none meet this NOx requirement).

c. For diesel powered equipment where the requirements of Part “b” cannot be met, the equipment shall be equipped with a Tier 3 engine without retrofit control devices or with a Tier 2 or lower Tier engine using retrofit controls verified by ARB or US EPA as the best available control device to reduce exhaust emissions of PM and nitrogen oxides (NOx) unless certified by engine manufacturers or the on-site AQCMM that the use of such devices is not practical for specific engine types. For purposes of this condition, the use of such devices can be considered “not practical” for the following, as well as other, reasons:

   1. There is no available retrofit control device that has been verified by either the California Air Resources Board or U.S. Environmental Protection Agency to control the engine in question and the highest level of available control using retrofit or Tier 1 engines is being used for the engine in question; or

   2. The use of the retrofit device would unduly restrict the vision of the operator such that the vehicle would be unsafe to operate because the device would impair the operator’s vision to the front, sides, or rear of the vehicle, or

   3. The construction equipment is intended to be on site for 10 work days or less.

d. The CPM may grant relief from a requirement in Part “b” or “c” if the AQCMM can demonstrate a good faith effort to comply with the requirement and that compliance is not practical.

e. The use of a retrofit control device may be terminated immediately provided that: (1) the CPM is informed within 10 working days following such termination; (2) a replacement for the construction equipment in question, which meets the level of control required, occurs within 10 work days following such termination of the use (if the equipment would be needed to continue working at this site for more than 15 work days after the use of the retrofit control device is terminated); and (3) one of the following conditions exists:

   1. The use of the retrofit control device is excessively reducing the normal availability of the construction equipment due to increased down time for maintenance, and/or reduced power output due to an excessive increase in exhaust back pressure.

   2. The retrofit control device is causing or is reasonably expected to cause engine damage.

   3. The retrofit control device is causing or is reasonably expected to cause a substantial risk to workers or the public.

   4. Any other seriously detrimental cause which has the approval of the CPM prior to implementation of the termination.

f. All equipment with engines meeting the requirements above shall be properly maintained and the engines tuned to the engine manufacturer's specifications. Each engine shall be in its original configuration and the equipment or engine must be replaced if it exceeds the manufacturer's approved oil consumption rate.

g. Construction equipment will employ electric motors when feasible.

h. If the requirements detailed above cannot be met, the AQCMM shall certify that a good faith effort was made to meet these requirements and this determination must be approved by the CPM.

All off-road diesel-fueled engines used in the construction of the facility shall have clearly visible tags issued by the on-site AQCMM showing that the engine meets the conditions set forth herein.

Verification: The AQCMM shall include in the MCR the following to demonstrate control of diesel construction-related emissions:

A. A summary of all actions taken to control diesel construction related emissions;

B. A table listing list of all heavy equipment used on site during that month, showing the tier level of each engine and the basis for alternative compliance with this condition for each engine not meeting Part "b" requirements. The MCR shall identify the owner of the equipment and contain a letter from each owner indicating that the equipment has been properly maintained; and

C. Any other documentation deemed necessary by the CPM and AQCMM to verify compliance with this condition. \

AQ-SC6 The project owner, when obtaining dedicated vehicles for mirror washing activities and other facility maintenance activities, shall only obtain new model year vehicles that meet California on-road or EPA non-road vehicle emission standards for the year when obtained.

Other vehicle/fuel types may be allowed assuming that the emission profile for those vehicles, including fugitive dust generation emissions, is comparable to the vehicles types identified in this condition.

Verification: At least 60 days prior to the start of commercial operation, the project owner shall submit to the CPM a plan that identifies the size and type of the on-site vehicle and equipment fleet and the vehicle and equipment purchase orders and contracts and/or purchase schedule. The plan shall be updated every other year and submitted in the Annual Compliance Report (**COMPLIANCE-7**).

AQ-SC7 The project owner shall provide a site operations dust control plan, including all applicable fugitive dust control measures identified in **AQ-SC3** that would be applicable to reducing fugitive dust from ongoing operations; that:

A. describes the active operations and wind erosion control techniques such as windbreaks and chemical dust suppressants, including their ongoing

maintenance procedures, that shall be used on areas that could be disturbed by vehicles or wind anywhere within the project boundaries; and

B. identifies the location of signs throughout the facility that will limit traveling on unpaved surfaces to solar equipment maintenance vehicles only. In addition, vehicle speed shall be limited to no more than 10 miles per hour on these unpaved surfaces, with the exception that vehicles may travel up to 25 miles per hour on stabilized unpaved surfaces as long as such speeds do not create visible dust emissions.

The site operations fugitive dust control plan shall include the use of durable non-toxic soil stabilizers on all regularly used unpaved roads and disturbed off-road areas within the project boundaries, and shall include the inspection and maintenance procedures that will be undertaken to ensure that the unpaved roads remain stabilized. The soil stabilizer used shall be a non-toxic soil stabilizer or soil weighting agent that can be determined to be both as efficient or more efficient for fugitive dust control as ARB approved soil stabilizers, and shall not increase any other environmental impacts including loss of vegetation.

The fugitive dust controls shall meet the performance requirements of condition **AQ-SC4**. The performance requirements of **AQ-SC4** shall also be included in the operations dust control plan.

At the time of decommissioning, the applicant is required to obtain Energy Commission approval to control wind-blown dust emissions until a natural crust is developed as part of the project owner's long-term dust control plan.

Verification: At least 60 days prior to start of commercial operation, the project owner shall submit to the CPM for review and approval a copy of the plan that identifies the dust and erosion control procedures, including effectiveness and environmental data for the proposed soil stabilizer, that will be used during operation of the project and that identifies all locations of the speed limit signs. At least 60 days after the beginning of commercial operation, the project owner shall provide to the CPM a report identifying the locations of all speed limit signs, and a copy of the project employee and contractor training material that clearly identifies that project employees and contractors are required to comply with the dust and erosion control procedures and on-site speed limits.

AQ-SC8 The project owner shall provide the CPM copies of all district issued Authority-to-Construct (ATC) and Permit-to-Operate (PTO) documents for the facility.

The project owner shall submit to the CPM for review and approval any modification proposed by the project owner to any project air permit. The project owner shall submit to the CPM any modification to any permit proposed by the district or U.S. Environmental Protection Agency (U.S. EPA), and any revised permit issued by the district or U.S. EPA for the project.

Verification: The project owner shall submit any ATC, PTO, and proposed air permit modifications to the CPM within 5 working days of its submittal either by 1) the project

owner to an agency, or 2) receipt of proposed modifications from an agency. The project owner shall submit all approved modified air permits to the CPM within 15 days of receipt.

AQ-SC9 The project owner shall submit to the CPM Quarterly Operation Reports, following the end of each calendar quarter, that include operational and emissions information as necessary to demonstrate compliance with the conditions of certification herein. The Quarterly Operation Report will specifically note or highlight incidences of noncompliance.

Verification: The project owner shall submit the Quarterly Operation Reports to the CPM and APCO no later than 30 days following the end of each calendar quarter.

DISTRICT CONDITIONS OF CERTIFICATION

Conditions Applicable to Hidden Hills Solar 1 Power Plant (GBUAPCD ATC Number 1604-00-11) and Hidden Hills Solar 2 Power Plant (GBUAPCD 1605-00-11) (identical conditions, only equipment ID numbers differ).

References below to the "CPM" mean the Energy Commission's Compliance Program Manger.

GENERAL CONDITIONS

AQ-1 Facility Startup

The permittee shall notify the District in writing when construction is complete and the equipment is ready for commissioning operations. Operation of this equipment shall be conducted in accordance with all data and specifications submitted with the application under which this ATC is issued unless otherwise noted. Notification shall be given to the District office by email, Postal Service delivery or telephone facsimile transmission at least 72 hours prior to equipment start-up. Operation of this equipment without a written Permit to Operate is a violation of District Rule 200 B, and can result in civil and criminal penalties under California Health & Safety Code (H&SC) § 42400.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or the CPM.

AQ-2 Commissioning Period under Temporary Permit to Operate:

Following a District inspection verifying that the facility is constructed in a manner consistent with the specifications in the application and with this Authority to Construct, a temporary Permit to Operate (TPO) shall be issued. The TPO shall be valid for the duration of the commissioning period defined below and until a Permit to Operate is issued or denied.

A. Commissioning activities are defined as, but not limited to, all testing, adjustment, tuning, and calibration activities recommended by the equipment manufacturers and the construction contractor to ensure safe and reliable steady state operation of the boilers and associated control systems.

B. The commissioning period shall commence when all mechanical, electrical, and control systems are installed and individual system startup has been completed, or when a boiler is first fired, whichever occurs first. The commissioning period shall terminate when the plant has completed initial source testing, completed final plant tuning, and is available for commercial operation.

C. During the commissioning period, the owner or operator shall keep records of the natural gas fuel combusted in the boilers on hourly and daily basis. The natural gas fuel combusted during the commissioning period shall accrue towards the annual fuel use limit.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CPM.

AQ-3 Right-of-Entry

The "Right of Entry", as defined by California H&SC § 41510 of Division 26, shall apply at all times with respect to the equipment and the Control System. Representatives of the Great Basin Unified Air Pollution Control District shall be permitted to enter the facility to inspect and copy any record required to be kept under the terms of this permit. District staff shall also be permitted to inspect any equipment, work practices, air emission-related activity or method dictated by this permit. If deemed necessary by the District to verify compliance with these conditions, the permittee shall within 7 days notice be available to open any sample extraction port, or exhaust outlet for the purpose of conducting source tests or to collect samples. In enforcing the terms of this permit, any cost incurred in collecting samples, source testing and laboratory analysis fees shall be the responsibility of the project owner. [District Rules 210 and 302 Analysis Fee]

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CPM.

AQ-4 Copy of Permit Onsite

A copy of the permit shall be maintained readily available at all times on the operating premises. [District Rule 200.D]

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CPM.

AQ-5 Report Violation of Emission Standard

Any violation of any emission standard to which the stationary source is required to comply, as indicated by the records of the monitoring device, shall be reported by the operator of the source to the district within 96 hours after such occurrence. The district shall, in turn, report the violation to the state board within five working days after receiving the report of the violation from the operator. [Cal H&S § 42706]

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CPM.

AQ-6 Severability Clause

If any provision of this permit is found invalid, such finding shall not affect any remaining provisions. [District Rule 107]

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CPM.

AQ-7 Right to Revise Permit

The provisions of this permit may be modified by the District if it determines the stipulated conditions are inadequate. [District Rule 210.C]

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CPM.

AQ-8 Breakdown (or Emergency) Reporting Conditions

A breakdown condition means an unforeseeable failure or malfunction of: 1) any air pollution control equipment or related operating equipment which causes a violation of any emission limitation or restriction prescribed by this permit or District rules and regulations, or by State law, or 2) any in-stack continuous monitoring equipment.

A. The permittee shall comply with the breakdown requirements of District Rule 403 (Breakdown), which shall include notifying the Air Pollution Control Officer of a breakdown condition within an hour of detection, unless it can be demonstrated that a longer reporting period is necessary -- not to exceed two (2) days.

B. Notification shall identify the time, location, equipment involved, and to the extent possible the cause of the breakdown and steps taken to correct the breakdown condition.

C. Within one (1) week after the breakdown occurrence, the permittee shall submit a written report to the Air Pollution Control Officer which includes: date of correction of the breakdown, determination of the cause of the breakdown, corrective measures to prevent a recurrence, an estimate of the emissions caused by the breakdown condition, and pictures of the failed equipment, if available.

D. Breakdown conditions shall not persist longer than 24 hours or the end of the production run, whichever is sooner, except for continuous monitoring equipment, for which the period shall be ninety-six (96) hours, unless the permittee obtains an Emergency Variance pursuant to District Rule 617. [District Rule 403]

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CPM.

FACILITY OPERATING CONDITIONS

AQ-9 Visible Emissions Opacity Limit

Visible emissions from any source shall not exceed a Ringelmann 1 (20% opacity) for a period or periods aggregating more than three minutes in any one hour. [District Rule 400]

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CPM.

AQ-10 Unit Emission Limits

To demonstrate consistency with the ambient air quality modeling and the screening health risk assessment provided in the application for certification to the California Energy Commission, the pound per hour equipment emission rate limits in Table 1 shall apply. Except during the commissioning period, startup/shutdown conditions and standby conditions, the pound per million Btu limits shall also apply. Compliance with these lb/MMBtu limits will also ensure compliance with the limits in the applicable New Source Performance Standards (NSPS).

Table 1: Criteria pollutant emission limits per unit in pounds per hour (pounds per million Btu)

Pollutant	Auxiliary Boiler	Nighttime Preservation Boiler	Emergency Backup Engine	Emergency Fire Pump Engine
NOx as NO_2	2.74 (0.0110)	0.17 (0.0110)	38.4	1.3
CO	4.55 (0.0183)	0.55 (0.0366)	20.8	1.15
VOC as CH_4	1.34 (0.0054)	0.08 (0.0053)	1.3	0.08
PM10/PM2.5	1.25 (N/A)	0.08 (N/A)	1.2	0.07
SO_2	0.52 (0.0021)	0.03 (0.0021)	0.04	0.003

Verification: The project owner shall submit to the CPM data showing compliance with the limits of this condition as part of the Quarterly Operation Report required under **AQ-SC9**.

AQ-11 Combined Plant-wide Daily Emission Limits

A. "Plant-wide" shall mean this Solar 1 Power Plant facility, GBUAPCD № 1604-00-11, plus the adjacent Solar 2 Power Plant and Common Area facilities (permitted separately, GBUAPCD № 1605-00-11 and 1606-00-11, respectively).

B. The total plant-wide combined emissions from the auxiliary and nighttime preservation boilers, emergency and fire pump engines shall not exceed the limits in Table 2.

Table 2: Criteria pollutant emission limits in pounds per day

Pollutant	All Fuel Burning Equipment
NOx as NO_2	116.0
CO	156.1
VOC as CH_4	37.8
$PM_{10}/PM_{2.5}$	21.3
SO_2	7.4

C. Compliance demonstration with these plant-wide limits shall entail the monitoring, recordkeeping and reporting requirements specified later in this permit.

D. Compliance with the NOx limit shall be demonstrated via the use of a plant-wide NOx Predictive Emission Monitoring System (PEMS), in accordance with condition of certification AQ-18, that totals both power plants' boiler emission rates.

Verification: The project owner shall submit a letter annually confirming compliance with this condition, to the CPM. During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CPM.

AQ-12 Boiler Fuel Use Limits

The total natural gas fuel consumption, expressed as heat input rates, shall not exceed 3,440 MMBtu/day or 746,400 MMBtu/year for combustion in the burners of all auxiliary and nighttime preservation boilers in the Solar 1 facility plus the adjacent Solar 2 facility (permitted separately, GBUAPCD №1605-05-11).

Verification: The project owner shall submit to the CPM the boiler fuel use data demonstrating compliance with this condition as part of the Quarterly Operation Report.

AQ-13 Toxic Hot Spots Program (AB 2588)

In lieu of an emissions inventory plan, the District accepts the screening health risk assessment provided in the Application for Certification to the California Energy Commission. The combined Solar 1 and Solar 2 facilities shall be categorized under AB 2588 as "Intermediate Level" and shall meet the reporting requirements under Section V of the Emission Inventory Criteria and Guidelines for the Air Toxics "Hot Spots" Program.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CPM.

BOILER SPECIFICATIONS AND NSPS STANDARDS

AQ-14 Boiler Specifications

Each 249 MMBtu/hr auxiliary boiler and each 15 MMBtu/hr nighttime preservation boiler shall be equipped with low-NOx burners, 9 ppmvd NOx at 3% O_2 or less at loads exceeding 25% maximum continuous rating (MCR), and flue gas recirculation (FGR). The boilers shall meet all specifications

stated in the permit application, including stack dimensions and pollutant emission rates.

Verification: As part of the Annual Compliance Report (**COMPLIANCE-7**), the project owner shall include information on the date, time, and duration of any violation of this permit condition.

AQ-15 New Source Performance Standards (NSPS) for Auxiliary Boiler

Each auxiliary boiler shall comply with the requirements of 40 CFR 60 Subpart Db – NSPS for Industrial-Commercial-Institutional Steam Generating Units. The boiler shall meet the following emission standards at all times except during periods of startup, shutdown, or malfunction:

- NOx: 0.20 lb/MMBtu (30-day average) [40 CFR §60.44b(a)]
- SO_2: 0.20 lb/MMBtu [40 CFR §60.42b(k)]

Verification: The project owner shall complete and submit to the CPM a compliance plan that provides a list of the 40 CFR 60 Subpart Db plans, tests, and recordkeeping requirements and their compliance schedule, dates as applicable for the HHSEGS Boilers 1, and 2 at least 30 days prior to first fire of the boilers or earlier as necessary for compliance with Subpart Db.

AQ-16 New Source Performance Standards (NSPS) for Nighttime Preservation Boiler

Each nighttime preservation boiler shall comply with the requirements of 40 CFR 60 Subpart Dc – NSPS for Small Industrial-Commercial-Institutional Steam Generating Units. The SO_2 emission limit in this subpart does not apply because the unit is rated below 30 MMBtu/hr.

Verification: The project owner shall complete and submit to the CPM a compliance plan that provides a list of the 40 CFR 60 Subpart Dc plans, tests, and recordkeeping requirements and their compliance schedule dates as applicable for the boilers on HHSEGS Solar Plant 1, and HHSEGS Solar Plant 2 at least 30 days prior to first fire of the boilers or earlier as necessary for compliance with Subpart Dc.

BOILER MONITORING CONDITIONS

AQ-17 Fuel Type and Flow Monitoring

A. The burners for the auxiliary and nighttime preservation boilers shall be fueled with natural gas that meets the standards of the California Public Utilities Commission (CPUC).

B. Each boiler shall be equipped with a continuous flow monitoring system to measure and record fuel consumption in million standard cubic feet per hour (MMscf/hr).

Verification: As part of the Annual Compliance Report (**COMPLIANCE-7**), the project owner shall include proof that only pipeline quality natural gas that meets Public Utilities Commission standards are used for the boilers. The Annual Compliance Report shall also report fuel used in each boiler.

AQ-18 Boiler Predictive NOx Emission Rate Monitoring Plan

A. As an element of the PEMS required by condition of certification **AQ-11.D**, the permittee shall estimate the auxiliary boiler emissions by continuously monitoring parameters indicative of emissions and maintaining records of the amount of natural gas combusted. The permittee shall monitor the auxiliary boiler operating conditions and predict NOx emission rates as specified in a plan that shall:

(1) Be submitted to the District within 360 days of initial startup in accordance with 40 CFR Subpart Db §60.49b(c) and §60.49b(g);

(2) Identify the specific operating conditions to be monitored and the relationship between these operating conditions and NOx emission rates (i.e., lb/MMBtu heat input). Steam generating unit operating conditions include, but are not limited to, the degree of staged combustion (i.e., the ratio of primary air to secondary and/or tertiary air) and the level of excess air (i.e., flue gas O_2 level);

(3) Include the data and information that the permittee used to identify the relationship between NOx emission rates and these operating conditions; and

(4) Identify how these operating conditions, including steam generating unit load, will be monitored on an hourly basis by the permittee during the period of operation of the affected facility; the quality assurance procedures or practices that will be employed to ensure that the data generated by monitoring these operating conditions will be representative and accurate; and the type and format of the records of these operating conditions, including steam generating unit load, that will be maintained by the permittee under 40 CFR §60.49b(g). [40 CFR Subpart Db §60.48b(d)]

B. If the permittee elects to estimate NOx emissions from the Nighttime Preservation Boilers using the pound per hour emission limit in Table 1, then the Plan may require continuous monitoring of only operating hours and fuel use for the Nighttime Preservation Boilers.

Verification: This initial plan shall be submitted to the district for approval, and the CPM for review, within 360 days of the initial startup. Any proposed changes to a district-approved plan shall include subsequent test results, operating parameters, analysis, and any other pertinent information to support the proposed changes. The district must approve any emissions estimation plan or revision for estimated NOx emissions to be considered valid.

BOILER TESTING CONDITIONS

AQ-19 Initial Boiler Testing

Initial performance testing shall be completed on each auxiliary and nighttime preservation boiler to demonstrate compliance with the emission limits

specified in condition of certification **AQ-10** at each boiler's maximum achievable production rate.

A. The initial performance test is to be scheduled within 60 days after achieving the maximum continuous rating (MCR) at which the affected facility will be operated, but not later than 180 days after initial startup of the facility. [§60.45b and 60.46b]

B. The permittee shall provide safe and accessible sampling ports that comply with California Industrial Safety Orders and Uniform Building Code and 40 CFR 60, Appendix A, Test Method 1.

C. A test protocol must be submitted to the Air Pollution Control District not later than 30 days before the proposed test date. This test protocol shall be approved by the District before testing begins and shall include the following, or other District-approved methods:

- PM10 emissions: EPA Method 5, Methods 201/202 or ARB Method 5
- NOx emissions: EPA Method 7, 7A, 7E
- SO_2 emissions: EPA Method 6, 6A, 6B or 6C
- CO emissions: EPA Method 10
- VOC emissions: EPA Method 25A

D. A copy of the test results shall be submitted to the District within 60 days following test completion. [District Rule 200.C, and Cal H&S Code § 44340]

Verification: The project owner shall notify the District and the CPM within thirty (30) working days before the execution of the compliance test required in this condition. The test results shall be submitted to the district and to the CPM within 60 days of the date of the tests.

DIESEL BACKUP GENERATOR AND FIRE PUMP ENGINE CONDITIONS

AQ-20 Emergency Backup Generator Engine

Each emergency backup generator shall be powered by a Tier 2, diesel-fueled, Caterpillar 3516C SCAC, 3,633 hp at 1,800 rpm, EPA Family ACPXL78.1T2E, ARB Executive Order U-R-001-0398-1, or an equivalent ARB-certified engine that meets the current EPA Tier standards for the given power range.

Verification: The project owner shall submit the emergency generator specifications to the CPM at least 30 days prior to purchasing the engines for review and approval.

AQ-21 Emergency Fire Pump Engine

Each emergency fire pump shall be powered by a Tier 3, diesel-fueled, Cummins CFP7E-F30, 200 hp at 2,100 rpm, EPA Family ACEXL0409AAB, ARB Executive Order U-R-002-0516, or an equivalent ARB-certified engine that meets the current EPA Tier standards for the given power range.

Verification: The project owner shall submit the emergency engine specifications to the CPM at least 30 days prior to purchasing the engines for review and approval.

AQ-22 Airborne Toxics Control Measure (also applies to Hidden Hills Common Area)

The permittee shall operate the diesel emergency backup generator and fire pump engines in compliance with the California Code of Regulations, Title 17 (17 CCR) § 93115.

Verification: The project owner shall submit the engine specifications at least 30 days prior to purchasing the engines for review and approval demonstrating that the engines meet NSPS and ARB ATCM emission limit requirements at the time of engine purchase.

AQ-23 Particulate Matter Limit (also applies to Hidden Hills Common Area)

Each emergency engine shall not discharge into the atmosphere particulate matter in excess of 0.3 grains per dry standard cubic foot of exhaust gas. [Rule 404-A].

Verification: The project owner shall make the site available for inspection of records and equipment by representatives of the District, ARB, and the CPM.

AQ-24 ARB Diesel Fuel (also applies to Hidden Hills Common Area)

Each engine shall be fueled with ARB diesel fuel with 15 parts-per-million sulfur content by weight or less, or an alternative diesel fuel that meets the requirements of the Standard of Motor Vehicle Fuel found in Title 13, CCR (13 CCR) § 2281. The amount of sulfur dioxide exhausted to the atmosphere shall not exceed 0.2% by volume. The permittee shall keep records of the composition of purchased fuel. [District Rules 210 and 416; 17 CCR § 93115.5(a)(1)]

Verification: During site inspection, the project owner shall make all records and reports available to the district, ARB, U.S. EPA or CPM.

AQ-25 Hour Meter Required (also applies to Hidden Hills Common Area)

A non-resettable totalizer elapsed time meter shall be installed and maintained on each engine to indicate the cumulative hours of engine operation. [District Rule 210.A, 17 CCR § 93115].

Verification: At least thirty (30) days prior to the installation of the engine, the project owner shall provide the district and the CPM the specification of the hour timer.

AQ-26 Non-Emergency Use Limitation (also applies to Hidden Hills Common Area)

A. Each emergency backup generator engine shall be allowed to operate up to 50 hours per year for maintenance and testing purposes. Operation of the engine beyond the 50 hours shall be allowed only by the events as defined in condition of certification **AQ-27** for what constitutes emergency use. [District Rule 210.A, 17 CCR § 93115.6(a)(3)(A)].

B. Each fire pump engine shall not operate more than the number of hours (up to 30 hours per year) necessary to comply with the testing

requirements of the National Fire Protection Association (NFPA). [District Rule 210.A, 17 CCR § 93115.6(a)(4)(A)].

Verification: The project owner shall make the site available for inspection of records and equipment by representatives of the district, ARB, and the CPM.

AQ-27 What Constitutes Emergency Use (also applies to Hidden Hills Common Area)

Emergency use of the engines is not limited and is defined in 17 CCR § 93115 as providing electrical power or mechanical work during any of the following events and subject to the following conditions that:

A. the failure or loss of all or part of normal electrical power service or normal natural gas supply to the facility:

(1) which is caused by any reason other than the enforcement of a contractual obligation the permittee has with a third party or any other party; and

(2) which is demonstrated by the permittee to the district APCO's satisfaction to have been beyond the reasonable control of the owner or operator;

B. the failure of a facility's internal power distribution system:

(1) which is caused by any reason other than the enforcement of a contractual obligation the permittee has with a third party or any other party; and

(2) which is demonstrated by the permittee to the district APCO's satisfaction to have been beyond the reasonable control of the owner or operator.

C. the pumping of water for fire suppression or protection;

D. the pumping of water to maintain pressure in the water distribution system for the following reasons:

(1) a pipe break that substantially reduced water pressure; or

(2) high demand on the water supply system due to high use of water for fire suppression; or

(3) the breakdown of electric-powered pumping equipment at sewage treatment facilities or water delivery facilities.

[District Rule 210.A, 17 CCR § 93115].

Verification: The project owner shall make the site available for inspection of records and equipment by representatives of the district, ARB, and the CPM.

AQ-28 Required Records for Emergency Engines (also applies to Hidden Hills Common Area)

The permittee shall keep a monthly log of usage that shall list and document the nature of use for each of the following:

A. emergency use hours of operation;

B. maintenance and testing hours of operation;

   a. hours of operation for emission testing to show compliance with the applicable standard;

C. initial start-up testing hours;

D. hours of operation for all uses other than those specified above; and

E. the fuel used.

   (1) For engines operated exclusively on ARB Diesel Fuel, the owner or operator shall document the use of ARB Diesel Fuel through the retention of fuel purchase records indicating that the only fuel purchased for supply to an emergency standby engine was ARB Diesel Fuel; or

   (2) For engines operated on any fuel other than ARB Diesel Fuel, fuel records demonstrating that the only fuel purchased and added to an emergency standby engine or engines, or to any fuel tank directly attached to an emergency standby engine or engines, meets the requirements of section 93115.5(b).

[District Rule 210.A, 17 CCR § 93115.10(g)(1)].

Verification: The project owner shall submit records required by this condition that demonstrating compliance with the sulfur content and engine use limitations of conditions **AQ-24** and **AQ-27** in the Annual Compliance Report, including a photograph showing the annual reading of engine hours. The project owner shall make the site available for inspection of records by representatives of the district, ARB, and the CPM.

AQ-29 Record Retention (also applies to Hidden Hills Common Area)
Log entries shall be retained for a minimum of 36 months from the date of entry. Log entries made within 24 months of the most recent entry shall be retained on-site, either at a central location or at the engine's location, and made immediately available to the District staff upon request. Log entries made from 25 to 36 months from most recent entry shall be made available to District staff within 5 working days from request. [Rule 210.A, 17 CCR § 93115.10(g)(2)].

Verification: The project owner shall submit records required by this condition that demonstrating compliance with the sulfur content and engine use limitations of conditions **AQ-24,** and **AQ-27** in the Annual Compliance Report, including a photograph showing the annual reading of engine hours. The project owner shall make the site available for inspection of records by representatives of the district, ARB, and the CPM.

PARTICULATE MATTER MITIGATION CONDITIONS

AQ-30 Fugitive Dust Mitigation

The permittee shall take reasonable precautions during construction activities to prevent visible particulate matter from being airborne, under normal wind conditions, beyond the HHSEGS property line, in accordance with the requirements for dust control in Rule 401.A. The District deems the California Energy Commission (CEC) staff conditions of certification (HHSEGS) **AQ-SC1** through **AQ-SC5** for construction and operation mitigation methods to be reasonable precautions under Rule 401. The permittee shall submit the Air Quality Construction Mitigation Plan, required by **AQ-SC2** to the District after its approval by the CEC.

Verification: The permittee shall submit the Air Quality Construction Mitigation Plan, required by **AQ-SC2** to the District after its approval by the CEC. The permittee shall make available to the District, upon request, copies of the CEC-required MCR containing documentation of the actions taken to comply with these conditions.

FACILITY RECORDKEEPING & REPORTING CONDITIONS

AQ-31 Natural Gas Heat Input Records

Records for demonstrating compliance with the plant-wide natural gas combustion heat input, required by condition of certification **AQ-12**, shall be presented in MMBtu/day, MMBtu/month and MMBtu per rolling 12-month period.

Verification: The project owner shall submit to the CPM the boiler fuel use data demonstrating compliance with this condition as part of the Quarterly Operation Report.

AQ-32 Plant-wide Emission Records

Emission records for the plant-wide NOx PEMS, required by condition of certification AQ-11, shall be presented in pounds per hour (lb/hr), pounds per day (lb/day) and pounds per million Btu (lb/MMBtu) for each individual boiler in the Solar 1 and Solar 2 facilities. The sum total of NOx for all boilers shall be presented in pounds per day (lb/day) for each calendar day, midnight to midnight. Data obtained to estimate boiler NOx emissions shall be presented as specified in the plant-wide NOx PEMS plan required by condition of certification AQ-18.

Verification: The project owner shall submit to the CPM the boiler fuel use data demonstrating compliance with this condition as part of the Quarterly Operation Report.

AQ-33 Monitoring Record Retention

Required recordkeeping information shall be retained by the permittee in a form suitable for inspection for a period of at least two (2) years from the end of the calendar year of the journal entry. [Rule 206.B, Cal H&S Code § 42705]

Verification: The project owner shall submit records required by this condition that demonstrating compliance with the sulfur content and engine use limitations of conditions **AQ-24,** and **AQ-27** in the Annual Compliance Report, including a photograph showing the annual reading of engine hours. The project owner shall make the site available for inspection of records by representatives of the district, ARB, and the CPM.

AQ-34 Reporting of Monitoring Records

All monitoring records shall be made immediately available to the District staff upon request.

Verification: The project owner shall make the site available for inspection of records and equipment by representatives of the district, ARB, and the CPM.

Conditions Applicable to Hidden Hills Common Area (GBUAPCD ATC Number 1606-00-11)

GENERAL CONDITIONS

General conditions **AQ-1** and **AQ-3** to **AQ-8** for Hidden Hills Solar 1 Power Plant and Solar 2 Power Plant are also applicable for the Common Area.

FACILITY OPERATING CONDITIONS

AQ-35 Unit Emission Limits

To demonstrate consistency with the ambient air quality modeling and the screening health risk assessment provided in the Application for Certification to the California Energy Commission, the pound per hour equipment emission rate limits in Table 1 shall apply.

Table 1: Common Area Emission Limits in pounds per hour

Pollutant	Emergency Backup Engines	Emergency Fire Pump Engines
NOx as NO_2	2.6	1.3
CO	2.28	1.15
VOC as CH_4	0.15	0.08
$PM_{10}/PM_{2.5}$	0.13	0.07
SO_2	0.004	0.003

Verification: The project owner shall submit to the CPM data showing compliance with the limits of this condition as part of the Quarterly Operation Report

DIESEL BACKUP GENERATOR AND FIRE PUMP ENGINE CONDITIONS

AQ-36 Visible Emissions Opacity Limit

Visible emissions from each engine shall not exceed a Ringelmann 1 (20% opacity) for a period or periods aggregating more than three minutes in any one hour. [District Rule 400]

Verification: The project owner shall make the site available for inspection of records and equipment by representatives of the district, ARB, and the CPM.

AQ-37 Emergency Backup Generator Engine

The emergency backup generator (Unit EG1C) shall be powered by a Tier 3, diesel-fueled, Caterpillar C9 ATAAC, 398 hp at 1,800 rpm, EPA Family ACPXL08.8ESX, ARB Executive Order U-R-001-0373, or an equivalent ARB-certified engine that meets the current EPA Tier standards for the given power range.

Verification: During site inspection, the project owner shall make all records and reports available to the district, ARB, EPA or CPM.

AQ-38 Emergency Fire Pump Engine

The emergency fire pump (Unit FP1C) shall be powered by a Tier 3, diesel-fueled, Cummins CFP7E-F30, 200 hp at 2,100 rpm, EPA Family ACEXL0409AAB, ARB Executive Order U-R-002-0516, or an equivalent ARB-certified engine that meets the current EPA Tier standards for the given power range.

Verification: During site inspection, the project owner shall make all records and reports available to the district, ARB, EPA or CPM.

Conditions **AQ-22** to **AQ-29** also apply to the Hidden Hills Common Area.

ACRONYMS

AAQS	Ambient Air Quality Standard
ACC	Air Cooled Condenser
AERMOD	ARMS/EPA Regulatory Model
AFC	Application for Certification
AQCMM	Air Quality Construction Mitigation Manager
AQCMP	Air Quality Construction Mitigation Plan
AQMD	Air Quality Management District
ARB	California Air Resources Board
ATC	Authority to Construct
ATCM	Airborne Toxic Control Measure
BACT	Best Available Control Technology
bhp	brake horsepower
BRW	Basin Range and Watch
Btu	British thermal unit
CAA	Clean Air Act (Federal)
CAAQS	California Ambient Air Quality Standard
CCR	California Code of Regulations
CEC	California Energy Commission (or Energy Commission)
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CPM	(CEC) Compliance Project Manager
DOC	Determination of Compliance
dscf	dry standard cubic feet
EIR	Environmental Impact Report
ERC	Emission Reduction Credit
FDOC	Final Determination Of Compliance
FSA	Final Staff Assessment (this document)
GBUAPCD	Great Basin Unified Air Pollution Control District
GBVAB	Great Basin Valleys Air Basin
GHG	Greenhouse Gas
gr	Grains (1 gr $\cong$ 0.0648 grams, 7000 gr = 1 pound)
hp	horsepower
H_2S	Hydrogen Sulfide
HSC	Health and Safety Code

HHSEGS	Hidden Hills Solar Electric Generating System (proposed project)
lbs	Pounds
LORS	Laws, Ordinances, Regulations and Standards
MCR	Monthly Compliance Report
mg/m^3	milligrams per cubic meter
MMBtu	Million British thermal units
MW	Megawatts (1,000,000 Watts)
NAAQS	National Ambient Air Quality Standard
NH_3	Ammonia
NMHC	Non-Methane Hydrocarbons
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NO_3	Nitrates
NOx	Oxides of Nitrogen *or* Nitrogen Oxides
NSPS	New Source Performance Standard
NSR	New Source Review
O_2	Oxygen
O_3	Ozone
OLM	Ozone Limiting Method
PM	Particulate Matter
PM10	Particulate Matter less than 10 microns in diameter
PM2.5	Particulate Matter less than 2.5 microns in diameter
ppm	Parts Per Million
ppmv	Parts Per Million by Volume
ppmvd	Parts Per Million by Volume, Dry
PSA	Preliminary Staff Assessment
PTO	Permit to Operate
PVMRM	Plume Volume Molar Ratio Method
scf	Standard Cubic Feet
SO_2	Sulfur Dioxide
SO_3	Sulfate
SOx	Oxides of Sulfur
SRSG	Solar Receiver Steam Generator
STG	Steam Turbine Generator

U.S. EPA	United States Environmental Protection Agency
$\mu g/m^3$	Microgram per cubic meter
VOC	Volatile Organic Compounds

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AIR QUALITY APPENDIX AIR-1
GREENHOUSE GAS EMISSIONS

Jacquelyn Leyva and David Vidaver

SUMMARY AND CONCLUSIONS

The Hidden Hills Solar Electric Generating System (HHSEGS) project is a proposed renewable project addition to the state's electricity system. If built, it would significantly contribute to the State of California's goal of having one-third of its electrical energy produced by renewable power plants by the year 2020. HHSEGS would be a concentrating solar power plant that would comprise fields of heliostat mirror arrays focusing solar energy on the solar receiver located on centralized power towers. As a solar project, it would emit considerably fewer greenhouse gases (GHG) than existing power plants and most other generation technologies, and thus would contribute to continued reduction of the annual average GHG emission rates for both California and the western United States. While HHSEGS would emit some GHG emissions, HHSEGS's contribution to the system build-out of renewable resources in California would result in a net cumulative reduction of energy consumption and GHG emissions from new and existing fossil resources.

Electricity is produced by operation of inter-connected generation resources. Operation of any one power plant, like HHSEGS, affects all other power plants in the inter-connected system. The operation of the HHSEGS would affect the overall electricity system operation and GHG emissions in several ways:

- HHSEGS would displace higher GHG-emitting electricity generation. Because the project's GHG emissions per megawatt-hour (MWh) would be largely based upon renewable solar generation, GHG emissions would be much lower than power plants that the project would displace even with use of natural gas in the auxiliary boilers. Therefore, the addition of the HHSEGS would contribute to a reduction of California and overall Western Electricity Coordinating Council system GHG[10] emissions and GHG emission rate average and would be part of a programmatic approach to meeting GHG emissions reduction goals.
- HHSEGS would facilitate to some degree the replacement out-of-state high-GHG-emitting (e.g., coal) electricity generation that must be phased out in conformance with the State's Emissions Performance Standard.
- HHSEGS could facilitate to some extent the replacement of generation provided by aging power plants and those that use once-through cooling (OTC).

These system effects would result in a net reduction in GHG emissions across the electricity system providing energy and capacity to California. Thus, staff believes that the project would result in a cumulative overall reduction in GHG emissions from power

[10] Fuel-use closely correlates to the efficiency of and carbon dioxide (CO_2) emissions even from renewable power plants. Since CO_2 emissions from fuel combustion dominate greenhouse gas (GHG) emissions from power plants, the terms CO_2 and GHG are used interchangeably in this section.

plants, would not worsen current conditions, and would not result in impacts that are cumulatively significant.

Staff concludes that the short-term, minor emissions of greenhouse gases during construction that are necessary to create this new, very low GHG-emitting renewable power generating facility would be reduced by "best practices" and would, therefore, would not be a significant impact.

The Hidden Hills Solar Electric Generating System project, as a solar project with a nightly shutdown, would operate significantly less than a 60 percent capacity factor and therefore would not be subject to the requirements of SB 1368 (Greenhouse Gases Emission Performance Standard; Title 20, California Code of Regulations, section 2900 et. seq.). However, the HHSEGS would easily comply with the requirements of SB 1368 and the Greenhouse Gas Emission Performance Standard.

AIR QUALITY GHG ANALYSIS - Jacquelyn Leyva Record

INTRODUCTION

The generation of electricity using fossil fuels, even in an auxiliary boiler or back-up generator at a thermal solar plant, produces greenhouse gas emissions in addition to the criteria air pollutants that have been traditionally regulated under the federal and state Clean Air Acts. California is actively pursuing policies to reduce GHG emissions that include adding non-GHG emitting renewable generation resources to the system. The greenhouse gases are carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4), sulfur hexafluoride (SF_6), hydrofluorocarbons (HFC), and perflurocarbons (PFC). CO_2 emissions are far and away the most common of these emissions; as a result, even though the other GHGs may have a greater impact on climate change on a per-unit basis due to their greater global warming potential, GHG emissions are often "normalized" in terms of metric tons of CO_2-equivalent (MTCO2E) for simplicity. Global warming potential is a relative measure, compared to carbon dioxide, of a compound's ability to warm the planet, taking into account each compound's expected residence time in the atmosphere.

GHG emissions are not included in the class of pollutants traditionally called "criteria pollutants." Since the impact of the GHG emissions from a power plant's operation has global rather than local effects, those impacts should be assessed not only by analysis of the plant's emissions, but also in the context of the operation of the entire electricity system of which the plant is an integrated part. Furthermore, the impact of the GHG emissions from a power plant's operation should be analyzed in the context of applicable GHG laws and policies, especially AB 32, California's Global Warming Solutions Act of 2006.

The state has demonstrated a clear willingness to address global climate change though research, adaptation[11], and GHG emissions reductions. In that context, staff evaluates the GHG emissions from the proposed project, presents information on GHG

[11] While working to understand and reverse global climate change, it is prudent to also adapt to potential changes in the state's climate (for example, changing rainfall patterns).

emissions related to electricity generation (see "**Electricity System GHG Impacts**" below) and describes the applicable GHG policies and programs.

In December 2009, the U.S. Environmental Protection Agency (EPA) declared that greenhouse gases (GHGs) threaten the public health and welfare of the American people (the so-called "endangerment finding"). Regulating GHGs at the federal level is required by Prevention of Significant Deterioration Program (PSD) for sources that exceed 100,000 tons per year of carbon dioxide-equivalent emissions. Additionally, Federal rules that became effective December 29, 2009 (40 CFR 98) require federal reporting of GHGs. As federal rulemaking evolves, staff at this time focuses on analyzing the ability of the project to comply with existing federal- and state-level policies and programs for GHGs.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS

The following federal, state, and local laws and policies in **Greenhouse Gas Table 1** pertain to the control and mitigation of greenhouse gas emissions applicable to power plants. Staff's analysis examines the project's compliance with these requirements.

GLOBAL CLIMATE CHANGE AND CALIFORNIA

There is general scientific consensus that climate change is occurring and that human activity contributes in some measure (perhaps significantly) to that change. Man-made emissions of greenhouse gases, if not sufficiently curtailed, are likely to contribute further to continued increases in global temperatures. Indeed, the California Legislature finds that "[g]lobal warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California" (Cal. Health & Safety Code, sec. 38500, division 25.5, part 1).

In 1998, the Energy Commission identified a range of strategies to prepare for an uncertain climate future, including a need to account for the environmental impacts associated with energy production, planning, and procurement (CEC 1998, p. 5). In 2003, the Energy Commission recommended that the state require reporting of greenhouse gases or global climate change[12] emissions as a condition of state licensing of new electric generating facilities (CEC 2003, IEPR p. 42). In 2006, California enacted the California Global Warming Solutions Act of 2006 (AB 32). It requires the California Air Resources Board (ARB) to adopt standards to reduce statewide GHG emissions to GHG emissions levels that existed in 1990, with such reductions to be achieved by 2020. To achieve this, ARB has a mandate to define the 1990 emissions level and achieve the maximum technologically feasible and cost-effective GHG emission reductions to meet this requirement. Executive Order S-3-05 also requires ARB to plan for further GHG emissions reductions to achieve an 80 percent reduction from 1990 GHG emissions by the year 2050.

[12] Global climate change is the result of greenhouse gases, or air emissions with global warming potentials, affecting the global energy balance and thereby the global climate of the planet. The terms greenhouse gases (GHGs) and global climate change (GCC) gases are used interchangeably.

The ARB adopted early action GHG reduction measures in October 2007, adopted mandatory reporting requirements and the 2020 statewide target in December 2007, and adopted a statewide scoping plan in December 2008 to identify how emission reductions will be achieved from significant sources of GHG via regulations, market mechanisms, and other actions. ARB adopted regulations implementing cap-and-trade regulations on December 22, 2011 and ARB staff continues to develop and implement regulations to refine key elements of the GHG reduction measures to improve their linkage with other GHG reduction programs. Federal and state mandatory reporting and state cap-and-trade requirements all apply to this project.

Greenhouse Gas Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
40 Code of Federal Regulations (CFR) Parts 51, 52, 70 and 71	This rule "tailors" GHG emissions to PSD and Title V permitting applicability criteria.
40 Code of Federal Regulations (CFR) Parts 51 and 52	A new stationary source that emits more than 100,000 TPY of greenhouse gases (GHGs) is considered to be a major stationary source subject to Prevention of Significant Determination (PSD) requirements. This project would not trigger this 100,000 TPY PSD threshold.
40 Code of Federal Regulations (CFR) Part 98	This rule requires mandatory reporting of GHG emissions for facilities that emit more than 25,000 metric tons of CO_2 equivalent emissions per year. This requirement is triggered by this project.
State	
California Global Warming Solutions Act of 2006, AB 32 (Stats. 2006; Chapter 488; Health and Safety Code sections 38500 et seq.)	This act requires the California Air Resource Board (ARB) to enact standards that will reduce GHG emission to 1990 levels by 2020. Electricity production facilities are regulated by the ARB. A cap-and-trade program became active in January 2012, with enforcement to begin January 2013. Cap-and-trade is expected to achieve approximately 20 percent of the GHG reductions expected under AB 32 by 2020.
California Code of Regulations, Title 17, Subchapter 10, Article 2, sections 95100 et. seq.	These ARB regulations implement mandatory GHG emissions reporting as part of the California Global Warming Solutions Act of 2006 (Stats. 2006; Chapter 488; Health and Safety Code sections 38500 et seq.)
California Code of Regulations, Title 17, Subchapter 10, Article 5, sections 95800 to 96023	These ARB regulations implement mandatory GHG cap-and-trade requirements for "covered entities," which include power plants which emit more than 25,000 metric tons of carbon dioxide equivalent emissions per calendar year. Enforcement begins January 2013.
Title 20, California Code of Regulations, section 2900 et seq.	These regulations prohibit utilities from entering into long-term contracts with any base load facility that does not meet a greenhouse gas emission standard of 0.5 metric tonnes carbon dioxide per megawatt-hour (0.5 MTCO2/MWh) or 1,100 pounds carbon dioxide per megawatt-hour (1,100 lbs CO2/MWh).

The California Climate Action Team produced a report to the Governor (CalEPA 2006) which included many examples of strategies that the state could pursue to reduce GHG emissions in California, in addition to several strategies that had been recommended by the Energy Commission and the Public Utilities Commission. Their third biennial report, published in December 2010 and required by Executive Order S-3-05, is the most recent report addressing actions that California could take to reduce GHG emissions (CalEPA 2010). The scoping plan approved by ARB in December 2008 builds upon the overall climate change policies of the Climate Action Team reports and includes recommended strategies to achieve the goals for 2020 and beyond. Some strategies focus on reducing consumption of petroleum across all areas of the California economy. Improvements in transportation energy efficiency (fuel economy) and land use planning and alternatives to petroleum-based fuels are slated to provide substantial reductions by 2020 (CalEPA 2006). The scoping plan includes a 33% Renewables Portfolio Standard (RPS), aggressive energy efficiency targets, and a cap-and-trade program that includes the electricity sector (ARB 2008). Mandatory compliance with cap-and-trade requirements commenced on January 1, 2012, although enforcement was delayed until January 2013. Senate Bill 2 (Simitian, Chapter 1, Statutes of 2011-12) expresses the intent of the California Legislature to have 33 percent of California's electricity supplied by renewable sources by 2020 and the Hidden Hills Project would contribute to this goal.

It is likely that GHG reductions mandated by ARB will be non-uniform or disproportional across emitting sectors, in that most reductions will be based on cost-effectiveness (i.e., the greatest GHG reduction for the least cost). For example, ARB proposes a 40 percent reduction in GHG emissions from the electricity sector even though that sector currently only produces about 25 percent of the state's GHG emissions.

SB 1368,[13] enacted in 2006, and regulations adopted by the Energy Commission and the Public Utilities Commission pursuant to that bill, prohibits California utilities from entering into long-term commitments with any base load facilities that exceed the Emission Performance Standard (EPS) of 0.5 metric tonnes CO_2 per megawatt-hour[14] (1,100 pounds CO_2/MWh). Specifically, the SB 1368 Emission Performance Standard (EPS) applies to base load power from new power plants, new investments in existing power plants, and new or renewed contracts with terms of five years or more, including contracts with power plants located outside of California.[15] If a project, instate or out of state, plans to sell base load electricity to California utilities, those utilities will have to demonstrate that the project meets the EPS. *Base load* units are defined as units that are expected to operate at a capacity factor higher than 60 percent. Compliance with the EPS is determined by dividing the annual average carbon dioxide emissions by the annual average net electricity production in MWh. This determination is based on capacity factors, heat rates, and corresponding emissions rates that reflect the *expected* operations of the power plant and not on full load heat rates [Chapter 11, Article 1 §2903(a)]. At the January 12, 2012 Business Meeting, the Energy Commission opened an Order Instituting Rulemaking (12-OIR-1) to consider revisions to the EPS.

[13] Public Utilities Code § 8340 et seq.

[14] The Emission Performance Standard only applies to carbon dioxide and does not include emissions of other greenhouse gases converted to carbon dioxide equivalent.

[15] See Rule at http://www.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/64072.htm

In addition to these programs, California is involved in the Western Climate Initiative (WCI), a multi-state and international effort to establish a cap-and-trade market to reduce greenhouse gas emissions in the Western United States and the Western Electricity Coordinating Council (WECC). WCI created a special entity, WCI, Inc. to assist jurisdictions that are moving ahead with cap-and-trade programs. The initial participants are California and the Canadian province of Quebec. Two other Canadian provinces may join in the near future.

Each participating entity is developing their own cap-and-trade program to reduce greenhouse gas pollution, using their own authorities, laws and regulations. These programs will be linked in a larger market if each participating organization finds that such joining of programs creates synergy and can be done without adversely impacting their own system.

WCI timelines are similar to those of AB 32, with full roll-out beginning in 2012. And, as with AB 32, the electricity sector has been a major focus of attention of this group. ARB continues to refine AB32 regulations to mesh California requirements with those of the WCI to minimize leakage of GHG emissions from one geographic area to another. For example, they held a staff workshop on April 9, 2012 to discuss draft amendments to California's cap-and-trade program to better link these two efforts. None of the proposed amendments would change GHG requirements for HHSEGS.

SB1018 (Unfinished Business, Senate Budget and Fiscal Review Committee, for purposes of implementing the Budget Act of 2012) establishes new legislative oversight and controls over the Air Resources Board including: the creation of a separate expenditure fund for proceeds from the auction or sale of allowances pursuant to the market-based compliance mechanism (their cap-and-trade program); the establishment of a separate Cost of Implementation Fee account for oversight and tracking of funds; oversight of actions taken on behalf of the State of California related to market-based compliance and auctions, specific to the Western Climate Initiative and Western Climate Initiative, Incorporated; and provides for return of certain funds to ratepayers of Investor Owned Utilities from funds related to the auction or sale of allowances.

If built, HHSEGS would be required to participate in California's greenhouse gas cap-and-trade program. This cap-and-trade program is part of a broad effort by the State of California to reduce GHG emissions as required by AB32, which is being implemented by ARB. As currently proposed, market participants such as HHSEGS would be required to report their GHG emissions and to obtain GHG emissions allowances (and offsets) for those reported emissions by purchasing allowances from the capped market and offsets from outside the AB32 program. As new participants enter the market, and as the market cap is ratcheted down over time, GHG emission allowance and offset prices will increase, encouraging innovation by market participants to reduce their GHG emissions. Thus, HHSEGS, as a GHG cap-and-trade participant, would be consistent with California's landmark AB 32 Program, which is a statewide program coordinated with a region wide WCI program to reduce California's GHG emissions to 1990 levels by 2020.

ELECTRICITY AND GREENHOUSE GAS EMISSIONS

Electricity use can be as simple as turning on a switch to operate a light or fan. The system to deliver the adequate and reliable electricity supply is complex and variable. But it operates as an integrated whole to meet demand, such that the dispatch of a new source of generation unavoidably curtails or displaces one or more less efficient or less competitive existing sources. Within the system, generation resources provide electricity, or energy, generating capacity, and ancillary services to stabilize the system and facilitate electricity delivery, or movement, over the grid. *Capacity* is the instantaneous output of a resource, in megawatts. *Energy* is the capacity output over a unit of time, for example an hour or year, generally reported as megawatt-hours or gigawatt-hours (GWh). Ancillary services[16] include regulation, spinning reserve, non-spinning reserve, voltage support, and black start capability. Individual generation resources can be built and operated to provide only one specific service. Alternatively, a resource may be able to provide one or all of these services, depending on its design and constantly changing system needs and operations.

Hidden Hills Project GHG Emissions

Project Construction

Construction of industrial facilities such as power plants requires coordination of numerous equipment and personnel. The concentrated on-site activities result in short-term, unavoidable increases in vehicle and equipment emissions that include greenhouse gases. Construction of the HHSEGS project would involve 29 months of activity (not including start-up or commissioning). The project owner provided a GHG emission estimate for the entirety of the construction phase. Construction equipment would be powered with newer, higher air quality-tiered (thus, lower emitting) diesel powered equipment and "best practices" would also be incorporated to minimize criteria pollutant emissions. These mitigation measures are described in the air quality section and would also minimize carbon dioxide emissions because they would inherently require newer engine models. The GHG emissions estimate, presented below in **Greenhouse Gas Table 2**, includes the total emissions for the 29 months of construction activity in terms of CO_2-equivalent. Construction period GHG emissions average 4,175 MTCO2E per

Greenhouse Gas Table 2
HHSEGS, Estimated Potential Construction Greenhouse Gas Emissions

Construction Source [a]	Construction-Phase GHG Emissions over 29 months (MTCO2E) [b]
On-Site Construction Equipment	7,781
Off-Site Worker Travel, Truck Deliveries	2,308
Construction Total	**10,089**

Source: Table 5.1-32R (CH2 2012p)

Notes:
a. Includes emissions from workers commuting to work site.
b. One metric tonne (MT) equals 1.1 short tons or 2,204.6 pounds or 1,000 kilograms.

[16] See CEC 2009b, page 95.

year, compared to annual operating emissions of 61,628 MTCO2E with mirror washing or 40,481 MTCO2E excluding mirror washing. Operating emissions are described more fully below.

Project Operations

The proposed HHSEGS would be a nominal 500-megawatt (MW) solar power tower electrical generating facility located in Inyo County, comprised of two 250 MW units. The primary sources that would cause GHG emissions would be from power block maintenance activities, including mirror cleaning and minimal undesired vegetation removal, weekly testing of the emergency generator and firewater pump, daily operation of each boiler (five hours per day of operation plus additional hours for startup of each auxiliary boiler and twelve to sixteen hours per day of operation plus an hour for startup of each nighttime boiler) and employee commute trips.

Greenhouse Gas Table 3 shows what the proposed project, as permitted, could potentially emit in greenhouse gases on an annual basis. Emissions are also converted to CO_2-equivalent and totaled. Electricity generation GHG emissions are generally dominated by CO_2 emissions from the carbon-based fuels; other sources of GHG are typically small and also are more likely to be easily controlled or reused/recycled, but are nevertheless documented here as some of the compounds have very high relative global warming potentials. Operating emissions are shown both with and without mirror washing.

Natural Carbon Uptake Reduction

This proposed project would cause the clearing of land and removal of vegetation, which would reduce the ongoing natural carbon uptake by vegetation. A study of the Mojave Desert indicated that the desert may uptake carbon in amounts as high as 100 grams per square meter per year (Wohlfahrt et. al. 2008). This would equate to a maximum reduction in carbon uptake, calculated as CO_2, of 1.48 MT of CO_2 per acre, per year, for areas with complete vegetation removal. For this 3,097 acre proposed project, which actually does not require the complete removal of vegetation over most of the project site, the maximum equivalent loss in carbon uptake assuming complete vegetation removal would be 4,582 MT of CO_2 per year, which would correspond to 0.003 MT of CO_2 per MWh generated. Therefore, the natural carbon uptake loss is negligible in comparison with the reduction in fossil fuel CO_2 emissions, which can range from 0.35 to 1.0 MT of CO_2 per MWh depending on the fuel and technology, that is enabled by this proposed project.[17] Given the current approach to minimizing vegetative removal, the impact would be less than significant.

Cumulative Impacts

Cumulative impacts are defined as “two or more individual effects which, when considered together, are considerable or . . . compound or increase other environmental impacts” (CEQA Guidelines § 15355). “A cumulative impact consists of an impact that is created as a result of a combination of the project evaluated in the EIR together with

[17] *Wohlfahrt. et. al. 2008. Georg Wohlfahrt, Lynn F. Fenstermaker, and John A. Arnone III. Large annual net ecosystem CO_2 uptake of a Mojave Desert ecosystem. Global Change Biology, 2008 (14).*

other projects causing related impacts" (CEQA Guidelines § 15130[a][1]). Such impacts may be relatively minor and incremental, yet still be significant because of the existing environmental background, particularly when one considers other closely related past, present, and reasonably foreseeable future projects. This entire assessment is a cumulative impact assessment. The project alone would not be sufficient to measureable change global climate or global inventories. But the project would emit greenhouse gases and therefore has been analyzed as a potential cumulative impact in the context of existing electrical system, the GHG regulatory requirements and GHG energy policies.

COMPLIANCE WITH LORS

Although still being refined as discussed above, ARB's AB 32 regulations will address both the degree of electricity generation sector emissions reductions and the method by which those reductions will be achieved (e.g., through cap-and-trade or command-and-

Greenhouse Gas Table 3
HHSEGS, Estimated Potential Greenhouse Gas (GHG) Emissions

	Maximum Emissions, metric tonnes/yr				
Emitting Source	**CO_2**	**CH_4**	**N_2O**	**SF_6**	**CO_2-equivalent (MTCO2E[a] per year)**
Auxiliary Boilers	31,902	0.60	0.06	--	
Nighttime Preservation Boilers	7,672	0.14	0.01	--	
Power Block Emergency Generator	704	0.03	0.01	--	
Common Area Emergency Generator	41	1.7E-03	3.3E-04	--	
Power Block Fire Pump Engine	49	2.0E-03	4.0E-04	--	
Common Area Fire Pump Engine	24	9.9E-04	2.0E-04	--	
WSACs	0	0.00	0.00	--	
Equipment Leakage (SF_6)	--	--	--	2.0E-03[g]	
Total	40,392	0.77	0.081	2.0E-03	
Global warming potential multiplier	1x	21x	310x	23,900x	
Total Project GHG Emissions – MTCO2E [b]	**40,392**	**16.27**	**25.11**	**47.8**	**40,481**
Mirror washing activities FFT[c] (on-road vehicles)	19,670	17	50	--	19,737
Mirror washing activities NT[d] (off-road vehicles)	1,405	1	4	--	1,410
MTCO2	**61,467**			**MTCO2E [b]**	**61,628**
Facility MWh per year [e]	1,432,000				1,432,000
Facility CO_2 EPS (MTCO2/MWh)	0.043[f]			Facility GHG Performance (MTCO2E/MWh)	0.043[f]

Sources: Revised April 2012 boiler optimization filing App 5.1B and table 5.1B-13R (CH2 2012p)

Notes: a. One metric tonne (MT) equals 1.1 short tons or 2,204.6 pounds or 1,000 kilograms.
b. Annualized basis uses the project owner's assumed maximum permitted operating basis.
c. Far from Tower (FFT)
d. Near Tower (NT)
e. Estimated Gross MWh
f.Value includes mirror washing
g. 2.0 E-03 is derived from 880.4 lbs of maximum onsite SF6, as shown in Hazardous Materials Table 5.5R-1 HHSEGS Chemical Inventory. Please see CEC 2012jj record of conversion.

control or both). However, the exact approach is still under refinement. That regulatory approach will address emissions not only from the newer, more efficient, and lower emitting facilities licensed by the Energy Commission, but also the older, higher-emitting facilities not subject to Energy Commission jurisdiction. This programmatic approach is expected to be more effective and less costly in reducing GHG emissions overall from the entire electricity sector to meet GHG emissions reduction goals.

ARB has adopted cap-and-trade requirements that went into effect in January 2012, although compliance is not required until January 2013. As ARB continues to codify improved GHG inventories and methods, it may become apparent that emission reductions from the generation sector are less cost-effective than other sectors, and that other sectors of sources can achieve reductions with relative ease and cost-effectiveness. However, all information to date suggests that the electricity sector would be affected at least in proportion to its contribution to GHG emissions, and moreso.

This project would be subject to ARB's mandatory reporting requirements and cap-and-trade requirements. How the project would comply with these ARB requirements is speculative at this time, but compliance would be mandatory. Compliance options for cap-and-trade would likely be a combination of purchased allowances and approved GHG emissions offsets, although GHG offsets are limited to no more than 8 percent of total obligations based upon mandatorily-reported GHG emissions. The project may have to provide additional reports and GHG reductions, depending on the future regulations expected from ARB. Similarly, this project would be subject to federal mandatory reporting of GHG emissions.

Reporting of GHG emissions would enable the project to demonstrate consistency with the policies described above and the regulations that ARB adopts and to provide information to demonstrate compliance with any additional, future AB 32 requirements if enacted in the next few years. Since this power project would be permitted for less than a 60 percent annual capacity factor, the project is not subject to the requirements of SB 1368 and the current Emission Performance Standard. However, the HHSEGS's GHG emission performance has been shown to be below the SB 1368 EPS level.

AVENAL PRECEDENT DECISION

The Energy Commission established a precedent in the Final Commission Decision for the Avenal Energy Project. This precedential decision requires all new fossil-fuel fired power plants certified by the Energy Commission to: (a) not increase the overall system heat rate for natural gas plants; (b) not interfere with generation from existing renewable facilities nor interfere with the integration of new renewable generation; and, (c) take into account these factors to ensure a reduction of systemwide GHG emissions and support the goals and policies of AB 32 (CEC 2009, page 111). This proposed, renewable energy project, with its minor amounts of fossil fuel use, would meet all of these conditions.

ELECTRICITY SYSTEM GHG IMPACTS - David Vidaver

DIRECT/INDIRECT OPERATION IMPACTS AND MITIGATION

The proposed HHSEGS promotes the state's efforts to move towards a high-renewable, low-GHG electricity system, and therefore reduces both the amount of natural gas used by electricity generation and greenhouse gas emissions. It does this in several ways:

- California's Energy Action Plan Loading Order specifies that electrical energy demand be met first by energy efficiency and demand response, followed by employing renewable energy such as would be provided by HHSEGS.

- The energy produced by the HHSEGS would displace energy from higher GHG-emitting coal- and gas-fired generation resources, lowering the GHG emissions from the western United States, the relevant geographic area for the discussion of GHG emissions from electricity generation.

- The dependable capacity provided by the HHSEGS would facilitate the retirement/divestiture of resources that cannot meet the Emissions Performance Standard or are adversely affected by the SWRCB's policy on once-through cooling (OTC).

- Finally, while the HHSEGS combusts natural gas in onsite boilers for the purposes of improving plants efficiency by facilitating the startup of the solar boiler system and to initiate and sustain output during periods of low solar irradiance, the latter displaces higher-emission generation. In addition, HHSEGS reduces the need for energy and ancillary services from natural gas-fired resources, potentially obviating the need for their construction/operation.

California's Energy Action Plan Loading Order

In 2003, the three key energy agencies in California – the California Energy Commission (Energy Commission), the California Power Authority (CPA), and the California Public Utilities Commission (CPUC) – came together in a spirit of unprecedented cooperation to adopt an "Energy Action Plan" (EAP) that listed joint goals for California's energy future and set forth a commitment to achieve these goals through specific actions. The EAP is a living document meant to change with time, experience, and need. In 2005 the CPUC and the Energy Commission jointly prepared an Energy Action Plan II to identify further actions necessary to meet California's future energy needs (CEC 2005).

The EAP's overarching goal is for California's energy to be adequate, affordable, technologically advanced, and environmentally-sound. Energy must be reliable – provided when and where needed and with minimal environmental risks and impacts. Energy must be affordable to households, businesses and industry, and motorists – and in particular to disadvantaged customers who rely on California government to ensure that they can afford this fundamental commodity. EAP actions must be taken with clear recognition of cost considerations and trade-offs to ensure reasonably priced energy for all Californians.

The EAP accomplishes these goals in the electricity sector by calling for a "loading order" specifying the priority order for how to balance electricity supply and demand. The loading order identifies energy efficiency and demand response as the State's preferred means of meeting growing electrical energy needs. After cost-effective efficiency and demand response, it relies on renewable sources of power and distributed generation, such as combined heat and power applications. To the extent efficiency, demand response, renewable resources, and distributed generation are unable to satisfy increasing energy and capacity needs, the loading order supports clean and efficient fossil-fired generation.

The Role of the HHSEGS in Energy Displacement

The Renewables Portfolio Standard (RPS) was established by Senate Bill 1078 (Sher, Chapter 516, Statutes of 2002), effective January 1, 2003, with revisions to the law following as a result of Senate Bill 1250 (Perata, Chapter 512, Statutes of 2006), Senate Bill 107 (Simitian, Chapter 464, Statutes of 2006), and Senate Bill X1 2 (Simitian, Chapter 1, Statutes of 2011, First Extraordinary Session). The RPS originally required California's electric utilities to obtain at least 20 percent of its power supplies from renewable sources by 2010. It now has been expanded to require retail sellers of electricity and local publicly owned electric utilities (POUs) to increase the amount of renewable energy they procure until 33 percent of their retail sales are served with renewable energy by December 31, 2020. Under the law, the Energy Commission is required to certify eligible renewable energy resources that may be used by retail sellers of electricity and POUs to satisfy their RPS procurement requirements, develop an accounting system to verify retail sellers' and POUs' compliance with the RPS, and adopt regulations specifying procedures for enforcement of the RPS for the POUs.

As California moves towards an increased reliance on renewable electrical energy by implementing the RPS, non-renewable electric energy resources will be displaced. A 33 percent RPS is forecasted to require California load-serving entities to procure more than 95,600 GWh of renewable electrical energy, an increase of roughly 55,000 GWh over 2010 levels.[18]

Given an RPS, renewable electrical energy displaces electricity that would otherwise be produced from coal- and natural gas-fired generation. The construction and operation of the HHSEGS would not displace other renewable resources as load-serving entities must meet the renewable energy purchase requirements embodied in the RPS. Even in the absence of an RPS, HHSEGS would not replace other renewables. The fuel and other variable costs associated with most forms of renewable generation are much lower than for other resources and, (b) even where this may not be the case (e.g., selected biofuels) the renewable resource will frequently have a "must-take" contract with a load-serving entity requiring that all of electrical energy produced by the project be purchased by the buyer. Hydroelectric generation is not displaced as it has very low variable costs of production; the variable cost of nuclear generation is much lower than for fossil resources as well.

[18] Retail sales requiring renewable procurement are forecasted to be almost 287,000 GWh in 2022 (CEC 2012); purchases of renewable energy are estimated to have been 41,000 GWh (CEC 2011a)

While the HHSEGS would combust some natural gas and thus emit GHGs as part of its operations, it would produce far less GHG emissions (emitting approximately 95 lbs CO2/MWh) than the coal- and natural gas-fired resources it would displace. Coal-fired generation requires the combustion of 9,000 – 10,000 Btu/MWh, resulting in more than 1,800 lbs CO2/MWh. Natural gas-fired generation in California requires an average of 8,566 Btu/MWh, yielding approximately 1,000 lbs CO2/MWh (CEC 2011b).[19]

The Role of the HHSEGS in Capacity Displacement

The HHSEGS would provide up to 500 MW of electrical capacity and associated electrical energy to the grid during early afternoon hours in the summer. Electricity demand in California reaches its peak during mid- to late-afternoon on the hottest weekdays of the summer. Dependable capacity – the amount of capacity that can be counted upon to be available during the peak - is needed to reliably serve loads; the generation fleet, in conjunction with demand response programs, must provide a sufficient amount of dependable capacity to meet demand on the highest load day of the year.[20] Load-serving entities in the California ISO control area, for example, are required by the California ISO to procure dependable capacity in amounts determined by their peak load forecast.

While the HHSEGS's dependable capacity value would depend upon its exact performance, its ability to sustain output even when solar irradiance is reduced due to cloud cover, and thus provide energy during extreme peak hours would mean a higher value than would otherwise be the case.

The dependable capacity provided by the HHSEGS would assist in replacing that lost due to the Emissions Performance Standard (EPS) and the State Water Resources Control Board's (SWRCB) once-through cooling (OTC) policy, both discussed more fully below.

Replacement of High GHG-Emitting Generation

High GHG-emitting resources, such as coal, are effectively prohibited from entering into new long-term contracts for California electricity deliveries as a result of the Emissions Performance Standard adopted in 2007 pursuant to SB 1368. Between now and 2020, 1,549 MW of coal-fired generation capacity will have to reduce GHG emissions or be replaced; these contracts are presented in **Greenhouse Gas Table 5**.

Retirement of Generation Using Once-Through Cooling

The State Water Resource Control Board's (SWRCB) policy on cooling water intake at coastal power plants has led to the retirement and replacement of several plants that use once-through cooling (OTC), numerous others are likely to retire on or prior to

[19] The HHSEGS would displace resources with a higher than average heat rate during most hours, as the most expensive (least efficient) resources would be displaced.

[20] This is usually the hottest weekday in the summer, when residential and commercial cooling loads are at their highest.

assigned compliance dates,[21] some of which will require replacement.[22] The units with compliance dates on or before the end of 2020 are presented in **Greenhouse Gas Table 6**

Greenhouse Gas Table 5
Expiring Long-term Contracts with Coal-fired Generation 2009 – 2020

Utility	Facility	Contract Expiration	MW
Department of Water Resources	Reid Gardner	2013 [1]	213
SDG&E	Boardman	2013	84
SCE [2]	Four Corners	2016	720
Turlock Irrigation District	Boardman	2018	55
LADWP	Navajo	2019	477
		TOTAL	**1,549**

Source: Energy Commission staff based on Quarterly Fuel and Energy Report (QFER) filings.
Notes:
1. Contract not subject to Emission Performance Standard, but the Department of Water Resources has stated its intention not to renew or extend.
2. The sale of SCE's share of Four Corners to Arizona Public Service has been approved by the CPUC and is awaiting FERC approval.

[21] Most of the OTC units are aging facilities, for which extensive retrofits will be uneconomical. While compliance using operational and structural controls is allowed, the ability of units to comply in this manner and still operate in a fashion that yields a sufficient revenue stream is questionable.

[22] The California ISO, CPUC and the Energy Commission are studying amount of OTC capacity that will require replacement.

Greenhouse Gas Table 6
OTC Units with SWRCB Compliance Dates on or before December 31, 2020[23]

Plant, Unit Name	Local Reliability Area	Capacity (MW)
Alamitos 1-6	L.A. Basin	1,970
Contra Costa 6, 7	S.F. Bay	680
El Segundo 3, 4	L.A. Basin	670
Encina 1-5	San Diego	951
Huntington Beach 1, 2	L.A. Basin	430
Huntington Beach 3, 4	L.A. Basin	450
Mandalay 1, 2	Ventura	436
Morro Bay 3, 4	None	600
Moss Landing 6, 7	None	1,404
Moss Landing 1, 2	None	1,080
Ormond Beach 1, 2	Ventura	1,612
Pittsburg 5-7	S.F. Bay	1,332
Redondo Beach 5-8	L.A. Basin	1,343
Total		12,958

Note: Pittsburg Unit 7 (682 MW) does not use once-through cooling but would be required to shut down if Units 5 and 6 retire.

GHG Emissions During Plant Operation

The HHSEGS would produce GHG emissions during operations, combusting natural gas in order to provide assistance in starting the solar boiler and increase or sustain energy output during periods of reduced solar irradiance (early morning and late afternoon hours, periods of high cloud cover)

The ability to produce energy for both station service and transmission to end-users slightly earlier and slightly later than would otherwise be the case without limited supplemental firing, as well as to smooth out fluctuations in output during periods when solar irradiance is interrupted has not only economic value to the owner, but provides reliability to the electricity system. The substantial amounts of solar capacity anticipated for development during the coming decade and beyond, combined with the retirement of perhaps as much as 13,000 MW of gas-fired generation using once-through cooling, is very likely to shift the system peak to late afternoon/early evening when solar resources would produce little if any energy and gas-fired resources would have to be dispatched to provide reserves. Similarly, gas-fired generation would be needed in the early morning when solar resources have yet to ramp up and wind generation is failing. The ability of the HHSEGS to provide energy during early morning and late afternoon/early

[23] Greenhouse Gas Table 6 does not include OTC units that retired prior to January 1, 2012, resources with compliance dates through 2020 that have already been slated for replacement (e.g., LADWP units at Haynes and Scattergood), or units with post-2020 compliance dates (the remaining units at Haynes and Scattergood, LADWP's Harbor combined cycle, and the nuclear facilities at San Onofre and Diablo Canyon)

evening hours using natural gas fueled equipment, as well as to sustain output under less-than-ideal conditions on extreme load days not only reduces the need to dispatch natural gas-fired generation but may, in some cases, obviate the need to build it.

The ability to sustain output levels during periods of extreme loads also reduces the need for regulation services. As the HHSEGS would be able to “ride through” brief periods of reduced irradiance, it would reduce the need for resources to be dispatched solely to adjust output in response to short-term changes in intermittent generation levels. This benefit is in addition to increasing the dependable capacity of the project and thus reducing the need for gas-fired capacity to meet dependable capacity requirements.

PROPOSED CONDITIONS OF CERTIFICATION

No conditions of certification related to greenhouse gas emissions are proposed. The project owner would comply with mandatory ARB GHG emissions reporting regulations (California Code of Regulations, tit. 17, Subchapter 10, Article 2, Sections 95100 et. seq.) and/or future GHG regulations formulated by the U. S. EPA or the ARB, such as GHG emissions cap-and-trade requirements.

CONCLUSIONS

The HHSEGS would emit considerably less greenhouse gases (GHG) than existing power plants and most other generation technologies, and thus would contribute to continued improvement of the overall western United States, and specifically California, electricity system GHG emission rate average. The proposed project would lead to a net reduction in GHG emissions across the electricity system that provides energy and capacity to California. Thus, staff concludes that the proposed project’s operation would result in a cumulative overall reduction in GHG emissions from the state’s power plants and that any short-term impacts would be less than significant.

Staff concludes that the GHG emission increases typical from construction and decommissioning activities would not create significant impacts under CEQA for several reasons. First, the periods of construction and decommissioning would be short-term and not ongoing during the life of the proposed project. Second, the best practices control measures that staff recommends, such as limiting idling times and requiring, as appropriate, equipment that meets the latest emissions standards, would further minimize greenhouse gas emissions since the use of newer equipment would increase efficiency and reduce GHG emissions and be compatible with low-carbon fuel (e.g., bio-diesel and ethanol) mandates that will likely be part of the ARB regulations to reduce GHG from construction vehicles and equipment. Finally, the construction and decommissioning emissions are miniscule when compared to the reduction in fossil-fuel power plant greenhouse gas emissions during project operation. For all these reasons, staff would conclude that the short-term emission of greenhouse gases during construction would be sufficiently reduced and would be offset during proposed project operations and would, therefore, not create a significant impact under CEQA.

The HHSEGS, as a renewable energy generation facility, is determined by rule to comply with the Greenhouse Gas Emission Performance Standard requirements of SB 1368 (Title 20, Greenhouse Gases Emission Performance Standard, Section 2900 et. seq.). The project is not subject to the requirements of SB 1368 (Greenhouse Gasses Emission Performance Standard; Cal. Code Reg., tit. 20, § 2900 et. Seq.) and the Emission Performance Standard; however, it would nevertheless meet the Emission Performance Standard.

STAFF PROPOSED FINDINGS OF FACT

1. GHG emissions from the HHSEGS project construction are estimated to be 10,089 MTCO2E during the 29-month construction period, which is the annual equivalent of 4,175 MTCO2E per year.
2. Construction GHG emissions would be minimal in comparison to the GHG emission reductions that the project would create in its lifetime, with annual GHGs estimated at up to 61,628 MTCO2E per year as shown in **Greenhouse Gas Table 3**.
3. HHSEGS would use best practices to control its construction-related GHG emissions.
4. Construction-related GHG emissions are less than significant if they are controlled with best practices.
5. State government has a responsibility to ensure a reliable electricity supply, consistent with environmental, economic, and health and safety goals.
6. California utilities are obligated to meet whatever electricity demand exists from any and all customers.
7. Under SB 1368 and implementing regulations, California's electric utilities may not enter into long-term commitments with base load power plants with CO_2 emissions that exceed the Emissions Performance Standard ("EPS") of 0.5 MTCO2 / MWh.
8. The maximum annual CO_2 emissions from HHSEGS operation would be 61,628 [24] MTCO2, which constitutes an emissions performance factor of 0.043 [25] MTCO2 / MWh.
9. The HHSEGS is a solar project that would operate at less than a 60 percent capacity factor, and therefore is not subject to the requirements of the SB 1368 Emissions Performance Standard. Nonetheless, the HHSEGS would easily meet the Greenhouse Gas Emission Performance Standard required by SB 1368.
10. AB 32 requires ARB to adopt regulations that will reduce statewide GHG emissions, by the year 2020, to the 1990 level. Executive Order S-3-05 requires a further reduction, by the year 2050, to 80 percent below the 1990 level.
11. The California Renewable Portfolio Standard (RPS) requires the state's electric utilities obtain at least 20 percent of the power supplies from renewable sources, by the year 2010.

[24] Includes mirror washing – otherwise the maximum emission is 40,481 MTCO2E

[25] Includes mirror washing – otherwise around 0.028 MTCO2.MWh without including mirror washing emission estimates

12. Senate Bill X1-2 increases the RPS target requirement to 33 percent by 2020.
13. California's power supply loading order requires California utilities to obtain their power first from the implementation of all feasible and cost-effective energy efficiency and demand response, then from renewable energy and distributed generation, and finally from the most efficient available fossil-fired generation and infrastructure improvement.
14. Operation of HHSEGS would be consistent with the loading order.
15. HHSEGS would displace generation from higher-GHG-emitting power plants.
16. HHSEGS would replace power from coal-fired power plants that would be unable to enter into new contracts or renew contracts with California utilities under the SB 1368 EPS, and from once-through cooling power plants that must reduce their use of coastal or estuarine water.
17. HHSEGS operation would reduce overall GHG emissions from the electricity system.

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Air Quality / GHG

List of Comment Letters

1	Applicant, BrightSource Energy, Inc.
2	Intervenor Cindy MacDonald
3	Intervenor Center for Biological Diversity
4	Intervenor, Old Spanish Trail Association
5	Inyo County
6	Bureau of Land Management
7	National Park Service
8	The Nature Conservancy
9	Amargosa Conservancy
10	Pahrump Paiute Tribe
11	Richard Arnold, Pahrump Piahute Tribe
12	Big Pine Tribe of Owens Valley
13	Basin & Range Watch

[1] Note - not all comments from the applicants are show in this comments matrix. Only those comments that were have a comment associated explanation rather than a text change within the document of the Final Staff Assessment are listed in this matrix. If there was a text change and CEC staff agrees with the change requested by the applicants the change has been made in the staff analysis.

[2]Note: the GBUAPCD has responses to some of the questions that are an attachment to the Final Determination of Compliance for HHSEGS and will be noted as "GBUAPCD response", CEC staff concur with the responses and have included the responses below for convenience of having all responses in the same location.

Comment	DATE	COMMENT TOPIC	RESPONSE
1	**July 23, 2012**	**[1]APPLICANT -- BrightSource Energy, Inc.**	
1.1		Project Description -- transmission interconnection description modification	Staff agrees. See page 4.1-13 of the FSA.
1.2		Project Description -- Kern River Gas Transmission Company (KRGT) gas line	Staff agrees. See page 4.1-13 of the FSA.
1.3		Project Description -- acreage / footprint	Correct acreage of 3,277 is now reflected throughout FSA
1.4		Project Description -- distance to Pahrump, NV	The distance to site from Pahrump, NV has been corrected throughout the document to reflect the correct distance.
1.5		Conditions requiring a third party review need to incorporate a 2 week limit for review and comment on the required documents.	Staff agrees. See General Conditions.
1.28	Comment 28	Page 4.1 23, Construction Impacts Mitigation, Items L and N: Applicant did not propose these items. Also, "top service shape" (in Item N) is ambiguous, and unenforceable as a practical matter; thus, delete Item N. Revise	Staff has decided to re-word instead of delete as applicant suggests. Text has been changed to say: "N. Construction equipment will be maintained as specified by OEM (original equipment manufacturers)".
1.45	Comment 45. The Applicant requests that changes be made to the following conditions of certification:	AQ-SC2: Applicants have suggested to change 30 days to 15 days.	Staff has changed to: "15 business days from the date of receipt."
	Comment regarding AQ-SC3	Various condition edits to the condition.	Staff does not agree to the proposed changes to staff condition **AQ-SC3**. The wording in **AQ-SC3** is appropriate for the proposed project and is consistent with what has been used on other Energy Commission projects.
Comment	**DATE**	**COMMENT TOPIC AIR QUALITY SECTION 3**	**RESPONSE**
2	**July 21, 2012**	**[2]INTERVENOR -- Cindy MacDonald**	

1. TEMPORARY CONSTRUCTION/COMMON AREA EMISSIONS	Question 1.1	Under which "heading" in Appendix 5.1F, has the applicant included the emissions impacts from construction and development of the temporary construction site and common area?	Construction of the temporary construction site and common area has been included in the emissions estimates of Appendix 5.1F in the Boiler Optimization document. Please find those estimates in the table heading titled "Solar Field Assembly and Installation, Concrete Batch Plant, and Miscellaneous".
2. CONSTRUCTION EQUIPMENT EMISSIONS FACTORS: DEFINING MILES PER HOUR	Question 2.1	In the Construction Equipment Emission Factors, what is the column title, "Tier (Nonroad), Avg. mph (Onroad)", referring too – average miles per hour the vehicle is estimated to travel or average speed of the vehicle?	GBUAPCD Response: The column shows the US EPA/California ARB engine certification tier (mainly Tier 3) for nonroad vehicles, and the average miles traveled per hour of travel for onroad vehicles. The differing units are needed because the conventions for calculating emissions from nonroad and offroad equipment differ. Exhaust emissions from nonroad equipment are typically calculated per unit of operating time (i.e., grams per horsepower per hour); whereas, exhaust emissions from onroad vehicles are calculated per distance the vehicle travels (i.e., grams per mile).
	Question 2.2	If the Construction Equipment Emission Factors in the column titled, "Tier (Nonroad), Avg. mph (Onroad)", is referring to emissions resulting from the speed of the vehicle, how accurate are these emissions when the conditions of the permit authorize speeds up to 10-25 mph, depending on surface type?	GBUAPCD Response: For on-road vehicles, the average miles traveled during an hour of travel (10) is an activity level, not a speed. The distance (in vehicle miles traveled per hour) is multiplied by the emission factors (in grams per vehicle mile traveled) to calculate pounds per hour of emissions from on-road-type vehicles. The speed limit of 25 mph applies to instantaneous speed, while the average miles the vehicle is estimated to travel during an hour reflects the average distance traveled over an entire hour, including stops.
	Question 2.3	If the emissions were calculated for non-road vehicles using a 10 mph vehicle speed, what is the difference (if any) in emissions impacts?	GBUAPCD Response: Emissions from non-road vehicles were not calculated using a 10 mph vehicle speed—they were calculated using Tier-specific emission factors that are not speed-based.
3. SF6 MAINTENANCE, REPLACEMENT AND WITHDRAWAL REQUIREMENTS	Question 3.1	What are the annual anticipated maintenance, replacement and withdrawal requirements of SF6 at the proposed project site as well as over the life of the project?	SF6 recharge (maintenance or replacement) may be required periodically to replace the SF6 lost due to leakage or contamination of the system and this rate of loss has been included in the GHG section of the FSA. Please see GHG Table 3 "HHSEGS Estimated Potential Greenhouse Gas (GHG) Emissions" under column SF6.
	Question 3.2	Where has the applicant disclosed this information in the AFC files or subsequent documents and where has CEC Staff accounted for them in the PSA?	The applicants have estimated an SF6 loss in the revised April 2012 "Boiler Optimization" document found in the Appendix 5.1B, Table 5.1B-13R. California Energy Commission staff has included an estimate in GHG table 3 - "Equipment leakage (SF6)".
4. SWITCHYARD CONTRADICTIONS/CHANGES IN SF6 STORAGE QUANITIES	Question 4.1	Is the new location of the switchyard on public or private land?	The proposed switchyard would be located on private land.
	Question 4.2	If the switchyard is moved outside of the CEC's jurisdiction, does this effectively eliminate the CEC's ability to evaluate and incorporate this portion of the proposed project in their direct, indirect and cumulative emissions and impact analysis?	If the switchyard is moved outside California, it would be outside the jurisdiction of the California Energy Commission. The California Energy Commission only has permitting authority within the state.
	Question 4.3	If the switchyard is moved out of state, will the CPM or any other California based entity or agency have any jurisdiction over its compliance to LORS over the life of the project?	If the switchyard is moved outside of California, it would be outside the jurisdiction of the California Energy Commission. The California Energy Commission only has permitting authority within the state.
	Question 4.4	Given the amount of contradictory information presented, can anyone explain what proposal we are suppose to be analyzing and commenting on?	The current project analyzed in the FSA and PSA is the "Boiler Optimization" configuration submitted April 2012.

	Question 4.5	Why has the amount of onsite SF6 increased if no changes in circuit breaker requirements have been introduced?	Please see the corrected value of SF6 in GHG Table 6.
	Question 4.6	What is the reason(s) for this increase in onsite storage of SF6, especially in light of the fact that the switchyard is supposedly no longer included in the California portion of the proposed project's design?	Staff believes the original value of SF6 was an error; the correct value is seen in GHG Table 3. The switchyard would be located in the California portion of the proposed project.
	Question 4.7	What is the specific emissions factor increase relative to this 400 lb increase in SF6 onsite storage quantities, including annual GHG impacts in terms of pounds/tons?	The SF6 quantity is not expected to change. Please see GHG Table 3 for the emission leakage rate of SF6.
5. CONCRETE BATCH, EMISSIONS CALCULATIONS AND HOURS OF OPERATION	Question 5.1	If the Concrete Batch Plant is estimated to operate for 21 hours per day, why is its associated equipment only projected to operate for 8 and 5 hours a day? Please explain timetables and operating procedures and explain why the California Energy Commission Staff found them acceptable for emissions calculations.	California Energy Commission staff believes the emissions estimate of 21 hours per day is conservative. The analysis assumes that up to two loaders and 20 transmix trucks will each operate up to 8 and 5 hours per day, respectively. This results in a total of 16 loader-hours per day and 100 transmix vehicle-hours per day of operation when the concrete batch plant is in operation. Because the plant operates in batch and not continuous mode, the loaders would not be expected to operate continuously for 21 hours. The five operating hours per day (when loading is not occurring) represents periods of time throughout the day when the plant has an adequate quantity of aggregate stored in its hopper for the current (or next) batch.
	Question 5.2	What are the actual "peak" months the Concrete Batch is projected to operate; September/October of 2013, March, April and May of 2014 or September 2013 through May 2014?	According to Table 5.1F-1 of the Boiler Optimization, the peak construction Max daily emissions would be around Month 8 and 9 due to fugitive dust from the concrete Batch Plant. Depending on the start of construction, month 8 and 9 could be in 2013 or in 2014.
	Question 5.3	Based on the answer to question 2, what are the true cumulative emissions totals that will occur during those months of "peak" Concrete Batch operations?	Please see Table 5.1-F of the Boiler Optimization.
	Question 5.4	How does Staff justify the use of 16 days emissions impacts during Concrete Batch Operations under the "hourly" emissions calculations when they know the Plant is already projected to operate for 21 hours per day and will operate "around the clock" for at least three months?	GBUAPCD Response: The hourly and daily construction equipment activity schedules were developed from the initial annual estimates based on a 16-day-per-month (4 days per week, 10 hours per day) operating schedule in order to conservatively overestimate worst case hourly and daily emissions. If a 5-day-per-week schedule had been assumed, the number of concurrently operating vehicles and/or the number of vehicle operating hours per day (or some combination of the two), would be reduced by 20 percent to accomplish the scheduled weekly construction tasks. For example, with a 5-day work week, daily working hours would be reduced from 10 to 8 (to maintain a 40 hour work week) and peak daily emissions would be 20 percent lower than the emissions analyzed.
6. MAXIMUM BOILER EMISSIONS: CONFLICTING DATA	Question 6.1	1. What are the reasons for these annual operating hour discrepancies?	Rather than limit the operating hours of the individual boilers on a daily, monthly or annual basis, the District also accepted the applicant's estimated

	Question 6.2	What differences do these variations in annual operating hours for boilers make to operating emissions impacts and emission limits in the Permit To Operate?	hours of operation. From the estimates, daily and annual natural gas fuel limits were derived in Table 5.1B-9R of the revised Boiler Optimization tables that will act as emission control limits for ensuring the 24-hour and annual impacts would be below the state and/or federal ambient air quality standards. The total natural gas fuel consumption, expressed as heat input rates, shall not exceed 3,440 MMBtu/day or 746,400 MMBtu/year for combustion in the burners of all auxiliary and nighttime preservation boilers in the Solar 1 facility or the adjacent Solar 2 facility.
7. ANNUAL POWER PRODUCTION	Question 7.1	Does the applicant's annualized capacity factor of approximately 3,000 full-load hours per year indicate this is the projected annual average of hours the plant will produce power over the course of that year?	Refer to the Response to Comments table in the **Efficiency and Facility Design** section of this FSA.
	Question 7.2	What is the daily power production potential in terms of hours during the peak summer months of June, July and August, when solarity is the highest due to long summer days?	
	Question 7.3	Due to potential increased production levels during summer months by possibly a large margin, can the proposed project's emissions qualify as a "seasonal" production facility subject to air pollution reporting requirements for seasonal generation? If not, why not?	The applicant is not requesting to be licensed as a "seasonal" source. Further, the local air district does not have any regulations for seasonal air pollution sources. Staff did not evaluate the project as a seasonal source.
8. HELIOSTAT COMMUNICATIONS SYSTEM: TRENCHING/IMPACTS TO AIR QUALITY & EMISSIONS	Question 8.1	If the applicant chooses to directly wire the heliostats, how many feet/yards/miles of trenching will be required and what does this translate to in terms of acreage disturbance at the project site?	Refer to the Response to Comments table in the **Soils and Surface Water** section of this FSA.

	Question 8.2	If the applicant chooses to directly wire the heliostats, what is the projected increase in heavy equipment required to install it, the projected cumulative increase in construction emissions from equipment and potential traffic impacts and was this accounted for in the AFC files or the PSA? If so, where?	If the applicants choose to directly wire the heliostats, installation would be using vehicles such as the tractors and pickup trucks that are already included in the construction equipment schedule. The construction emissions will be approximately the same as those for a wireless system and no increase in emissions would be expected. In the FSA this is included in Air Quality Table 7 "HHSEGS Construction Emissions" under Maximum Daily onsite and Offsite Emissions.
	Question 8.3	What are the estimated number of additional workers trenching would require during the construction phase, what hours of the day would they trench, what months would this affect during the construction portion of the project, how many feet/yards/miles is projected to be completed each day and was this accounted for in the AFC files or PSA? If so, where?	
9. CONFLICTING DATA ON MAINTENANCE ROAD DESIGNS: IMPACTS TO AIR QUALITY/EMISSIONS	Question 9.1	How many roads circle the power towers for each plant under each design element (20-ft versus 10 ft)?	Refer to the Response to Comments table in the **Soils and Surface Water** section of this FSA.
	Question 9.2	What is the projected total surface in acreage values for each of these maintenance road design elements and what is the difference in values between them? Example, 20-ft roads result in 500 acres of disturbance, 10-ft roads result in 1,000 acres of disturbance.	Refer to the Response to Comments table in the **Soils and Surface Water** section of this FSA.
	Question 9.3	How many miles of roads for each kind of road (paved, fully graded, partially graded) is the completed proposed project projected to have?	When assessing the amount of soil disturbance, staff is concerned with the area of roadway rather than the number of miles. The analysis is calculated by using the acreage of disturbed land.
	Question 9.4	What is the total number of square feet for each kind of road (paved, fully graded, partially graded) that will be incorporated into the proposed project sites operational design?	Refer to the Response to Comments table in the **Soils and Surface Water** section of this FSA.
	Question 9.5	What are the differences (if any) in emissions impacts via fugitive and windblown dust (PM10/PM2.5 particles) between these two variations of designs for the drive zones/maintenance paths surrounding the power towers? If so, were they accounted for in the AFC operational emissions data? If so, where?	All PM10 and PM2.5 emissions were estimated including those from windblown dust and fugitive dust caused by vehicles.
	Question 9.6	What is the projected PM10/PM2/5 fugitive and windblown dust for hourly, daily and annual emissions during the operational portion of the proposed project as a result of the drive zones/maintenance paths without mitigation measures and with mitigation measures?	Please see **AQ Table 7**, in the operational data table, emissions include mitigation measures.
	Question 9.7	What are the maximum hourly, daily and annual emissions limits for fugitive and windblown dust during the operational portion of the proposed project?	
10. MIRROR WASHING MACHINES AND MAINTENANCE SCHEDULE: NOT FEASIBLE	Question 10.1	Approximately, how many mirrors are projected to be included in each zone - Near Tower Zones and the Far From Tower Zones?	The project as a whole would have 170,000 heliostats, or 340,0000 mirrors. This is found in the Project Description section. Information about the number of heliostats and mirrors in each zone was not needed for staff's analysis.

	Question 10.2	How long will is take to clean each mirror per zone?	The applicant proposed washing the mirrors in the near-tower (NT) zone on a 2-week rotating cycle. The water washing would be supplemented with brushing, which would be done on an 8-week cycle. Emissions for the NT Zone were based on 4,000 vehicle miles traveled per power plant per year. Staff feels this is a reasonable estimate for evaluating emissions for NT mirror washing, especially fugitive dust emissions. The result is most likely conservative because staff has estimated VMT as much less than this value, which was submitted by the applicant. See answer to Question 10.4 for the FFT Zone.
	Question 10.3	Based on only employing 1 MWM in the NT Zone, what is the projected length of time it would take to complete one rotating cycle of general maintenance (cleaning, not scrubbing) per solar plant?	
	Question 10.4	Based on only employing 7 MWM's in the FFT Zone, what is the projected length of time it would take to complete one rotating cycle of general maintenance (cleaning, not scrubbing) per solar plant?	The applicant proposed washing the mirrors in the far-from-tower (FFT) Zone on a 2-week rotating cycle. The water washing would be supplemented with brushing, which will be done on an 8-week cycle. Emissions for the FFT Zone were based on 18,900 Vehicle miles traveled per HHSEGS power plant per year. Staff feels this is a reasonable estimate for emissions from mirror washing in the FFT Zone, especially fugitive dust emissions. The result is most likely very conservative because staff has estimated VMT as much less than this value submitted by the applicant.

	Question 10.5	How many additional MWM's would be necessary to keep the applicant's stated 2-week rotating cycle cleaning schedule for each zone and what would be the hourly, daily and annual emissions increases to accommodate these additional MWM's per zone?	Mirror washing emissions are calculated on a hourly, daily, and annual basis. Please see Air Quality Table 8 for all criteria pollutants and GHG Table 3 for Green House Gas emissions estimates for mirror washing activities, which include the Near Tower Zone and the Far From Tower Zone. Emissions were based on vehicle miles traveled (VMT) not on the number of mirror washing machines (MWMs).
	Question 10.6	Will additional MWM's or vehicles be required to complete the projected additional maintenance of mirror "scrubbing"? If not, what changes will be made to the time it takes to complete the regularly rotating schedule per zone? If so, how many additional MWMs or vehicles will be required per zone and what are their additional operational emissions impacts?	California Energy Commission staff believes there may not be a need for additional MWM vehicles necessary for scrubbing. Emissions were based on vehicle miles traveled (VMT), not the number of mirror washing machines (MWMs).
11. OPERATIONAL DUST CONTROL PLAN: INADEQUATE IMPACT ANALYSIS	Scenario 1: Question 11.1	How much medium sized gravel would be required for complete coverage of all fully and partially graded dirt roads required for project operations at a depth of 3" thick?	Alternatives analysis for 3" thick gravel was not included in the staff analysis, and staff does not need to know that in order to recommend issuance of the license. The applicant may be able to provide this information for the commenter. Currently staff has only assumed 1 inch gravel thickness. Please see **Soils and Surface Waters** section for more detailed information.
	Scenario 1: Question 11.2	How many delivery trucks would be required to deliver the proposed gravel in Question 1?	
	Scenario 1: Question 11.3	What would be the additional construction emissions factors for delivery trucks that hauled the proposed gravel in Question 1 to the site?	
	Scenario 1: Question 11.4	If medium sized gravel was applied to all fully and partially graded roads required for the proposed projects operations at a depth of 3" thick, would chemical dust suppressants/soil binders also be required to reduce fugitive and windblown dust?	
	Scenario 1: Question 11.5	If medium sized gravel at a 3" depth was applied to all fully and partially graded roads required for the proposed projects operations at a depth of 3" thick, to what degree would this offset vehicular emissions resulting from chemical dust suppressants/soil binders applications over the life of the project?	
	Scenario 2: Question 11.1	What product will be used?	At this point the soil binder product that would be used is not known. However BrightSource has submitted information for a product called Soil Sement which they have suggested for use on the current Ivanpah project. This product is pre-certified by the ARB and is approved by the California Regional Water Board (Fitz, 1996).
	Scenario 2: Question 11.2	How often must it be reapplied: once a month, once a year?	The rate of reapplication would be as-needed and would be determined by the project owner, during construction and operation of the facilities. The facility owner will be required to use approved suppressants and methods of application.
	Scenario 2: Question 11.3	What methods will the applicant apply these chemicals with: by hand or by vehicle?	The applicants would need to submit this information in the Air Quality Construction Mitigation Plan (AQCMP) at least 60 days prior to the start of any ground disturbance. The applicant would need to include the VMT and emissions as part of this plan.
	Scenario 2: Question 11.4	If vehicles are used, (which given the amount of coverage it appears will be needed, this is the most reasonably foreseeable choice), what kind of vehicles will they be?	

	Scenario 2: Question 11.5	What are their daily, monthly and annual emissions during the operational portion of the project?	Please see Air Quality Table 10.
	Scenario 2: Question 11.6	What limitations will apply and/or mitigation measures will reduce the introduction of these additional vehicle emissions impacts over the life of the project?	**AQ-SC6** requires the facility owner to submit to the CPM a plan that identifies the size and types of the on-site vehicles and equipment fleet, and the vehicle and equipment purchase orders and contracts and/or purchase schedules. The plan must be updated every other year and submitted in the Annual Compliance Report (**COMPLIANCE-7**). In addition, **AQ-SC7** requires the facility owner to submit to the CPM for review and approval a plan that identifies dust and erosion control procedures that will be used during operation of the project. The required information includes effectiveness and environmental data for the proposed soil stabilizer all locations of speed limit signs.
	Scenario 2: Question 11.7	Will the application and dispersal of these chemical dust suppressants/soil binders be prohibited during days where there is wind to prevent accidental application on native vegetation and inappropriate air dispersal? If not, what will be the wind speed limitation: 5 mph, 10 mph, etc.?	Staff is not proposing a condition of certification on the application and dispersal of the chemical dust suppressants. However, the facility owner would be required to use ARB and District approved dust suppressants and methods of application.
	Scenario 2: Question 11.8	How long will it take the applicant to reapply these substances (daily, weekly, monthly, annually?)	This would depend on the scheduling by the project owners and would be part of the air quality mitigation plan requiring approval by California Energy Commission staff.
	Scenario 2-A: Question 11.1	Based on the application requirements, precautions and effectiveness for two CARB precertified chemicals listed above, what are the site-specific limitations, requirements, direct, indirect and cumulative impacts to the proposed project site and surrounding environment for each of these products individually during both the construction and operational phase as well as over the life of the project?	This would depend on the scheduling by the project owners, and would be part of the air quality mitigation plan requiring approval by California Energy Commission staff. The facility owner will be required to use approved suppressants and methods of application.
	Scenario 2-A: Question 11.2	How does the grading and surface requirements for effective application of these two CARB precertified products affect the applicant's intent to implement a Low Impact Design to preserve natural washes and drainages throughout the proposed project site?	
	Scenario 2-A: Question 11.3	What is the estimated number of acres any of these products will be applied to during the construction and operational phase of the proposed project?	The applicants estimates during construction are: (1) fully graded dirt roads (12' & 20' width) at 18.2 acres and (2) partially graded dirt roads (10' width) at 171 acres.
	Scenario 2-A: Question 11.4	What are the estimated daily, monthly and annual vehicle passes per kind of road (fully graded and partially graded) that will be required for both the construction and operational phase of the proposed project?	Please see Air Quality Table 8 under "Maintenance Vehicles" and "Employee and Delivery Vehicles" for estimates of daily, monthly, and annual emissions.

	Scenario 2-A: Question 11.5	How much in terms of acres (if any) of the proposed project site could be classified as “not suitable” for application of either of the two CARB precertified dust suppressants/soil binders?	Soil stabilizers would be used for "unpaved, and minimally used roads". These are to be used only for dust suppressant, and are not meant to be in place of gravel or paving. The facility owner would be required to use approved suppressants and methods of application.
	Scenario 2-A: Question 11.6	What are the public health implications (if any) if any of these considerations increase fugitive and windblown dust (PM10/PM2.5 particles) due to lack of site suitability (soils, road surface, aggregate, natural drainage) in terms of applying either of these two CARB precertified products?	Refer to the Response to Comments table in the **Public Health** section of this FSA.
	Scenario 2-A: Question 11.7	What evidence is available that supports the effectiveness and dust control rates of these two CARB precertified dust suppressants/soil binders with respect to heavy-duty equipment such as will be used during both the construction and operational phase at the proposed project site?	Information on available soil stabilizers is at: http://www.avaqmd.ca.gov/Modules/ShowDocument.aspx?documentid=2705
	Scenario 2-A: Question 11.8	Do any of these considerations trigger significant impact thresholds to air quality? If so, what is the level (in terms of percentage) of the significance and by what degree do the proposed mitigation measures individually (by percentage) reduce those impacts?	No, they do not trigger significant impact thresholds to air quality. Soil stabilizers could potentially reduce fugitive dust emissions by up to 80%.
	Scenario 2-A: Question 11.9	Since PennzSuppress® D is not recommended for multiple areas related to water and water drainage, what are the projected direct, indirect and cumulative impacts to water, ground water, waters of the state and biological resources at and around the project site? if this product is approved of in the dust control plans currently scheduled to be formulated after the CEQA equivalency process is closed?	This product has not been submitted in a dust plan and has not been reviewed nor evaluated by California Energy Commission staff. Before any dust suppressant is approved for use, it will be evaluated and only approved materials would be allowed.
	Scenario 3: Question 11.1	If the applicant uses water trucks to control fugitive and windblown dust over the life of the project, what are the additional water annual water requirements and can they be met with the currently proposed water limitations?	Refer to the Response to Comments table in the **Water Supply** section of this FSA.
	Scenario 3: Question 11.2	If the applicant uses water trucks to control fugitive and windblown dust over the life of the project, what are the additional emissions impacts the water trucks will add to operations on a daily, monthly and annual basis?	This has been taken into consideration in emission estimates in Air Quality Table 8 - row "Maintenance Vehicles (mirror washing)".
	Scenario 3: Question 11.3	Given the significant difference in emissions resulting from the applicant’s change of use to on-road heavy duty engines for the Mirror Washing Machines versus the original AFC plans of using tractor trailers, will California Energy Commission Staff propose as a Condition of Certification that if water trucks are used over the life of the project as part of the dust control plant that they also be equipped with on-road heavy duty engines to reduce emissions impacts?	For all dedicated vehicles, including those for mirror washing, **AQ-SC6** requires the facility owner to obtain new model year vehicles that meet California on-road vehicle emission standards for the model year when obtained.
	Scenario 3: Question 11.4	How can the 200,000 to 400,000 gallons of recycled water be counted on for dust control if its discharge depends on the fluid sample levels of contamination?	Refer to the Response to Comments table in the **Soils and Surface Water** section of this FSA.
	Scenario 3: Question 11.5	What happens to this recycled water if it fails to register as “clean”? How will it be disposed of?	Refer to the Response to Comments table in the **Soils and Surface Water** section of this FSA.
	Scenario 3: Question 11.6	Will the applicant just dilute the recycled water until it registers as “clean”? If so, how much additional water would this require?	Refer to the Response to Comments table in the **Soils and Surface Water** section of this FSA.

	Scenario 3: Question 11.7	If the fluid samples fail to register as "clean" and the applicant dilutes it with additional water until it can register as clean enough for discharge, isn't the same amount of "nonclean" chemicals being discharged into the environment? If so, what is the cumulative affect of this discharge to soil, water and biological resources over the life of the proposed project?	
General Questions: Dust Control Plan for Operations	Question 1	Are there alternative dust control methods for the operational portion of the proposed project that have not been included here? If so, what are they and what are their potential direct, indirect and cumulative impacts?	The project owner would need to submit the dust control plan according to AQ-SC7. California Energy Commission staff would assess the Dust Control Plan for the operational portion of the project once construction is completed. The Energy Commission does not propose or recommend alternative dust control plans. The facility owner would be required to use approved suppressants and methods of application.
	Question 2	Why does Staff believe it is appropriate to exclude these issues, impacts and decisions relevant to the Dust Control Plan for both the construction and operational phase of the proposed project and should only be vetted after the California Energy Commission CEQA equivalency process has closed?	Staff believes we have evaluated the AQ issues and impacts from the project to less than significant with all associated mitigation measures. Siting regulations Section 1742.5 states the staff are to assess the environmental effects of the applicant's proposal and make a recommendation whether this project would or would not cause a CEQA significant impact.
	Question 3	Of the three scenarios outlined above to be used for fugitive and windblown dust control during operations, which of them would rank as the environmentally preferred alternative over the life of the project?	Refer to the Response to Comments table in the **Alternatives** section of this FSA.
12. REQUIRED EARTHMOVEMENT: FINAL GEOTECHNICAL REPORT	Question 12.1	What are the reasons Staff failed to request a Final Geotechnical Report be performed and completed by the applicant during the discovery period for purposes of siting and CEQA analysis?	Refer to the Response to Comments table in the **Paleontological** section of this FSA.
	Question 12.2	How has Staff determined the proposed project site is suitable to support the current design over the life of the project without significantly altering the native soils, landscape and environmental?	Refer to the Response to Comments table in the **Soils and Surface Water** section of this FSA. Please see the **Biology** section for response for "wildlife abundance and distribution"
	Question 12.3	Why does Staff believe it is possible to adequately determine construction and operational impacts, levels of significance and appropriate mitigation measures for the proposed project absent the results of the Final Geotechnical Report with respect to air quality, additional construction emissions, and additional traffic impacts for trucks that will be required to haul in or haul out soil stabilizing agents?	Refer to the Response to Comments table in the **Paleontological** section of this FSA.
13. FINAL GEOTECHNICAL REPORT: COMPLIANCE WITH RULE 502. 3.16	Question 13.1	Since the determinations of the Final Geotechnical Report has yet to be revealed, how can the proposed project's approval comply with the necessity to regulate fugitive and windblown dust as defined by Rule 502.316 regarding earthmovement?	The Final Geotechnical Report is not finalized until just before construction of a project, and is not required in order for California Energy Commission staff to make a recommendation on significance of a project. California Energy Commission staff believes we have enough information in the Preliminary Geotechnical Report to make findings and require adequate mitigation.
	Question 13.2	What is California Energy Commission Staff's definition of "emissions caused by the movement of soil" as defined in Rule 502.3.16 and how does it apply or not apply with respect to potential emissions resulting from the movement, replacement and/or stabilizing of soil as outlined in the applicant's Preliminary Geotechnical Report?	Because this is a district rule, we defer to the districts definition. GBUAPCD Response: District Rule 502 applies to agricultural operation sites (see Section 2.0 of the rule), and the purpose of the rule "is to limit fugitive dust emissions from agricultural operation sites…"(Section 1.0) The rule does not apply to activities or emissions from facilities other than agricultural operation sites.

	Question 13.3	Wouldn't including the findings of the Final Geotechnical Report impact the emissions analysis of the projects emissions compliance as well as insuring appropriate dust mitigation measures that are tailored for the soil types of the area in the Conditions of the Permit versus the current generic "one-size-fits-all" approach that was deemed inadequate for the Owen's Valley mitigation measures?	Staff does not believe it is necessary to have a Final Geotechnical Report or to prepare a more detailed analysis of potential fugitive dust emissions to ensure that appropriate dust mitigation measures are imposed for this project. The District and the California Energy Commission have proposed performance-based mitigation requirements. GBUAPCD Response for inadequacy of the Owens's Valley Mitigation: The District requires more sophisticated monitoring techniques at Owens Lake because Owens Lake has a severe and longstanding PM10 fugitive dust problem that has been the subject of extensive study. Fugitive dust from construction projects are an entirely different and, in many respects, a much simpler class of fugitive dust problem and can be addressed through enforcement of Rule 401 (Fugitive Dust), which is intended to minimize the formation and transport of fugitive dust from anthropogenic activity, and Rule 402 (Nuisance), which is intended to minimize emissions that would cause injury, and through the imposition of the mitigation measures required by PDOC Condition 30.
	Question 13.4	Since the proposed project requires a variety of vehicles and roads in order to operate over its lifetime, why has issuing daily, monthly and annual limits on fugitive dust created by the daily operations of the solar plants so far evaded criteria pollutant emissions limits?	All criteria pollutant emission levels were included in the California Energy Commission staff's Preliminary Staff Assessment and are included the Final Staff Assessment. Please see Air Quality Table 8 for "Operations", and Table 7 for "Construction" for all criteria pollutant emissions. The table includes onroad and offroad construction and operations vehicles, and non construction "worker" vehicles, traveling both onsite and offsite.
	Question 13.5	Will California Energy Commission Staff require PM10/PM2.5 limits for the operational phase of the proposed project just like other criteria air pollutants will be limited by Conditions of the Permit and the GBUAPCD's Permit to Operate?	Both PM10 and PM2.5 are regulated criteria pollutants and the applicants are required to mitigate so that their impacts are less than significant. Yes there are conditions of certification (i.e.. **AQ-SC6**, **AQ-SC7, AQ-10** & **11**) that will limit emissions during both Construction and Operational phases of the project.
14. DUST MITIGATION MEASURES: "NORMAL" VERSUS WORST-CASE SCENARIOS	Question 14.1	What are the wind speeds California Energy Commission Staff defines as "normal" and what are the wind speeds that meet the criteria of "non-normal" that the proposed dust mitigation measures won't cover?	"Normal" wind speeds are those that occur under meteorological conditions typical of the project site. The meteorological data set used in evaluating fugitive dust emissions from the project included wind speeds above 11.1 meters per second (25 mph). There are no wind speeds that the dust mitigation plan won't cover.
	Question 14.2	What mitigation measures, if any, does the CEC Staff propose for dust impacts in "worst-case scenarios" that result from construction and operational activities such as wind events resulting in wind speeds in excess of 25 mph?	Please see **AQ-SC4**, Dust Plume Response Requirements. .
	Question 14.3	What mitigation measures does the CEC Staff recommend to protect public health during the construction and operational phases of the proposed project to insure air quality standards don't exceed significant thresholds of PM10/PM2.5 fugitive and windblown dust emissions for wind speeds occurring in the project area outside the currently undefined definition of "normal"?	Staff imposes conditions of certification that are intended to ensure air quality impacts are reduced to less than significant. Staff has recommended AQ-SC1 to AQ-SC5 during construction and AQ-SC6 to AQ-SC9 during operations. Also refer to the Response to Comments table in the **Public Health** section of this FSA.

	Question 14.4	How will the CEC or the GBUAPCD monitor fugitive and windblown dust levels during the operational portion of the proposed project to detect levels and frequency of PM10/PM2.5 emissions exceeding significant thresholds and posing threats to public health?	Refer to the Response to Comments table in the **Public Health** section of this FSA.
15. VALLEY FEVER	Question 15.1	Which regulatory agencies is CEC Staff referring to that recognize this is an appropriate mitigation measure the public can take to protect themselves from Valley Fever?	Refer to the Response to Comments table in the **Public Health** section of this FSA.
	Question 15.2	Where have these regulatory agencies posted this policy and does it supersede laws aimed at protecting public health from known infections such as those produced by the fungus responsible for inducing Valley Fever?	
	Question 15.3	How will tourists passing through and those visiting the area for recreational purposes protect themselves from air borne fungus resulting from project site disturbances as they have no place to go indoors?	
	Question 15.4	How will customers at the St. Theresa Mission and Front Site Training Institute protect themselves from exposure due to the proposed projects volume of site disturbance during both the construction and operational phase of the proposed project?	
	Question 15.5	What is the feasibility of local residents and others in the area "staying indoors" during times when wind events last for longer than 1 day as is known to occur in the area?	
	Question 15.6	How does the currently proposed mitigation measure of staying indoors during potential exposure times comply with Nuisance Regulation H&SC §41700?	
	Question 15.7	Considering the proposed project site will experience continued soil disturbance over the project's lifetime due to critically required maintenance activities, is this the only mitigation plan that can be utilized to protect public health for the next 25-30 years if the project is approved?	
16. CONSTRUCTION AND OPERATIONAL DUST: T&E SPECIES	Question 16.1	Are there any studies that have analyzed the impacts of construction emissions, fugitive dust, or chemical dust suppressants in relation to respiratory trends and impacts to Desert Tortoise that the CEC Staff is aware of and might apply to the proposed project?	California Energy Commission staff relies on the federal primary and secondary ambient air quality standards to protect against adverse impacts to humans, animals and plants. Please see the **Biology** section for response regarding Desert Tortoise.
	Question 16.2	What is the projected zone of impact to Desert Tortoise and other special status species from project emissions (construction and operational), fugitive dust and onsite chemical use (such as dust suppressants/soil binders) if the proposed project is approved?	

17. FOOD PRODUCTION/PRODUCE EXPOSURE PATHWAYS	Question 17.1	While it is acknowledged that serpentine habitat containing specialized soils and adaptive plant species related to those soils may be adversely affect from NOx emissions, could the NOx emissions and their cumulative impacts over the life of the project effect the wide variety of fruits and vegetables currently grown in the area for local food production?	GBUAPCD Response: Ambient air quality standards are set at levels that are protective of public health and welfare. CEC and Air District staff are responsible for evaluating the compliance of proposed stationary sources with these ambient air quality standards. The ambient air quality impact assessment submitted for the HHSEGS project demonstrates that project impacts will be below the most stringent state and federal NO2 standards, even when combined with existing background ambient NO2 levels. On this basis, we have concluded that NOx emissions from the proposed project will not result in NO2 concentrations that would cause damage to fruits, vegetables, or other crops or vegetation in the area. Secondary, Federal AAQS are intended to address these effects.
	Question 17.2	Are there species of fruits, vegetables or alternative types of vegetation that may be highly sensitive to nutrient absorption via roots or leaves as described in the "serpentine habitats" that may also be affected by annual or cumulative emissions from the proposed project? If so, what are they and what are the emissions impact levels that could trigger adverse effects?	Energy Commission and Air District staff are not aware of any specific species of fruits, vegetables or alternative types of vegetation that may be highly sensitive to nutrient absorption via roots or leaves. Secondary, Federal AAQS are intended to address these issues. Please see the **Biology** section for response for "vegetative species".
	Question 17.3	As NOx builds within the soils in the area as well as other criteria and non criteria pollutants and PAH's, (i.e., diesel particulate matter, VOC's, etc.), over the life of the project, can these cumulative impacts cause our fruit trees or vegetable gardens from obtaining the nutrients they need to grow and/or produce fruit via the root systems, clog the leaves thereby preventing adequate photosynthesis, or potentially impact flower production that may in turn cause reductions in product yield or plant death?	Oxides of nitrogen (NOx) emissions are comprised of nitric oxide (NO) and nitrogen dioxide (NO2), both of which are gases at standard conditions. These convert to secondary aerosols that eventually deposit on soils, but this occurs at great distances downwind and nitrogen deposition occurs more from automobile traffic. Air Quality Staff if unaware of any such studies. Please see the **Biology** section for response for "Nitrogen Deposition" questions.
	Question 17.4	Are there models for air emissions impacts on species-specific fruit/vegetable production and yield that could tell those in the community that produce food more about the potential direct, indirect and cumulative impacts to our food production over the life of the project?	Nitrogen deposition models could be used, but they are not specific to crop type. No modeling of nitrogen deposition impact is needed because it is not expected to be a problem for HHSEGS, given the expected annual NOx emissions rate. Please see the **Biology** section for response for "Nitrogen Deposition".
	Question 17.5	If agricultural production on a commercial scale were to be initiated surrounding the proposed project site over the life of the project, what impacts will emissions have to those commercial crops?	As stated above by the local air district (see 17.1) secondary National Ambient Air Quality Standards (NAAQS) protect against these effects. The project will not cause or contribute to an exceedance of a NAAQS, so the project is not expected to cause an adverse impact on commercial crops, should they be planted around the facility site.
	Question 17.6	If these models on food production exist, would the CEC Staff recommend the applicant perform a modeling analysis for direct, indirect and cumulative impacts to community food production over the life of the project? If not, why not?	No, nitrogen deposition is not expected to be a problem for HHSEGS. See response to 17.4
	Question 17.7	Are there other sources of air pollution, such as the fugitive dust example given by the Charpied's who claim they lost 30% of their crops through false pollination, which may also adversely impact local food production if the proposed project is approved?	California Energy Commission staff relies on the federal primary and secondary ambient air quality standards to protect against adverse impacts to humans, animals and plants.
	Question 17.8	What does the CEC Staff define as a "significant impact" on food production? 10% loss of crops/vegetation? 20% loss of crops/vegetation? 50% loss of crops/vegetation?	California Energy Commission staff does not assess significant impact on food production and therefore does not use such a threshold.

	Question 17.9	Can single source emissions, cumulative emissions or other impacts from the proposed project reduce local pollinators (insects) to a significant degree that in turn would cause a reduction and/or prevent of pollination of food crops?	California Energy Commission staff does not believe there are any indications of potential concentrations in excess of state or federal ambient air quality standards. Staff does not believe the impacts from the proposed project would be sufficient to cause any loss of crops or vegetation in the area. This is the basis for staff's conclusion that the project will have no significant impact on food production in the area. Also see response to 17.4
18. COMMUNITY HEALTH RISK ASSESSMENT	Question 18.1	What does this chart reflect and model besides cancer risks?	Refer to the Response to Comments table in the **Public Health** section of this FSA.
	Question 18.2	What chemicals (by specific component) and emissions does this chart represent under “Acute Health Hazard Index” and “Chronic Health Hazard Index”?	
	Question 18.3	Does it incorporate just carcinogenic risks exclusively or does it incorporate other health risks such as respiratory conditions? If so, which ones?	
	Question 18.4	Did the applicant model or provide any Health Risk of Diesel Exhaust assessment for potential respiratory impacts or other health impacts to workers or local populations resulting from diesel emissions besides cancer? If not, why not?	
	Question 18.5	Did the CEC Staff request any additional Health Screening Risks of Diesel Exhaust from the applicant besides the supplied cancer risk assessment or consult with the applicant in any way prior to the applicant initiating the parameters for the Health Screening Risk modeling? If not, why not?	
	Question 18.6	Where is the “produce ingestion pathway” referred to in the GBUAPCD’s response or in the AFC files or subsequent documents?	
19. ALL TERRAIN VEHCILES: EVADING ENVIRONMENTAL IMPACT ANALYSIS?	Question 19.1	Is the Great Basin Unified Air Pollution Control District unaware of how the applicant intends to utilize the all-terrain vehicles at the proposed project site?	The GBUAPCD evaluated all traffic associated with construction and operation as did staff. The all-terrain vehicles at the proposed site are not expected to operate excessively on active disturbed surfaces, and therefore would not contribute significantly to onsite fugitive PM10 and PM2.5 emission.
	Question 19.2	How can the soil disturbance of installing 170,000 heliostat/mirror assemblies be considered “negligible”?	GBUAPCD Response: In the construction industry, disturbed area or soil disturbance area typically means an area that is altered as a result of clearing, grading, and/or excavation. Staff use of "negligible" in describing heliostat installation in the field (vehicle driving, vegetation mowing, and foot traffic) reflected that no grading would be required. Staff changed the description to “Area of Land Grading and Excavation” to avoid confusion. Please see Total Soil Disturbance discussion in the Soils & Surface Water section.
	Question 19.3	Where is the site-specific data located that describes how the heliostat/mirror assemblies will be installed, how many will be installed per day per ATV and how long this process is expected take?	The general installation procedure for heliostats is found in the Project Description section. Information about the number of heliostats installed per day is not included, and staff does not need to know that in order to recommend issuance of the license. The applicant may be able to answer this question for the commenter.

15. Traffic and Transportation	Question 15.1	Will CEC Staff provide any mitigation measures, such as requiring waiting trucks to turn off their engines if they must wait longer than three minutes for site entry in order to control air emissions and 5:00 am noise pollution to Charleston View residents located merely 5 acres away from the Old Spanish Trail Highway?	Staff has included in staff condition AQ-SC5(j): All diesel heavy construction equipment shall not idle for more than 5 minutes. Vehicles that need to idle as part of their normal operation (such as concrete trucks) are exempted from this requirement. Please also see **Traffic and Transportation** and **Noise** technical section regarding time duration of construction related activity.
5	**July 17, 2012**	**Inyo County**	
Inyo County General Plan Goal or Policy	**Identified by PSA as LORS?**	**Consistency clause made by Inyo County**	**Response by Energy Commission Staff**
Goal AQ-1: "Provide good are quality for Inyo County to reduce impacts to human health and the economy."	No	"Compliant. Mitigation has been developed for impacts to air quality that will decrease them to less than significant levels."	Change has been made to the LORS Air Quality Table 1 and in AQ section Compliance with LORS, and is expected to also be consistent with GBUAPCD Rule 400 and 401, 402 and 404.
Policy AQ-1.2/Attainment Programs: "Participate in the GBUAPCD's attainment programs."	No		
Policy AQ-1.3/ Dust Suppression During Construction: "Require dust-suppression measures for grading activities."	No		
Policy AQ-1.5/Monitor Regional Development: "Publicly object to development proposals within the region that do not adequately address and mitigate air quality impacts, especially fugitive dust."	No		
Comment	**DATE**	**COMMENT TOPIC**	
13	**Pre-PSA comment letter posted July 3, 2012**	**Basin & Range Watch**	
	Concern No. 1	"We are worried that industrial construction in the region will compromise the air quality to the point where not only visual resources, but public health will be impacted."	A section has been included in the FSA to address these concerns by the Basin and Range Watch Group. Please see the subtopic "Construction Impacts Mitigation" section of the FSA on page 4.1-25 of the Air Quality section. Also please see **AQ-SC1** through **AQ-SC6** for staff-recommended conditions of certification for construction of the project.
	Concern No. 2	"Construction should not be permitted during days of high winds. Wind speeds of 15 MPH and higher should be determining factors that limit construction. Construction should also be limited during the hottest months of the year. Evaporation rates will be greatest during the months of June, July and August."	

BIOLOGICAL RESOURCES

Carol Watson, Chris Huntley, and Carolyn Chainey-Davis

INTRODUCTION

This section provides the California Energy Commission (Commission) staff's analysis of potential impacts to biological resources from the construction and operation of the Hills Solar Electric Generating System project (HHSEGS or project) as proposed by BrightSource Energy, Inc. (applicant). This analysis addresses potential impacts to special-status plant and animal species, desert washes, common and rare natural communities, groundwater-dependent ecosystems, and other areas of critical biological concern. Information contained in this document includes a detailed description of the existing biotic environment, an analysis of potential impacts to biological resources and, where necessary, specifies mitigation measures (conditions of certification) to reduce potential impacts to less than significant levels. Additionally, this analysis assesses compliance with applicable laws, ordinances, regulations, and standards (LORS).

This analysis is based, in part, on information provided in the HHSEGS Application for Certification (AFC) – Volumes 1 and 2 (HHSG 2011a), two supplements to the AFC (HHSG 2011b and HHSG 2011c) responses to data requests, staff's observations during field visits on November 8, 2011, January 18, 2012, April 6, 2011, April 12, 2012, June 5 and 6, 2012, July 30 to August 3, 2012, and December, 2012. Information was also obtained through discussions with representatives of the U.S. Fish and Wildlife Service (USFWS) from Nevada and California, California Department of Fish and Game (CDFG), representatives from the U.S. Bureau of Land Management (BLM) from both Nevada and California, and staff workshops for the project conducted in October, November, and December of 2011, and January, February, March, April, June, August, and December of 2012.

SUMMARY OF CONCLUSIONS

The Hidden Hills Solar Electric Generating System project (HHSEGS or project) would have significant direct and indirect impacts on biological resources. The proposed project, which is located on private land, features minimal grading onsite; however, mowing of vegetation and fencing of the site would result in the functional loss of Mojave Desert scrub, shadscale scrub, ephemeral desert washes, and habitat for a variety of special-status species that occur within the approximately 3,277- acre site. Without mitigation the project would contribute to cumulatively significant impacts to biological resources within Pahrump Valley, a broader area encompassed by the Northern and Eastern Mojave Desert Planning Area (NEMO)[1], and extending into the Pahrump, Nevada environs. Staff has proposed impact avoidance and minimization measures as well as compensatory mitigation, through habitat acquisition, to offset

[1] The NEMO plan serves as the primary land use control document for the U.S. Bureau of Land Management (BLM), and therefore is solely applicable to public lands. Because this plan encompasses the regional landscape and natural features surrounding the proposed project site, staff believes the NEMO plan to be an appropriate reference document for the project.

direct, indirect, and cumulative impacts to the state-listed threatened desert tortoise and other special-status wildlife species, special status plant species, and desert washes. These measures are necessary to ensure compliance with state and federal laws, as well as other applicable ordinances.

SUMMARY OF IMPACTS TO SPECIAL-STATUS WILDLIFE

Common Wildlife and Nesting Birds: Construction and operation of the HHSEGS project will adversely affect common wildlife and nesting birds from the construction and operation of the facility. Wildlife will also be affected from the installation of permanent exclusion fencing around the perimeter of the site. Species that are not capable of dispersing to surrounding areas would be confined within the project boundaries and subjected to increased risk of road kill and repeated disturbance during construction and operation of the facility. The project exclusion fencing will also exclude species from the site which will result in the loss of foraging and breeding habitat and may disrupt wildlife movement. Implementation of Conditions of Certification **BIO-1** through **BIO-8** would reduce project-related direct and indirect impacts to common wildlife and nesting birds to less than significant levels. These conditions require a project Biologist, and prescribe a variety of minimization measures and best management practices to reduce wildlife mortality, protect nesting birds, control fugitive dust, and reduce the potential for wildfires. Conditions of Certification **BIO-15** (Avian Bat & Golden Eagle Protection Plan) and **BIO-16** (Pre-construction Nesting Bird Surveys, see discussion of impacts to sensitive birds) include conducting pre-construction nesting surveys, and establishing limited disturbance buffers for nesting birds. Condition of Certification **BIO-18** requires the preparation and implementation of a Weed Management Plan to prevent the spread of invasive plants and to protect wildlife from weed management activities. Habitat loss for common wildlife would be mitigated by the implementation of Condition of Certification **BIO-12** (Desert Tortoise Compensatory Mitigation).

Desert Tortoise: Construction and operation of the HHSEGS project will result in direct, indirect, and operational impacts to desert tortoise (federally and State listed as a threatened species). Implementation of the project would also result in the permanent loss of approximately 3,197 acres of occupied desert tortoise habitat. Desert tortoises are present on the project site and their distribution varies based on habitat conditions and proximity to intact desert scrub communities. The project site is expected to support an estimated six to 33 adult/subadult tortoises, three to 34 juvenile tortoises, and 46 to 158 desert tortoise eggs. The estimated numbers of desert tortoise that may occur on the project site were calculated using applicant survey data, formulas recommended by the USFWS, and published scientific literature. These numbers represent a conservative approach and the actual number of desert tortoise detected on the project site may vary. In order to construct the facility desert tortoises would need to be translocated outside of the project site. The translocation of tortoises and other construction related impacts of the proposed project pose substantial effects to this species. At the high end of known mortality rates for translocation (45 percent, see “Impacts to Special-Status Wildlife”) for translocated animals, project construction and translocation may result in the mortality of 46 to 158 eggs and 11 to 65 desert tortoise if mortality rates are reached. If mortality rates are lower or fewer desert tortoise are detected there would be a corresponding reduction in mortality figures. Implementation of Conditions of certification **BIO-1** through **BIO-9** require the protection of desert

tortoise and other biological resources that occur in and near the project area, and Conditions of Certification **BIO-10** through **BIO-12**, which are specific to desert tortoise, would reduce impacts to desert tortoise.

To reduce project effects from the large-scale loss of desert tortoise habitat of the large scale land use conversion, staff has proposed the acquisition of compensatory mitigation lands. This compensatory mitigation is designed to fully mitigate impacts to this species as required under the California Endangered Species Act (CESA). Energy Commission staff proposes compensation at a 3:1 ratio for the loss of desert tortoise habitat that occurs in creosote bush scrub vegetation and a 1:1 ratio for areas dominated by shadscale scrub vegetation. Staff has not required compensatory mitigation for impacts to heavily disturbed lands such as dirt roads, a fallow orchard or graded areas. Currently, the applicant contends that this approach should be further refined to reflect the physical characteristics of the site and provided an alternative approach to determining compensatory mitigation ratios for the site. These ratios varied from a low of 0.5:1 for areas characterized as weed infested to 1.5:1 for areas considered more intact habitat. Staff reviewed the proposal in coordination with the CDFG and determined the approach had merit but failed to accurately characterize habitat conditions at the site. Staff proposed to workshop this issue further to gain resolution, however the applicant declined this offer.

Implementation of the proposed Conditions of Certification, including the acquisition, management, and enhancement of mitigation lands would achieve full mitigation under CESA for habitat loss and other significant impacts to desert tortoises.

Burrowing Owl: Implementation of the proposed HHSEGS project will result in the direct loss of foraging habitat for the burrowing owl (a state species of special concern). Construction of the proposed project may also displace resident wintering or breeding birds. Burrowing owl and their sign (i.e., white wash, pellets, and feathers) was observed on the project site. Depending on the timing of construction and if burrowing owls are present on the project site the applicant will be required to implement passive relocation actions to avoid the direct loss of the birds. With implementation of Conditions of Certification **BIO-1** through **BIO-8**, **BIO-12** (Desert Tortoise Compensatory Mitigation), and **BIO-17**(Burrowing Owl Impact Avoidance and Minimization Measures); the project's impacts to burrowing owls would be mitigated to less-than-significant under CEQA. Condition of Certification **BIO-17** identifies survey requirements, eviction guidelines, and provides for compensatory requirements. Staff considered the recently published 2012 Staff Report on Burrowing Owl Mitigation (CDFG 2012) to provide the most relevant guidance addressing impacts and mitigation development to this species.

Operational impacts would be reduced through Condition of Certification **BIO-15** (Avian, Bat, and Golden Eagle Protection Plans). This requires development of a monitoring and reporting program under the oversight of USFWS, CDFG, and the Energy Commission, that would document and report potential collision and heat flux exposure within the proposed solar fields, and provide compensation if necessary.

Golden Eagle & Migratory Birds: Golden eagle, a California Fully Protected species, are known to nest within the adjacent mountain ranges and have been routinely observed over the project site. Numerous migratory birds are also known to utilize the

site for forage, nesting, and breeding, and are protected by federal laws as well as CDFG code. The large scale land use conversion for the HHSEGS project would result in the loss of approximately 3,277 acres of foraging habitat for golden eagle and migratory birds. The USFWS considers that foraging habitat loss may be interpreted as take under the Bald and Golden Eagle Protection Act (BGEPA) if it causes territory abandonment or reduced productivity. Staff believes that these effects, would be difficult at best to attribute to any given land use. However, staff concludes that the loss of foraging habitat would be significant under CEQA and require compensatory mitigation. Staff does not consider the habitat loss to constitute take under state or federal LORS. To address potential impacts from the loss of foraging habitat, solar flux, and collision concerns (discussed below under operational effects) staff has proposed Condition of Certification **BIO-15** (Avian, Bat, and Golden Eagle Protection Plans). This requires a monitoring and reporting program that would document and report potential collision and flux exposure within the proposed solar fields, and implement conservation measures if deemed necessary. The plan also calls for the implementation of actions that reduce threats to eagles in the region such as placing anti perching devices and reducing existing risks to known nest sites. However, staff believes significant residual impacts to avian species would remain even after the implementation of the proposed conditions of certification.

Nelson's Bighorn Sheep: Nelson's bighorn sheep, a State Fully Protected Species, is known to occur in the Nopah, Kingston, and Clark Mountains which border the Pahrump Valley. Bighorn sheep were not detected during surveys however a partial horn fragment and potential pellets (scat) were identified on the project site. Anecdotal observations of bighorn sheep have also been provided by the public during a workshop for the proposed project. However, the proposed project is not located in a designated movement or linkage corridor for this species and while periodic use of the site may occur; bighorn sheep are not expected to frequent the area. Construction and operation of the proposed project is not expected to result in significant impacts to bighorn sheep foraging habitat or interfere with intermountain movement. Bighorn sheep could be subject to construction disturbance if moving or foraging near the site or attempting to cross existing highways. Implementation of **BIO-8** (General Impact Avoidance & Minimization Measures) would reduce these impacts to less than significant levels.

Potential significant impacts to seasonal watering holes for bighorn sheep would be reduced through the implementation of Condition of Certification **BIO-23** (Groundwater-dependent Vegetation Monitoring) and **WATER SUPPLY-4** which requires groundwater monitoring. Condition of Certification **BIO-23** will protect groundwater-dependent ecosystems (GDEs) within the influence of the project pumping wells from the impacts of project-related groundwater drawdown.

American Badger and Desert Kit Fox: Implementation of the proposed HHSEGS project will result in the direct loss of foraging habitat for American badger and desert kit fox. These species were detected on the HHSEGS project site and are expected to be present during the initial phases of construction. Desert kit fox are a protected furbearing mammal and have been the focus of concern for the CDFG, BLM, and USFWS after outbreaks of canine distemper were documented near existing solar facilities. American badger is a state species of special concern and occurs in low densities throughout the desert. Construction of the proposed project is expected to

result in direct effects to badgers and kit fox. Because of the large size of the project badgers or kit foxes may be confined within the desert tortoise exclusion fence and subject to mortality from road kill, loss or alteration of foraging habitat, overlapping territories or barriers to dispersal. In order to construct the proposed project the applicant will be required to passively relocate badgers and kit foxes form the project site. State regulations (Fish and Game code) currently prohibit trapping of these species.

Staff's proposed Conditions of Certification **BIO-1** through **BIO-8** provide general avoidance and minimization measures for these and other wildlife species. In addition, Condition of Certification **BIO-14** (American Badger and Kit Fox Management Plan) requires that prior to ground disturbance, a qualified biologist perform a preconstruction survey for badger and kit fox dens in the project area, including areas within 250 feet of all project facilities, and access roads. If present, the applicant will flag and avoid occupied badger and kit fox dens during ground-disturbing activities and establish a buffer to avoid loss of maternity dens. Should the applicant need to work in an area with occupied badger dens, the applicant will slowly excavate the den in accordance with Condition of Certification **BIO-14**. The plan also includes an adaptive management approach emphasizing flexibility in the methods employed for passive relocation; the timing of ground-disturbance; monitoring; and the treatment or testing in the event of an outbreak of distemper. Staff's proposed Condition of Certification **BIO-12**, the compensatory mitigation plan for desert tortoise habitat, would also offset the loss of habitat for these species and reduce the impact from habitat loss to less-than-significant levels under CEQA.

SUMMARY OF IMPACTS TO SPECIAL-STATUS PLANTS, COMMON AND SENSITIVE PLANT COMMUNITIES, DESERT WASHES, AND GROUNDWATER-DEPENDENT ECOSYSTEMS

Invasive Weeds: Project-related soil disturbance, increased vehicle traffic, and the movement of equipment and materials onsite and offsite are expected to spread invasive non-native species from the project to uninfested areas, and introduce new species into the vicinity from contaminated vehicles, equipment, and materials during construction and operation. Invasive weeds adversely affect wildlife and sensitive plants by causing destructive changes in ecosystem processes, increasing the flammability of vegetation and altering fire frequency intervals. Some weed species are toxic to wildlife. The project's contribution to the spread of weeds, when combined with similar effects from past, present, and foreseeable future projects, would contribute to a cumulatively considerable effect. These impacts would be minimized to a level less than cumulatively considerable through implementation of Condition of Certification **BIO-18** (Weed Management Plan). **BIO-21** (Qualified Botanist) requires the Weed Management Plan be prepared by a qualified botanist or vegetation ecologist. Prevention measures to address the increased risk of fire from the proliferation of non-native annual grasses onsite and potentially offsite are included in **BIO-8** (General Impact Avoidance and Minimization Measures) and **BIO-18.** Condition of Certification **BIO-6** (Worker Environmental Awareness Program) requires worker training in fire prevention and minimizing the spread of weed. **BIO-18** includes measures for protecting offsite biological resources from collateral or non-target harm from herbicide drift.

Special-status Plants: Twenty-eight occurrences of 11 special-status plant species were found on the project site. Occurrences that are not destroyed directly by grading and construction are expected to decline and perish during operation as a result of vegetation mowing, herbicide spraying, altered surface drainage patterns and geomorphic processes, shading, disrupted dispersal pathways, and other factors.

Two years of *offsite* surveys were conducted to determine if the special-status species were more common than currently understood because the area is generally under-surveyed and some species were only recently added to the California Natural Diversity Database (CNDDB) (2012). Many new occurrences were found for some species; no new occurrences were found for others.

Direct impacts to four of the 11 species are significant because the project would eliminate a substantial portion of their range in California and because the affected species exist in such small numbers in California that all or a significant portion of the species' California distribution may become endangered. For the remaining species, the population or range in California is larger or more stable, the proportion affected by the project less is substantially less, and/or the local population is robust.

Condition of Certification **BIO-20** (Special-status Plant Compensatory Mitigation) requires compensatory mitigation for four species – gravel milk-vetch, Wheeler's skeletonweed, Torrey's joint, and Preuss' milk-vetch – through acquisition and preservation or restoration. Mitigation ratios are based on the degree of extinction risk; three offsite occurrences shall be protected for every S1 ("critically imperiled") species affected and two offsite occurrences protected for every S2 ("imperiled") species affected.

Nine occurrences of special-status plants are located offsite in very close proximity to the project boundary. Potential indirect impacts to these occurrences during operation from fugitive dust, herbicide drift, and the proliferation of invasive plants would be avoided or minimized through measures in **BIO-19** (Special-status Plant Avoidance & Minimization). Potential impacts to plants from the increased risk of fire are addressed in fire prevention measures added to **BIO-8** (General Impact Avoidance & Minimization Measures), **BIO-18** (Weed Management Plan)**,** and **BIO-6** (Worker Environmental Awareness Program). **BIO-21** (Qualified Botanist) was added to ensure a qualified specialist implement tasks requiring the expertise of a botanist or vegetation ecologist. Combined with the compensatory mitigation required in **BIO-20**, these measures would minimize the project's impacts to special-status plants to a level less than significant. Integration of special-status plant compensation lands with desert tortoise or other habitat compensation lands is acceptable only if the mitigation lands meet all selection criteria required in **BIO-20**.

Desert Washes:

A total of 23.21 acres of jurisdictional Waters of the State, including single-thread channel and braided ephemeral streams, were delineated on the project site (CH2 2012mm). Of these 23.21 acres, 0.42 acres are also Waters of the United States. Six of the features are depicted as blue line features on the U.S. Geological Survey (USGS) topographic maps. During an August 2, 2012 field verification of the applicant's state waters delineation (URS 2012b), an additional nine ephemeral streams were identified

within the project boundary. The delineation map was subsequently revised and the total state jurisdictional area adjusted to 23.21 acres (CH2 2012mm).

The applicant will minimize obstructions of the natural surface drainage patterns where possible but staff concluded the biological functions and values of the streams will be lost due to perimeter exclusion fencing, partial grading, road construction and maintenance, vegetation maintenance, herbicide spraying, and human disturbance. These impacts are significant because they would cause a loss of the beneficial functions and values that these state waters provide to wildlife.

Condition of Certification **BIO-22** (State Waters Compensatory Mitigation and Avoidance and Minimization Measures) requires compensatory mitigation for impacts to desert washes by acquiring, preserving, and enhancing ephemeral streams of comparable or better quality within the local watershed, or adjacent watersheds. This mitigation could be integrated with the desert tortoise mitigation requirement for acquisition and enhancement of suitable desert tortoise habitat if the desert tortoise mitigation lands meet the selection criteria described in **BIO-22**. With implementation of this proposed condition of certification, and erosion control measures required in **SOIL-1**, impacts to the project's ephemeral streams would be reduced to less-than-significant levels.

Groundwater-Dependent Ecosystems: Project-related groundwater pumping during construction and operation could result in a drawdown of the water table within the zone of influence of the project pumping wells. Groundwater pumping could have significant indirect and cumulative impacts to biological resources if it lowers the water table in areas where groundwater-dependent ecosystems occur. Approximately 4,000-acres of groundwater-dependent mesquite habitats occur within the cone of depression identified by the applicant in the AFC (**Biological Resources Figure** 1and 2; CH2 2011g, Figure DR48-1), including several seeps, and the Nevada Bureau of Land Management Stump Spring Area of Critical Environmental Concern (ACEC). These resources have exceptional values to wildlife in the project vicinity including special-status species (Crampton et al. 2006; Beedy pers. comm.).The Stump Spring area and mesquite habitats throughout Pahrump Valley are identified as conservation priorities by BLM and the BLM-sponsored Clark County Mesquite-Acacia Conservation Management Strategy adopted by the Multiple Species Habitat Conservation Plan.

Condition of Certification **BIO-23** (Groundwater-dependent Vegetation Monitoring Plan) and groundwater elevation monitoring required in **WATER SUPPLY-6**, would ensure that a significant drawdown would be detected before it resulted in adverse impacts to the groundwater-dependent ecosystems, and will protect groundwater-dependent ecosystems (GDEs) within the influence of the project pumping wells from the impacts of project-related groundwater drawdown. The plans require monitoring to track the impacts of pumping to groundwater levels as they develop during the life of the project, and define triggers for adaptive management to be implemented if data indicate impending adverse effects. With implementation of these mitigation measures, significant impacts to Stump Springs ACEC and the mesquite washes and dunes within the influence of the project pumping wells would be avoided.

The **Water Resources** section of FSA contains an analysis of the project's potential to impact the Amargosa River and local groundwater resources. **Water Resources** staff

concluded the project is not expected to have a measurable impact on the Amargosa River or its tributaries. Condition of Certification **WATER SUPPLY-2** requires compensation for the project's contribution to overdraft conditions in the Pahrump Valley groundwater basin through the acquisition and retiring of local active, senior water rights.

Common and Sensitive Plant Communities: Construction would eliminate the habitat functions and value of 1580.5 acres of shadscale scrub and 1,616.5 acres of Mojave Desert scrub (creosote bush scrub) within the project disturbance area. Although common and widespread plant communities, they nevertheless provide important breeding and foraging habitat for a variety of special-status species, including desert tortoise. To achieve full mitigation under CESA for desert tortoise, and to mitigate to less than significant under CEQA for habitat loss and other significant impacts to desert tortoises, compensation at a 3:1 ratio is proposed for the loss of Mojave Desert scrub habitat and a 1:1 ratio for the loss of shadscale habitat. This compensation would also minimize foraging and breeding habitat losses to other wildlife resulting from the loss of Mojave Desert scrub and shadscale scrub.

Sensitive plant communities indirectly affected by the project include mesquite coppice dunes and mesquite washes. Significant impacts to these groundwater-dependent habitats would be avoided through the monitoring, performance standards, and triggers for adaptive management required in **BIO-23** and **WATER SUPPLY-4**. The project would also impact 1.2 acres of creosote bush/galleta grass association, a rare natural community with a CNDDB state rank of 3. Because the community is more common off the project site, and ranked "S3" (vulnerable but not imperiled), the 1-acre impact is less than significant.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The following laws, ordinances, regulations, and standards (LORS) are applicable to project construction and operation, as listed in **Biological Resources Table 1**.

Biological Resources Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	Description
Federal	
Endangered Species Act (Title 16, United States Code, section 1531 et seq., and Title 50, Code of Federal Regulations, part 17.1 et seq.)	Designates and protects federally threatened and endangered plants and animals and their critical habitats.
Clean Water Act (Title 33, United States Code, sections 1251 through 1376, and Code of Federal Regulations, part 30,	Requires the permitting and monitoring of all discharges to surface water bodies, including some desert washes. Section 404 requires a permit from the U.S. Army Corps of Engineers (USACE) for a discharge of dredged or fill materials into Waters of the U.S., including wetlands. Section 401 requires a permit from a regional water quality control board (RWQCB) for the discharge of pollutants.

Applicable LORS	Description
section 330.5(a)(26))	By federal law, every applicant for a federal permit or license for an activity that may result in a discharge into a California water body, including wetlands, must request state certification that the proposed activity will not violate state and federal water quality standards.
Eagle Act (Title 50, Code of Federal Regulations, section 22.26)	Would authorize limited take of bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) under the Eagle Act, where the taking is associated with, but not the purpose of activity, and cannot practicably be avoided.
Eagle Act (Title 50, Code of Federal Regulations, section 22.27)	Would provide for the intentional take of eagle nests where necessary to alleviate a safety hazard to people or eagles; necessary to ensure public health and safety; the nest prevents the use of a human – engineered structure, or; the activity, or mitigation for the activity, will provide a net benefit to eagles. Only inactive nests would be allowed to be taken except in the case of safety emergencies.
Bald and Golden Eagle Protection Act (Title 16, United States Code section 668)	This law provides for the protection of the bald eagle and the golden eagle by prohibiting, except under certain specified conditions, the take, possession, and commerce of such birds. The 1972 amendments increased penalties for violating provisions of the Act or regulations issued pursuant thereto and strengthened other enforcement measures. Rewards are provided for information leading to arrest and conviction for violating the Act.
Northern and Eastern Mojave Desert Management Plan (NEMO)	A regional amendment to the CDCA Plan approved in 2002, NEMO protects and conserves natural resources while simultaneously balancing human uses in the northern and eastern portion of the Mojave Desert.
California Desert Protection Act of 1994 (CDPA)	An Act of Congress which established 69 wilderness areas, the Mojave National Preserve, expanded Joshua Tree and Death Valley National Monuments and redefined them as National Parks. Lands transferred to the National Park Service were formerly administered by the BLM and included substantial portions of grazing allotments, wild horse and burro Herd Management Areas, and Herd Areas.
Migratory Bird Treaty (Title 16, United States Code, sections 703 through 711)	Makes it unlawful to take or possess any migratory nongame bird (or any part of such migratory nongame bird) as designated in the Migratory Bird Treaty Act.
Executive Order 11312	Prevent and control invasive species.
California Desert Conservation Area Plan	The California Desert Conservation Area (CDCA) comprises one of two national conservation areas established by Congress at the time of the passage of the Federal Land and Policy Management Act (FLPMA) in 1976. The FLPMA outlines how the BLM will manage public lands. Congress specifically provided guidance for the management of the CDCA and directed the development of the 1980 CDCA Plan.
Desert Tortoise (Mojave Population) Recovery Plan (USFWS 2011)	Describes a strategy for recovery and delisting of the desert tortoise.
Wild and Scenic Rivers Act (Public Law	Created by Congress in 1968, this act designates certain rivers or portions of rivers to be preserved in free-flowing condition, in order to

Applicable LORS	Description
90-542; 16 U.S.C. 1271 et seq.)	conserve scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values for the public good.
State	
California Endangered Species Act of 1984 (Fish and Game Code, sections 2050 through 2098)	Protects California's rare, threatened, and endangered species.
Definition of "Take" (Fish and Game Code section 86)	Defines take as to hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill.
Protected furbearing mammals (California Code of Regulations, Title 14, section 460)	Fisher, marten, river otter, desert kit fox, and red fox may not be taken at any time.
California Code of Regulations (Title 14, sections 670.2 and 670.5)	Lists the plants and animals of California that are declared rare, threatened, or endangered.
Fully Protected Species (Fish and Game Code, sections 3511, 4700, 5050, and 5515)	Designates certain species as fully protected and prohibits the take of such species or their habitat unless for scientific purposes (see also California Code of Regulations Title 14, section 670.7).
Nelson's bighorn sheep (Fish and Game Code section 4902)	Regulates adoption of sound biological management practices, including sport hunting, of the Nelson's bighorn sheep.
Nest or Eggs (Fish and Game Code section 3503)	Protects California's birds by making it unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by code or regulation.
Birds of Prey (Fish and Game Code section 3503.5	Unlawful to take, possess, or destroy any birds in the orders Falconiformes and Strigiformes or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by code or regulation.
Migratory Birds (Fish and Game Code section 3513)	Protects California's migratory birds by making it unlawful to take or possess any migratory nongame bird as designated in the Migratory Bird Treaty Act or any part of such migratory nongame birds except as otherwise provided by code or regulation.
Nongame mammals (Fish and Game Code section 4150)	Makes it unlawful to take or possess any non-game mammal or parts thereof except as provided in the Fish and Game Code or in accordance with regulations adopted by the commission.
Migratory Birds (Fish and Game Code section 355-357)	The commission may, annually, adopt regulations pertaining to migratory birds to conform with or to further restrict the rules and regulations prescribed pursuant to the Migratory Bird Treaty Act except as otherwise provided by code or regulation.
Lake and Streambed Alteration Agreement (Fish and Game Code	Regulates activities that may divert, obstruct, or change the natural flow or the bed, channel, or bank of any river, stream, or lake in California, including desert washes designated by CDFG in which

Applicable LORS	Description
sections 1600 and following)	there is at any time an existing fish or wildlife resource or from which these resources derive benefit. Impacts to vegetation and wildlife resulting from disturbances to waterways are also reviewed and regulated during the permitting process.
California Native Plant Protection Act of 1977 (Fish and Game Code section 1900 and following)	Designates state rare, threatened, and endangered plants.
California Desert Native Plants Act of 1981 (Food and Agricultural Code section 80001 and following and California Fish and Game Code sections 1925-1926)	Protects non-listed California desert native plants from unlawful harvesting on both public and private lands in Imperial, Inyo, Kern, Los Angeles, Mono, Riverside, San Bernardino, and San Diego counties. Unless issued a valid permit, wood receipt, tag, and seal by the commissioner or sheriff, harvesting, transporting, selling, or possessing specific desert plants is prohibited.
Porter-Cologne Water Quality Control Act	Defines waters of the state and regulates discharges of waste and fill material to waters of the state, including “isolated” waters and wetlands.
Local	
Inyo County Renewable Energy Ordinance(Title 21)	Provides comprehensive, long-range plans, policies, and goals to guide the physical development of the county. Specifically, Title 21 requires restoration and revegetation of the site, along with posting financial security to accomplish same.

DESERT RENEWABLE ENERGY CONSERVATION PLAN – INTERIM PLANNING

In addition to the federal, state, and local LORS summarized above, federal and state agencies are currently collaborating to establish joint policies and plans to expedite development of California’s utility-scale renewable energy projects. On October 12, 2009, the State of California and the U.S. Department of Interior entered into a Memorandum of Understanding (MOU) on renewable energy, building on existing efforts by California and its federal partners to facilitate renewable energy development in the state. The MOU stems from California and Department of Interior energy policy directives, and California’s legislative mandate to reduce greenhouse gases to 1990 levels by 2020, and meet the goal of 33 percent of California’s electricity production from renewable energy sources by 2020.

The California-Department of Interior MOU expands on several MOUs issued in 2008 to establish the activities of the California Renewable Energy Action Team (REAT). The REAT was established with California Executive Order S-14-08 (issued November 18, 2008), to “*establish a more cohesive and integrated statewide strategy, including greater coordination and streamlining of the siting, permitting, and procurement processes for renewable generation* ….”

The Energy Commission and CDFG are the primary state collaborators in the REAT, operating under a November 18, 2008 MOU between the two agencies to create a “one-

stop process" for permitting renewable energy projects under their joint permitting authority. The BLM and the USFWS also participate in the REAT under a separate MOU signed in November 2008, which outlines the state and federal cooperation of the group. The October 12, 2009 MOU between California and the Department of Interior reiterates several tasks of the REAT provided for in S-14-08 and the Energy Commission-Fish and Game MOU.

The REAT's primary mission is to streamline and expedite the permitting processes for renewable energy projects in the Mojave and Colorado Desert ecoregions within the State of California, while conserving endangered species and natural communities at the ecosystem scale. To accomplish this goal the REAT Agencies are developing a Desert Renewable Energy Conservation Plan (DRECP), a science-based process for reviewing, approving, and permitting renewable energy applications in California. Once the DRECP is complete, anticipated in late 2012, the plan will provide tools to expedite coordination of federal and state endangered species act permitting. The DRECP will also offer a unified framework for state and federal agencies to oversee mitigation actions, including land acquisitions, for listed species.

The REAT Agencies recognize that some renewable energy projects are scheduled to be approved prior to completion of the DRECP. Section 8.9 of the October 2009 Draft Planning Agreement for the DRECP < http://www.energy.ca.gov/2009publications/REAT-1000-2009-034/REAT-1000-2009-034.PDF> directs the REAT Agencies to ensure that permitting for these projects is consistent with the preliminary conservation objectives for the DRECP; would not compromise successful completion and implementation of the DRECP; would facilitate Federal Endangered Species Act, California Endangered Species Act, National Environmental Policy Act, and California Environmental Quality Act compliance; and would not unduly delay permitting during preparation of the DRECP.

SPECIAL CONSIDERATIONS

Special permitting issues arise from the proposed project, and stem from the inter-state nature of the project elements. Electric grid connection (i.e., transmission) and natural gas lines cross into public land in Nevada, and therefore are subject to the review of the BLM, pursuant to the National Environmental Policy Act (NEPA). The Nevada BLM is the federal lead agency and is preparing an Environmental Impact Statement (EIS), which will analyze the whole of the action, including those impacts which occur in California. Pursuant to the Endangered Species Act (ESA), the BLM also has undertaken formal consultation with the USFWS for a Section 7 incidental take statement for the federally listed endangered desert tortoise (*Gopherus agasizzii*). The incidental take statement, if granted by the USFWS, would supplement the analysis and conditions recommended in the FSA proposed to fully mitigate project effects to the desert tortoise in California. The incidental take statement would provide additional language dictating the methods and location for all translocation activities; provide guidance on husbandry topics; and recommend a suite of protective measures that would be implemented from the onset of ground disturbance through project decommissioning and post-project monitoring. See the "Special-Status Plants and Wildlife Species" subsection of this FSA section for more information.

The Energy Commission does not provide CEQA analysis for project features that are located in Nevada such as the electrical transmission and gas lines. These elements will be analyzed by the BLM, and available for public review in the draft EIS. However, effects of the California project to biological resources that may occur in Nevada are considered in the FSA where the project is demonstrated to pose a potential direct, indirect, or cumulative impact. Energy Commission staff have prepared impact assessments for plants, significant natural features, wildlife and other protected biological resources based on the regional factors that contribute to conserving and protecting that feature through applicable LORS. These regional factors were considered in staff's analysis, and extend into Nevada in varying degrees. Further explanation of rationale and geographical extent of analysis is provided in the "Assessment of Impacts and Discussion of Mitigation" subsection of this FSA section. The cumulative impact analysis includes projects in Nevada likely to contribute incrementally to cumulative impacts to biological resources. These cumulative impacts would affect resources in California and Nevada. Refer to the "Cumulative Impacts" subsection of this FSA section for further information and conclusions.

SETTING

PROJECT AREA AND VICINITY DESCRIPTION

The proposed project is located in southeastern Inyo County, immediately adjacent to the Nevada-California border, in the Pahrump Valley. Charleston View, an unincorporated community, is immediately south of the site, and the closest incorporated city is the town of Pahrump, located eight miles to the northwest, in Nevada. The proposed project site is located on privately-owned land, and private land borders the project site to the south and west. The BLM manages public lands to the north and east of the proposed project site, which is bordered to the east by Nye, and Clark counties. The area is sparsely populated and BLM is the major land holder in the county. The California Desert Conservation Area (CDCA) and the Northern and Eastern Mojave Planning Area (NEMO) encompass the BLM lands in the project vicinity.

Proposed Project Facilities

The proposed project would be composed of two solar fields, each one containing approximately 85,000 heliostats and each capable of generating 270 megawatts (MW). Solar plant 1 is 1,483 acres, solar plant 2 is 1,510 acres, and collectively, the solar fields and other project features would occupy approximately 3,277 acres and would produce 500 MW. The proposed project components related to the generation and transmission of electricity are described below. For further information about the elements of the project, please see the **Project Description** and **Soil and Surface Water** sections of this **FSA.**

REGIONAL SETTING

The proposed project is located within the Amargosa Desert-Pahrump Valley ecological subregion of the Mojave Desert (Goudey & Smith 1994). The subregion includes the alluvial plains of the Amargosa Desert, Sarcobatus Flat, Stewart Valley, Pahrump Valley, Sandy (Mesquite) Valley, and California Valley.

The boundary of the Pahrump Valley Wilderness Area is located in the Kingston Range three miles south of the project site. The Nopah Wilderness Area boundary is approximately four miles to the northwest. The BLM Southern Nevada District administers lands to east of the site, including the Stump Spring Area of Critical Environmental Concern (ACEC). The boundary of the ACEC is located approximately two and a half miles east of the project's southeastern corner. BLM lands north and west of the project are in the California BLM Barstow District. The NEMO planning area encompasses BLM lands on the California and Nevada side of the project.

The California portion of the Mojave Desert occupies the northern two-thirds of the California Desert floristic province (Baldwin et al. 2002). It is characterized by hot, dry summers, warm and dry winters, and exhibits greater temperature ranges and topographical relief than the Sonoran Desert region of California in eastern Riverside and Imperial counties. The mean annual precipitation is approximately four to six inches, and in the project vicinity is influenced by two distinct storm patterns: one occurring in winter and the other in summer. Winter precipitation tends to be of low intensity and long duration, and covers greater areas. In contrast, most summer rains, resulting from local convective thunderstorms, are of high intensity and short duration (Belcher & Sweetkind 2010), and frequently patchy but can stimulate late season plant germination and growth. Some native annual plants, including special-status plants, germinate only in response to these warm monsoonal rain events.

The project site is located in the western (California) portion of the bi-state Pahrump Valley and Pahrump watershed. Elevations on the valley floor range from 2,515 feet at the Pahrump Playa to about 2,655 feet in the southwestern part of the basin along Tecopa Road. The project site is located between the middle position and the toe of an alluvial fan complex (bajada) on the western flank of the Spring Mountains (in Nevada) that drain into the Pahrump Playa. The project site is gently sloping with the highest point in the southeast corner, at 2,685 feet elevation, and the lowest along the northwest boundary closest to the playa at 2,590 feet.

The shallow aquifer from which the project and all of Pahrump meets its water needs, and the deeper, more laterally-extensive regional aquifer that underlies the shallow aquifer, occur within the Death Valley Regional Groundwater Flow System (DVRFS). The DVRFS is exceptionally rich in springs and other groundwater-dependent ecological resources. At least 30 groundwater-dependent fish, invertebrate and plant species are found in the region that exist nowhere else in the world, primarily in adjacent basins, such as the Amargosa River and Ash meadows areas. No groundwater-dependent resources occur within the project boundary; however, Pahrump Valley supports a 9,000-acre complex of mesquite washes and coppice dunes arranged linearly along the stateline fault zone where groundwater is forced to or nearer the surface by juxtaposed Pleistocene lake deposits and basin-fill deposits. **Biological Resources Figure 1** shows the distribution of the mesquite east of the project, and **Figure 2a-b** contains photos of groundwater-supported habitats in southern Pahrump Valley.

All surface waters on and adjacent to the project site are ephemeral, i.e., they flow only during storm events, and in the terminal reaches water persisted a day or more following a moderate storm event. All features are presumed to be supported by

precipitation (not groundwater) due to their ephemeral hydrology. The washes enter the site from the east and southeast, and trend northwest towards the playa. A few of the project streams originate as single-thread channels from the more steeply sloped fan terrace to the east but most of the delineated desert washes onsite are characteristic of alluvial fan distributary channel networks, characterized by multiple low-flow meandering and braided channels, nested within a larger but less conspicuous watercourse defined by a frequently shifting channel network. Flow volume decreases due to seepage into the unconsolidated sediments of the fan, and transitions into unconfined sheet flood areas in the western half of the project site. The channels increase in number and density but decrease in size as they flow down the alluvial fan, where the resulting habitat is more diverse and spatially variable than the single-thread portion upstream. **Biological Resources Figure 3a-c** contains photos of characteristic stream forms on the project.

The surface hydrology of the site has been somewhat altered by the network of roads, which diverts and redistributes a portion of the runoff from smaller channels; however, the hydrology of the features delineated as Waters of the State (23.21 ac. total) is intact, based on site visits conducted after small-to-medium size storm events.

Habitat quality in the western portion is highly variable, ranging from small areas of densely weedy, historically disturbed habitat of low native diversity to saltbush scrubs and creosote bush scrubs of moderate-to-high native species diversity but with a moderate-to-high component of non-native annual weeds. Three special-status plant species -- Pahrump Valley buckwheat, Torrey's joint-fir, and Goodding's phacelia occur across the western and eastern portion of the project. A total of 77 acres were mapped as disturbed habitat in the western portion of the project site (areas with a significantly disturbed topography) but topographic disturbance in the remainder of the western portion is limited to unpaved roads and a few areas that appear to have been disked historically and are degraded but in varying stages of recovery. Transitional creosote bush and saltbush scrubs occur near the center of the project site and creosote bush scrubs of good quality and high diversity dominate the eastern third of the project site. **Biological Resources Figure 4a-f** contains photos of the habitats contained on the project site, and **Figure 5** shows the location of the photo points.

SPECIAL-STATUS PLANT AND WILDLIFE SURVEYS

The following description of biological resources presents the results of the applicant's botanical and wildlife surveys of the project site and vicinity, including delineations of desert washes and groundwater-dependent vegetation, summarized from data presented in the Application for Certification (AFC) and responses to staff's data requests. This assessment also represents staff's independent review of the data, including: observations from staff's multiple site visits (representing a minimum of 144 person hours in the field); consultation with recognized experts and resource agencies; and independent research (review of literature and databases).

Resources affected only by the construction of project components in Nevada are not included in this assessment.

NATURAL COMMUNITIES

Natural communities documented within the project area and one-mile buffer surrounding the project are described below, followed by a discussion of desert washes and groundwater-dependent ecosystems found on or near the site. “Natural Communities”, as used here, includes plant communities, desert washes, seeps and springs, and habitats defined by their geology, such as dunes.

Two plant communities were mapped on the project site during the spring 2011 surveys: Mojave Desert scrub (creosote bush scrub) and shadscale scrub. In summer of 2012, staff documented a small (1.2 acre) polygon of a rare natural community along the eastern boundary: creosote bush/big bush galleta grass association. No groundwater-dependent vegetation or springs occur on the project site.

The western half of the project site occurs at the toe of the alluvial fan and edge of the basin sink in silty, fine-textured, Pleistocene lakebed sediments inhabited by a shadscale-dominant saltbush scrub. The eastern half of the project, toward the middle portion of the alluvial fan, on gravelly, well-drained soils, supports a Mojave Desert scrub of creosote bush and white bursage on coarser, gravelly, well-drained soils. The project site also contains approximately 77 acres of topographically disturbed habitat, including dirt roads, a graded area, and a fallow orchard.

Mojave Desert scrub and shadscale scrub also dominate the one-mile buffer surrounding the project site. The groundwater-dependent communities within an approximate five-mile radius of the project are generally restricted to the Nevada side of the state line, and include honey mesquite-dominated coppice dunes and washes. The stabilized mesquite coppice dunes (dunes formed by the entrapment and accumulation of blowing sand at the base of shrubs) are generally confined to the fault zone east of the project site that parallels the California-Nevada stateline, and apparently supported by shallower groundwater forced to the surface by juxtaposed lake and basin-fill deposits (Belcher & Sweetkind 2010).

Plant communities are discussed in more detail below. **Biological Resources Figures 3**, and **4** contain photos of the habitats characteristic of the project site. The total estimated area occupied by each community is provided in **Biological Resources Table 2**.

Biological Resources Table 2
Natural Communities within the HHSEGS Project Site

Natural Community Types within Study Area	**Project Site (Acres)**
Mojave Desert scrub	1,580.5*
Shadscale scrub	1,616.5*
Disturbed (excluding roads)	77
Total upland, State and federal waters	3,277
Desert Washes/Waters of the US**	0.4
Desert Washes/Waters of the State**	23.21
Creosote bush/big bush galleta grass association	<1 ac.

* Comments on the PSA provided by the applicant included revised estimates of disturbed habitat. This included an additional 61 acres of dirt roads. Estimates did not include revised vegetation estimates; therefore staff decreased the acreages of Mojave Desert Scrub and Shadscale scrub by 30.5 acres each.
** The total acreage of waters is a subset of existing vegetation acreages.

Mojave Desert Scrub

A total of 1,580.5 acres of Mojave Desert scrub occurs within the project site (HHSEGS 2011a). Mojave Desert scrub occurs on well-drained, alluvial soils of slopes, fans, and valleys below 4,000 feet elevation (Holland 1986). In the project area it consists of evergreen and drought-deciduous shrubs one to four feet in height, dominated by creosote bush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*). Common associated shrubs include rabbit-thorn (*Lycium pallidum var. oligospermum*) and shadscale (*Atriplex confertifolia*). This community also supports a large variety of mostly native herbaceous forbs and bunchgrasses, and provides valuable habitat for a wide variety of common and special-status wildlife. Eleven species of special-status plants were also documented within this community-type.

Creosote bush and white bursage-dominant communities have a CNDDB Element Rank (NatureServe state-rank) of five, meaning they are "demonstrably widespread, abundant, and secure" (Master et al. 2009). Their extinction risk in California is low. Some variations of the creosote-bursage alliance are rare, including the creosote bush/big galleta grass association, described in more detail below under "Sensitive Natural Communities".

Shadscale Scrub

A total of 1,616.5 acres of shadscale scrub occurs within the project site (HHSEGS 2011a). Shadscale scrub comprises of low-growing, salt-tolerant shrubs that are widely spaced and often have lower overall species diversity; however, shrub species diversity is very good in some areas. Most shrubs are less than two feet in height. This plant community typically occurs on poorly-drained flats with fine-textured, somewhat alkaline soils between 3,000 and 6,000 feet elevation (Holland 1986). Common plant associates include winterfat (Kraschenninikovia lanata), desert allysum (*Lepidium fremontii*), Anderson's boxthorn (*Lycium andersonii*), rabbit-thorn, Emory's globemallow (*Sphaeralcea emoryi*), and prince's plume (*Stanleya pinnata*).

Fewer special-status plant species were found in the shadscale scrub; most of which prefer the more gravelly, better-drained and less alkaline soils farther up the alluvial fan; however, three rare species are nevertheless abundant in the shadscale scrub: (Pahrump Valley buckwheat, Torrey's joint-fir, and Goodding's phacelia. Special-status wildlife are also found in lower abundance in this area. The western half of the site is somewhat more disturbed and the invasive weeds halogeton (*H. glomeratus*) and red brome (*Bromus madritensis* ssp. *rubens*) are abundant in many areas (HHSEGS 2011a).

Shadscale-dominant natural communities have a CNDDB Element Rank (Nature Serve state-rank) of 4.2, meaning they are "not rare and apparently secure, but with cause for long-term concern; this rank is clearly lower than G3 but factors exist to cause some concern; i.e., there is some threat, or it has a somewhat narrow habitat" (Master et al. 2009).

Disturbed

A total of 77 acres of disturbed habitat occurs on the project site (HHSEGS 2011a). This includes roads, and sparsely vegetated weedy areas that were previously graded. A

fallow peach orchard is located on the project site at the corner of Silver Street and Old Spanish Trail Highway. Additional disturbed areas were mapped along the Old Spanish Trail Highway on the south side of the project site. Non-native annuals and cultivated species are characteristic of this mapping unit, with few-to-no native shrubs present. Tumbleweed (*Amaranthus albus*) and the invasive weed Russian knapweed *(Acroptilon repens*) are common in the disturbed areas.

SENSITIVE NATURAL COMMUNITIES

Vegetation mapping was conducted in spring 2011 and classified according to Holland (1986) vegetation descriptions (AFC Figure 5.2-3, HHSG 2011a; see also **Biological Resoures Figure 5**). Surveys for rare natural communities, based on the classification system described in *Manual of California Vegetation* (Sawyer et al. 2009), were conducted in spring 2012. The applicant also mapped groundwater-dependent vegetation within an approximate four-mile radius of the project (CH2 2011g, Figure DR48-1). Staff's independent review included a reconnaissance-level survey of the Pahrump Lake playa margins and other mesquite-habitats and springs beyond the four-mile boundary, including the Tecopa area, the stabilized dunes east of the project, and an onsite field verification of the applicant's delineation of state waters and desert tortoise habitat (CH2 2011c; **Biological Resources Figure 6**).

The Mojave Desert scrub and shadscale scrub communities described above are common and widespread habitats; their vulnerability to extinction in California is low at this time. Sensitive natural communities, however, are usually locally and regionally scarce and therefore vulnerable to elimination. Such habitats may be sensitive because they are regulated and protected (such as streams, wetland and riparian habitat, and other state or federal jurisdictional waters), or they are identified in local plan policies or ordinances. Sensitive natural communities often support unique or biologically important plant or wildlife species, or perform important ecological functions (e.g., the bank stabilization or water filtration functions of riparian vegetation). Communities that are not regulated under California Fish and Game Code or the state or federal Clean Water Act or other LORS may still be recognized by agencies and the scientific community as rare and sensitive (CNDDB 2003; Sawyer et al. 2009).

The CDFG Vegetation Program's *Manual of California Vegetation* [2nd ed.](Sawyer et al. 2009) provides a valuable measure of a community's vulnerability through the CNDDB Element Rank (synonymous with the NatureServe state rank). Communities with a state or global rank of 1, 2, or 3 are considered vulnerable to extinction within their range in California. Some of these communities are also globally at-risk. The global and state ranks do not reflect other concerns, *e.g*., whether the habitat is designated critical habitat for a listed species. Some *alliances* (a description of the community based on its dominant species) that are common have rare *associations* (a finer level of classification), such as those with high levels of diversity in the shrub layer, associations of galleta grass or with an important component of stem succulents like Mojave yucca or various cacti (Sawyer et al. 2009).

Sensitive natural communities found onsite include:

- Ephemeral desert washes (Waters of the State)
- Creosote bush/big galleta grass association

The desert washes on the project site are described in the subsection “Desert Washes”, following the discussion of mesquite communities, invasive weeds, special-status plants, and groundwater-dependent ecosystems.

Sensitive natural communities documented or observed *offsite* within the one-mile study area surrounding the project site include:

- Honey mesquite alliance (a groundwater-dependent species)
- Coppice dunes
- Ephemeral desert washes

Mesquite Alliance

Honey mesquite-dominant habitats, their importance to area wildlife, and conservation status are described in more detail under “Groundwater-dependent Ecosystems”. Over 4,000 acres of mesquite-dominant habitats were documented within the five- to six-mile radius of the project study area in the applicant’s mapping of groundwater-dependent vegetation (CH2 2011g, Figure DR48-1; **Biological Resources Figure 1**). With the exception of a small area along lower Stump Spring Wash in the Charleston View area, all mesquite habitats within the study area occur on the Nevada side of the state line. No mesquite habitats occur within the project boundary, with the exception of a few scattered shrubs. This was confirmed by staff during the field verification of the state waters delineation. The nearest mesquite-dominant habitats in California occur 13 to 20 miles west of the project site in the Tecopa area at springs, around playa margins, and along the Amargosa River and its tributaries.

The mesquite-dominated habitats within the study area occur in two forms: 1) coppice dunes of low-growing shrubs, less than six feet tall, on sandy, hummocky stabilized dunes, and 2) as stringers of lush, taller stands along the deeply incised canyons and ephemeral washes that dissect the alluvial fan surface east of the project. In these settings, they occur as very dense stands of taller shrubs and single- or multi-trunked small trees up to approximately eight inches diameter and 15 feet in height. **Biological Resources Figure 1** contains photos of the mesquite habitats characteristic of the incised washes east of the project site. The ephemeral washes do not flow frequently enough to support this obligate phreatophyte (groundwater-dependent) species; the mesquite are presumed to be supported by one or a combination of shallow groundwater forced to the [near] surface along the fault zone, groundwater flow from the Spring Mountains, and in a few small areas by discharging seeps and springs.

Like the dunes (described below), the mesquite associated with the dunes are arranged linearly along the fault zone, between approximately 600 and 2,500 feet east of the project boundary. The mesquite associated with the dunes, spring, and washes at Stump Springs Area of Critical Environmental Concern (ACEC) occur between two and four miles of the project’s southeast corner. The mesquite washes occur as close as one-half mile of the eastern project boundary and extend up to five miles or more east toward the Spring Mountains.

All mesquite-dominant communities are rare in California and Nevada (Crampton et al. 2006; Sawyer et al. 2009). The total mesquite-dominant woodland area in southern Nevada, northwestern Arizona, and southeastern California is 24,669 acres (Crampton et al. 2006). Mesquite-dominant habitats are also rare in California and occurrences are threatened by a variety of factors, predominantly groundwater pumping and urbanization (Sawyer et al. 2009; Crampton et al. 2006).

Classification of the Mesquite Habitats

Staff chose not to include an academic discussion about vegetation classification in the PSA; the issue of the mesquite classification is included here to address concerns expressed by the applicant during workshops and in the PSA comments.

At the applicant's request, the CDFG Vegetation Program was consulted for information on the conservation status and classification of mesquite in California. The Senior Vegetation Ecologist (Keeler-Wolf pers. comm.) affirmed that the mesquite-dominant habitats in California are classified as "Honey Mesquite Alliance"; not "thickets", "bosque" or "woodland". The state and national standard for classification is based on dominant species, not on habitat structure. Under the U.S. National Vegetation Classification system (USNVC), a system still in development, honey mesquite alliances fall under several different "Ecological Systems" including "North American Warm Desert Riparian Low Bosque & Shrubland Group" (Keeler-Wolf pers. comm.). This might explain why BLM uses the term "bosque" to describe the mesquite habitats east of the project.

In the BLM-sponsored Mesquite-Acacia Conservation Management Strategy (CMS) (Crampton et al. 2006), prepared for and adopted by the Clark County Multiple Species Habitat Conservation Plan, the mesquite habitats throughout the study area (that includes southern Nye County) are consistently referred to as "woodlands. The management plan also notes that the southern portion of the Pahrump "Metapatch" (aggregation of smaller patches) known as Stump Spring is "...distinct from the rest of the region in topography, hydrology, soils and mesquite growth form...Many of these woodland patches are comprised of shrubby dune mesquite; however, larger shrubs and trees grow along the deeply eroded wash." (Crampton et al. 2006)

Regardless of the terminology used, the conservation status and ecological importance of Stump Spring ACEC, the mesquite-dominant habitats north of the ACEC and east of the project, and the value of mesquite to wildlife, are undisputed; the ACEC and the entire Pahrump Valley metapatch are identified conservation priorities in the Mesquite-Acacia Conservation Management Strategy (Crampton et al. 2006), and BLM is in the process of developing an additional ACEC that would encompass the mesquite habitats just east of the project (Poff pers. comm.).

The importance of mesquite communities to wildlife are described in more detail under "Groundwater-dependent Ecosystems". **Biological Resources Figure 2** contains photos of the mesquite habitats characteristic of the incised washes east of the project site.

Coppice Dunes

The mesquite coppice dunes are arranged linearly along the fault zone as a discontinuous system of stabilized (inactive) dunes. Most occur within one-half mile of the eastern boundary, occur on BLM lands, and extend southeast of the project to the Stump Spring ACEC, approximately two and one-half miles east of the project's southeast corner

Coppice dunes form as a result of the trapping of aeolian silts and fine sands by shrubs adapted to sand burial. Any shrub (or other obstacle) standing in the airborne stream of sand is an impediment to wind-sand transport, and the resulting turbulence and speed losses cause sand grains to settle out on the downwind side of the shrub and around its base. Only certain kinds of plants are associated with coppice dunes, because only those "edifying" species adapted to sand burial by forming new roots and shoots from buried branches can continue to grow as the sand accumulates around them.

Honey mesquite (*Prosopis glandulosa* var. *torreyana*) is the clear dominant on the coppice dunes. Other shrubs associated with coppice dunes in the project vicinity include creosote bush, Mormon tea (*Ephedra* spp.), and four-wing saltbush (*Atriplex canescens*). The stabilized dunes provide ideal sites for burrowing fauna due to the lack of stones, abundant coarse material, and shade provided by the shrubs (Huang et al. 2011). The vertical structure of the vegetation provides wildlife with nesting and foraging habitat.

Creosote Bush/Big Galleta Grass Association

Some *alliances* (a description of the community based on its dominant species) that are common, such as creosote bush, have rare *associations* (a finer level of classification). The creosote bush/galleta grass *association* found onsite is one example (Sawyer et al. 2009). Only 1.2 acres of this plant community occurs onsite (**Biological Resources Figure 5**). This community extends to the east toward the fault zone coppice and is more abundant off the project site. This association has been observed by staff and others in different locations throughout the eastern Mojave and Colorado Desert regions of California (Sawyer et al. 2009, Evens pers. comm.). This rare natural community has a CNDDB (NatureServe) state rank of 3, meaning it is "vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation." (Master et al. 2009)

In the small stand documented in the project area, the big galleta grass (*Pleuraphis rigida*) is the co-dominant in the creosote bush-white bursage alliance. Overall shrub diversity is very good at the site but only the galleta grass and white bursage dominate (31 percent and 38 percent relative cover, respectively).

Blackbrush communities (a habitat of upper bajadas) in southern Nevada that contain a major component of big galleta are heavily utilized by bighorn sheep and are referred to as 'preferred habitat' (Matthews 2000). It also provides fair cover for small mammals and small nongame birds (*ibid.*).

INVASIVE WEEDS

Target lists of invasive non-native plants potentially occurring in the project area were developed from the lists of the California Department of Food & Agriculture (CDFA), California Invasive Plant Council (Cal-IPC), and the Nevada Department of Agriculture (NDA). Because the surveys were floristic, i.e., all plants encountered were identified to at least species level, any new weed species not on the target lists would have been detected, if present. Non-native invasive weed species were mapped in spring 2011, and their abundance was estimated by size classes.

Invasive weeds are species of non-native plants included on the weed lists of the California Department of Food and Agriculture (CDFA 2010), the California Invasive Plant Council (Cal-IPC 2006) and the Mojave Weed Management Area (MWMA 2011). They are of particular concern in wildlands because of their potential to degrade habitat and disrupt the ecological functions of an area (Cal-IPC 2006). Specifically, invasive weeds can alter habitat structure, increase fire frequency and intensity, decrease forage (including for special-status species, such as desert tortoise), exclude native plants, and decrease water availability for both plants and wildlife.

A digest of California's weed laws is available on the CDFA website: http://www.cdfa.ca.gov/plant/ipc/encycloweedia/winfo_weedlaws.htm. The website ("Encycloweedia") also provides fact sheets on weed species management.

Thirteen species of invasive weeds of varying abundance and distribution were mapped in the project area during the 2010/2011 floristic surveys (HHSEGS 2011a). Weeds are most abundant in the western two-thirds of the project area, or the portion of the project most disturbed by grading for the now abandoned residential subdivision (predominantly along roads), areas with an agricultural history, and seasonally moist areas. The species documented onsite are described below, as well as two additional weed species of particular concern to local agricultural commissioner INYO 2012a).

Invasive Weeds on the Project Site

Russian knapweed (Acroptilon repens)

Russian knapweed was found in two locations on the project site; the fallow orchard and along an interior site road. Russian knapweed occurs in the Great Basin, Mojave Desert, and northern California mainly on agricultural lands and roadsides. Russian knapweed is a deep-rooted perennial and established stands are more difficult to control than other knapweeds. Russian knapweed can invade and persist in numerous ecosystems, including rangeland, pastures, agricultural fields, riparian areas, and wildlands. It has been found in saline, alkaline, low lying areas. It most readily invades disturbed areas, forming dense single-species stands. Once established, Russian knapweed uses a combination of adventitious shoots and allelopathic chemicals (toxic to other plants) to spread outward into previously undisturbed areas. On agricultural land, it has caused serious reductions in yields, crop value, and may devalue the land. CDFA recommends avoiding driving vehicles or equipment through mature patches as seed heads can become attached and spread over long distances (CDFA 2012). It is a CDFA A-rated pest; a priority for eradication.

Red brome (Bromus madritensis ssp. rubens)

Red brome is abundant and widespread in the project area, occurring at 218 widely scattered locations. It is an introduced Eurasian grass adapted to microhabitats and was frequently found at the base of desert shrubs and moist places. Red brome is widespread throughout the Mojave Desert and the seeds from this species can disperse readily and across large distances. Cal-IPC has declared this plant highly invasive (Cal-IPC 2006). Because of its widespread distribution, red brome is not considered feasible for general control.

Cheat grass (Bromus tectorum)

Cheat grass was found at 21 scattered locations on the project site. It is among the most widely distributed invasive plant species in the western U.S. Closely related to red brome, it is adapted to colder steppe and woodland habitats. Cal-IPC has declared this plant highly invasive (Cal-IPC 2006). Because of its widespread distribution, cheat grass is not considered feasible for general control.

Purple mustard (Chorispora tenella)

Purple mustard was found in low abundance in two locations in wetter, low-lying areas. This species is uncommon to California and is commonly associated with heavily disturbed agricultural lands. It is primarily a problem in winter annual cereal crops and may cause extensive yield losses at moderate infestations. Densities as low as three plants per square foot have reduced wheat yields by over 50 percent. Purple mustard may also infest roadsides, non-crop areas, and disturbed rangeland. Additionally, dairy animals grazing purple mustard produce milk with a bitter taste and foul odor. It is still somewhat limited in its distribution in California and infestations frequently tend to spread along roads and field edges. Populations should be mapped and aggressively controlled to prevent the continued increase of this weed in cereals (CDFA 2012). It is a B-rated pest plant, meaning it is a known economic or environmental detriment and of currently limited distribution. At the discretion of the individual county agricultural commissioner they are subject to eradication, containment, suppression, control, or other holding actions.

Field bindweed (Convolvulus arvensis)

Field bindweed was found in low abundance at one location in the 250-foot buffer. Field bindweed is considered one of the most noxious weeds of agricultural fields throughout temperate regions of the world. Plants typically develop large patches and are difficult to control. Heavy infestations in grain crops can reduce harvest yields 30-40 percent or more. It can also spread certain plant viruses, and the foliage contains tropane alkaloids and can cause intestinal problems in horses grazing on heavily infested pastures. It is a C-rated by the state, meaning it is a pest of known economic or environmental detriment and, if present in California, it is usually widespread. If found in the state, they are subject to regulations designed to retard spread or to suppress at the discretion of the individual county agricultural commissioner but there is no state enforced action.

Halogeton (Halogeton glomeratus)

Halogeton is abundant and widespread on the western two-thirds of the project site south to the Old Spanish Trail Highway and corresponding 250-foot buffers. Halogeton

often grows in areas of disturbance such as burned-over areas, overgrazed areas, dry lakebeds, abandoned dry farms, along roads, and in places where the soil has been disturbed. It is tolerant of saline soils of colder semiarid regions, especially where native plant cover is thin. Halogeton competes poorly with established perennial vegetation. It is a prolific seed producer and seeds may remain viable in the soil for 10 years or longer. Seeds disperse with wind, water, human activities, seed-gathering ants, animals, and when dry plants break off at ground level and tumble with the wind. It is poisonous to livestock, especially sheep. Though common in Nevada, halogeton is not as widespread in California. CDFA (2012) has assigned it an “A” rating, meaning that eradication is a priority by the state. However, the site is infested over very large areas (at varying densities); containment may be the only realistic management approach.

African mustard (Malcolmia africana)

African mustard is abundant and widespread on the northern two-thirds of the project site, the corresponding 250-foot buffers, and along Old Spanish Trail Highway. It is currently widespread throughout the Southwest and is considered invasive in Nevada and Utah. African mustard can be effectively controlled with herbicide in priority areas. It is not currently rated by the state but because it has been recorded in only a few locations in California, this species should be eradicated if observed.

Mediterranean grass (Schismus arabicus)

Mediterranean grass was observed on the project site and on the 250-foot buffer. Cal-IPC has determined that this plant has a limited invasiveness rating in California (Cal-IPC 2006). BLM and other agencies recognize that because of the widespread distribution of Mediterranean grass, this species is not considered feasible to control.

Russian thistle (Salsola spp.)

Russian thistle, also known as tumbleweed, is more common in the northern half of the project and is abundant along the Old Spanish Trail Highway near the southern boundary of the site. They are strongly competitive in semiarid areas and are heavily favored by disturbance. Tumbleweeds disperse seed over long distances as they are carried along the ground by the wind. Frequently, new infestations appear as a "trail" of tumbleweed seedlings across fields. Skeletons also often collect along fencerows, and subsequent populations can become very dense. One of the keys to preventing spread of Russian thistle is controlling seedlings along both sides of fence rows and along field borders, where tumbleweed skeletons accumulate. Additionally, areas "downwind" of infested areas are most likely to be invaded. In many cases, it is impossible to prevent tumbleweed movement and sensitive areas should be monitored each year for new plants (CDFA 2012). It is a CDFA C-rated pest.

Tumble mustard (Sisymbrium altissimum)

Tumble mustard was mapped mainly in sandy soil in the eastern third of the site and the corresponding 250-foot buffer. Tumble mustard is more common in the Great Basin, but occurs in the Mojave Desert invading roadsides and overgrazed rangelands. It is not currently rated by the state and its impact to wildlands is unknown (CalIPC 2006).

London rocket (Sisymbrium irio)

London rocket is widespread throughout the warm deserts of North America. It was widely scattered throughout the project site and especially abundant along the Old Spanish Trail Highway. It matures earlier in the year than native species, allowing it to out-compete them. It is not currently rated by the state but Cal-IPC has declared this plant moderately invasive in wildlands (Cal-IPC 2006).

Mediterranean tamarisk or saltcedar (Tamarix ramosissima)

Salt cedar was observed near the project site to the south across Tecopa Road within the 250-foot buffer. It appears that the tamarisk has been planted near rural residences. It is a riparian plant and is therefore restricted to habitats where there is perennial saturation such as springs and seeps, or runoff from poorly maintained water pipelines or well pumps. Cal-IPC has declared this plant highly invasive (Cal-IPC 2006).

Filaree or storksbill (Erodium cicutarium)

Filaree is a widespread annual species common in disturbed habitats, and was detected at the project site and in the 250-foot buffer. It can form dense, transient populations when conditions are suitable. It has a limited overall rating by Cal-IPC, generally because the ecological impacts of the species are minor. Because of its widespread distribution, eradication of filaree is not considered feasible.

Other Invasive Weeds of Concern

The Inyo-Mono County Agricultural Commissioner expressed concern about the potential introduction of two additional species, camelthorn and Malta starthistle. Contaminated vehicles and equipment of employees and contractors coming from the Las Vegas area, where there are known infestations may act as a vector for the introduction of these species in the Pahrump Valley (Inyo 2012a). These highly invasive species are not currently documented on the project site.

Camelthorn (*Alhagi pseudalhagi*)

Camelthorn is a highly invasive perennial shrub that invades agricultural lands and riparian areas. Its strongly competitive and rapid aggressive growth allows it to out-compete both native vegetation and cultivated crops. It has been eliminated from all but four California counties due to eradication efforts but large infestations remain in arid parts of Nevada, Arizona, and Washington. In Arizona dense thickets have formed along the Colorado River in the Grand Canyon and along the Little Colorado River. It reproduces by seed and vegetatively by rhizomes that send up shoots and often spreads through contaminated hay, straw, and livestock. CDFA (2010) has assigned it an “A” rating, meaning that eradication is a priority. It was not found on the project but infestations are known from surrounding communities in southern Nevada (Inyo County 2012b).

Malta starthistle (*Centaurea melitensis*)

Malta starthistle was not found on the project but it is another concern and identified priority for eradication by the local agricultural commissioner. Similar to yellow starthistle (*Centaurea solstitialis*), it readily invades disturbed and open areas. Infestations of Malta starthistle displace native plants and animals, threatening natural ecosystems and

nature reserves. It has been documented to significantly reduce seed production in at least one endangered plant (Cal-IPC 2006). It is also toxic to horses. While Malta star-thistle is less invasive than yellow starthistle, it still spreads quickly by producing great quantities of seed that is easily carried on tires and it is often spread by contaminated straw (straw is commonly used on construction sites for erosion and sediment control).

COMMON WILDLIFE

The HHSEGS project is located in the Pahrump Valley within the eastern Mojave Desert. This area consists of a broad open valley supporting a mosaic of desert scrub communities that intergrade depending on the local topography, hydrology, and soil structure. Dry lakebeds, seeps, ephemeral drainages, and complexes of mesquite thickets and woodlands provide a range of conditions that support a complex assemblage of wildlife. The valley is bordered by a series of steep rocky mountain ranges which provide habitat for numerous reptiles, birds, and large mammals.

Habitat on the HHSEGs project site is utilized by a broad suite of common and sensitive wildlife. The distribution of wildlife on the site appears to be a function of the level of historic disturbance, soil type, and existing vegetative cover. Areas characterized by more intact native plant communities such as the northern and eastern portions of the site appear to support higher native species diversity.. More disturbed areas including graded roads, former staging areas along roads, the fallow orchard and other areas heavily colonized by weedy annuals provide lower habitat value and tend to support lower species diversity than otherwise intact native plant communities. Nevertheless, many areas with a moderate to high weed component still had good to excellent diversity in the shrub layer.

Invertebrates

Desert ecosystems are known to support a broad group of invertebrate life. As in all ecosystems, invertebrates play a crucial role in a number of biological processes. Insects serve as the primary or secondary food source for a variety of bird, reptile, and mammal predators; they provide important pollination vectors for plant species; they act as efficient components in controlling pest populations; and, they support the naturally occurring maintenance of an area by consuming detritus and contributing to necessary soil nutrients. The project site likely supports a wide variety of common and non-native invertebrates. Some of the orders identified in the project area included Hemiptera (true bugs), Coleoptera (beetles), and Diptera (flies). Various insects were routinely observed on the project site by staff during surveys conducted to verify and document biological resources.

Desert fairy shrimp are known from saline lakes in the region and various species of gastropods can be associated with desert seeps and springs. In arid climates, such as that found in the Mojave desert, fairy shrimp inhabit pools that may last from as little as three days to as long as four months, with much more variable levels of dissolved salts than found in pools in more humid climates (Brown and Carpelan 1971). It is possible that during periods of heavy or prolonged rainfall that small depressions, road ruts or gullies may support conditions that allow for the presence of common fairy shrimp. It is also likely that fairy shrimp occur in the dry lake west of the project site and that portions of the project are periodically inoculated with cysts inadvertently carried by mammals or

shorebirds. Therefore it is possible small pooled areas could support fairy shrimp during extremely wet years.

A review of existing literature did not find any comprehensive study describing the species of fairy shrimp expected to occur in the Pahrump Valley. However, approximately 23 species of fairy or brine shrimp are known to occur in California (Bauder et al. 1998) and five species are known from within 100 miles of the project site (Eriksen and Bell, 1999). These include, ranging from farthest to closest, the giant fairy shrimp (*Branchinecta gigas*), Colorado fairy shrimp (*B. coloradensis*), San Francisco brine shrimp (*Artemia franciscana*), versatile fairy shrimp (*B. lindahli*), and the alkali fairy shrimp (*B. mackini*). Tadpole fairy shrimp (*Lepidurus lemmoni*) are also known from Nevada and are common in playas across the great basin. None of these species have California or federal status. Based on the known distribution and habitat requirements of sensitive fairy shrimp; sensitive species are not likely to occur on or near the proposed project site. Native harvester ants (*Pogonomyrmex spp.*) were also detected on the project site and although not detected during surveys, the proximity to rural residents may increase the potential for the introduction of non-native Argentine ants (*Linepithema humile, formerly Iridomyrmex humile*). The introduced Argentine ant is abundant in urban and agricultural lands throughout much of California and invades into relatively mesic natural habitat such as along river courses and in some coastal lowlands (Ward 2005). Desert areas are likely more resilient to invasion due to the low levels of soil moisture that are occur in those locations.

During an August,28, 2012 staff workshop, Intervenor Center for Biological Diversity requested more information on special status butterflies be provided, and provided a reference website (Warren et al 2012). A review of this database indicated that three butterflies are known from the Pahrump Valley: silvery blue (*Glaucopsyche lygdamus deserticola*), small checkered-skipper (*Pyrgus scriptura apertorum*), and Mormon metalmark (*Apodemia mormo autumnalis*). None of these species have special status (CDFG 2011a).

Reptiles and Amphibians

The applicant observed a wide diversity of snakes on the project site. This included three species of rattlesnake; sidewinder (*Crotalus cerastes*), speckled rattlesnake (*C. mitchellii*) and northern Mojave rattlesnake (C*. scutulatus scutulatus*). Great basin gopher snake (*Pituophis catenifer ssp. deserticola*), coachwhip (*Masticophis flagellum ssp. flagellum*), and glossy snake (*Arizona elegans*) were also observed on the HHSEGS site. Although not observed on the project site it is possible that common desert amphibians are also present. Red spotted toad (*Anaxyrus punctatus*) is known from the Kingston Range and may occur in areas supporting ponded water and at Stump Spring. However, investigations of the site conducted by staff following extensive summer storms detected only small pools and road ruts that were often dry within 24 hours.

Mammals

Mammals were well represented on the HHSEGS project site and a variety of species were observed by the applicant. Vegetation on the project site such as the creosote bush scrub, shadscale scrub, and native annuals provide foraging and breeding habitat

for many mammalian species including pocket mouse (*Perognathus longimembris*), white-tailed antelope squirrel (*Ammospermophilus leucurus*), and Merriam's kangaroo rat (*Dipodomys merriami*). Desert cottontail (*Sylvilagus audubonii*) and black tailed jack rabbit (*Lepus californicus*) were observed by staff and the applicant across the project site. In addition, high burrow densities of Botta's gophers (*Thomomys bottae*) were noted along many of the access roads and within portions of the more disturbed vegetation communities. Small carnivores including desert kit fox (*Vulpes macrotis*), coyote (*Canis latrans*), and American badger (*Taxidea taxus*) also appear to commonly use the site. Numerous kit fox complexes were detected on the project site and badger sign was evident in many areas. Wide ranging carnivores such as bobcat (*Felis rufus*) may also use the site. Nelson's big horn sheep (*Ovis Canadensis nelsoni*) are known from the adjacent mountain ranges and likely cross the site during periodic intermountain movement events. The partial fragment of a horn was observed by the applicant during surveys of the project site.

A number of bats are known from desert regions and these species may periodically forage in and near the project area. The presence of stored trailers, vehicles, and other structures on lands east of the site may provide potential roost sites for bats. Standing water does not routinely occur on the project site which reduces the potential for many bats to actively forage in the area. However, due to the proximity of the project site to suitable habitat for foraging and roosting (e.g. Stump Spring ACEC and scattered mesquite thickets along the California-Nevada Stateline), the applicant was requested to install an Anabat station on the HHSEGS site. This technology records bat echolocation calls which are then interpreted by a skilled mammalogist. Data collection began December 21, 2011, and the applicant has committed to providing quarterly reports until December 2012. Preliminary data provided by the applicant indicate the site supports low level use by a variety of common and at least one sensitive bat species. Some of these species include the California myotis (*Myotis californicus*), big brown bat (*Eptesicus fuscus*), western pipistrelle (*Pipistrellus hesperus*), Mexican free-tailed bat (*Tadarida brasiliensis*), and pallid bat (*Antrozous pallidus*). Bat roosts were not detected on the HHSEGS project site but may occur in adjacent off-site areas including old trailers and structures.

Exotic Species

Cattle and sheep grazing are permitted activities within portions of the Pahrump Valley and the project site has been subject to historic grazing. The sign of domestic cattle (*Bos taurus*), sheep (*Ovis aries*), and free ranging burrow (*Equus asinus*) was present on the HHSEGS site. Because of the proximity to residential communities at Charleston View the HHSEGS site also likely experiences periodic use by domestic dogs (*Canis domesticus*).

Avian Species

The Pahrump Valley and Mojave Desert support a wide range of both resident and migratory bird species. The site is located within the Pacific Flyway, a very broad corridor stretching along the Pacific Coast from Mexico north to Alaska and into Siberia, Russia. The states of California and Nevada lie entirely within this large corridor (CDFG, accessed April 19, 2012). Bird use on the site includes resident breeding birds, periodic migrants, and wintering species. For some species of birds, including many large

raptors, the site does not support nesting habitat; however the abundance of small mammals and reptiles provide foraging opportunities for these species. Over 60 species of birds were identified by the applicant in AFC (HHSEGS 2011a).

There are a number of factors that affect the type and the distribution of birds that occur in any given area. Some of these include the type and composition of habitat, the time of year, existing levels of anthropogenic disturbance, and the projects proximity to areas that support high quality or important habitat types including areas mapped as important bird areas (IBAs). IBA's can yield further information on the migrants that would typically be expected to move over the site.

The HHSEGS project site is not located in an IBA. The closest IBA is the East Mojave Peak IBA, located approximately five and a half miles south of the project site in the Kingston Mountain range. Joshua tree woodlands and pinyon-juniper vegetation characterize the habitat in this IBA which support s various species such as Bendire's thrasher (*Toxostoma bendirei*), juniper titmouse (*Baeolophus ridgwayi*), and Scott's oriole (*Icterus parisorum*). Only the Bendire's thrasher was reported onsite, however the applicant believes the bird may have been misidentified (HHSEGS 2011a). The Shoshone-Tecopa IBA, associated with the Amargosa River and Grimshaw Lake are located approximately 18 miles from the project site and provides riparian woodlands, wetlands, and alkali marsh habitat. It also is home to a very rare population of endangered yellow-billed cuckoo (*Coccyzus americanus occidentialis*). The East Mojave Springs IBA is approximately 14 miles from the HHSEGS site, and Horsethief Springs, is a major attractant for all wildlife, including migratory birds. A complex of two other above-ground springs, the Piute and Cornfield Springs, provide rare riparian vegetation in what is otherwise arid desert habitat. Bell's vireo (*Vireo bellii*), crissal thrasher (*T. crissale*), least bittern (*Ixobrychus exilis*), northern harrier (*Circus cyaneus*), and snowy plover (*Charadrius nivosus*) use this area for foraging, breeding, and nesting.

The Stump Spring ACEC, other area springs, and the associated greater metapatch of mesquite thickets located in washes and on coppice dunes east of the project provide unique and important habitat to wildlife. The system of mesquite thickets along the state border in Nevada are believed to be crucially important to the greater desert ecosystem and over 30 species of migratory birds are known from these areas. One locally important species, phainopepla (*Phainopepla nitens*), forages on the berries of mistletoe, a hemi-parasitic species common to mesquite and other trees. Recently, phainopepla have been the focus of the Clark County, Nevada, Section 10 Multiple Species Habitat Conservation Plan. This plan contains regional management conservation strategies for a host of special-status plant and wildlife species.

A variety of resident and migratory birds have been detected on and adjacent to the site. Some of these include burrowing owl (*Athene cunicularia*), lesser nighthawk (*Chordeiles acutipennis*), horned lark (*Eremophila alpestris*), western meadowlark (*Sturnella neglecta*), and sage sparrow (*Amphispiza belli canescens*). Possible migrant or wintering Brewer's sparrow (*Spizella breweri*), chipping (*Spizella passerina*), and white crowned sparrows (*Zonotrichia leucophrys*) were also observed. Other species identified on the project site included LeConte's thrasher (*T. lecontei*), black-throated sparrow (*Amphispiza bilineata*), California quail (*Callipepla californica*), cactus wren

(*Campylorhynchus brunneicapillus*), northern mockingbird (*Mimus polyglottos*), Scott's oriole and purple martin. Raptors were well represented and were observed by applicant and staff. Common raptors included red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), Cooper's hawk (*Accipiter cooperii*), and ferruginous hawk (*B. regalis*). Golden eagles (*Aquila chrysaetos*) were detected in flight above the site and in adjacent areas. Golden eagles were also noted perching in areas adjacent to the proposed project.

SPECIAL-STATUS PLANT AND WILDLIFE SPECIES

Pre-field research conducted by the applicant to assess the potential presence for special-status plants and animals included a review of literature, databases, and other sources of biological resource information. These include the California Natural Diversity Database (CNDDB 2012), California Native Plant Society (CNPS) *Online Inventory of Rare and Endangered Plants of California* (CNPS 2012), Consortium of California Herbaria (CCH 2012), and the U.C. Riverside Herbarium. Staff independently reviewed the databases and herbarium records, and consulted recognized experts in the rare plant flora of the project vicinity (Silverman pers. comm.; Bagley pers. comm.).

Surveys for special-status plants were consistent with recommended guidelines for botanical surveys of the California Department of Fish and Game (CDFG 2009), the U.S. Fish and Wildlife Service (USFWS 1996), and the California Native Plant Society (CNPS 2001). They were floristic in nature; i.e., all plants encountered were identified to a level necessary for detecting special-status species, if present. Special-status plant surveys of the project site were conducted over a three-year period that included a normal rainfall season and a dry season. Surveys onsite, including a 250-foot buffer around the site, were conducted in spring and fall (spring 2010 and 2011; fall 2010 and 2011). A one-mile buffer surrounding the site was surveyed at a reconnaissance-level in spring 2011.

Because the area is generally under-surveyed, the applicant also conducted extensive offsite surveys to determine if special-status plants were more common than previously understood. Offsite surveys were conducted in several locations in California and Nevada during the spring of 2011 and 2012. Cacti occur in very low numbers in the project area, and no individuals of any species of Yucca are present; thus, cacti and stem succulents were not mapped.

"Special-Status Species" is a universal term used in the scientific community for species that are considered sufficiently rare that they require special consideration and/or protection and should be, or have been, listed as rare, threatened or endangered by the Federal and/or State governments. The applicant has objected to the use of the term, which it dismissed as a "non-legal colloquialism sometimes assigned by other parties".

Special-status Plant Species Definition

In *Protocols for Surveying and Evaluating Impacts to Special-Status Native Plant Populations and Natural Communities* (CDFG 2009), CDFG defines "special-status plant species" to include all plant species that meet one or more of the following criteria:

- Listed or proposed for listing as threatened or endangered under ESA or candidates for possible future listing as threatened or endangered under the ESA (50 CFR §17.12);

- Listed or candidates for listing by the State of California as threatened or endangered under CESA (Fish and Game Code §2050 et seq.). A species, subspecies, or variety of plant is endangered when the prospects of its survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, over-exploitation, predation, competition, disease, or other factors (Fish and Game Code §2062). A plant is threatened when it is likely to become endangered in the foreseeable future in the absence of special protection and management measures (Fish and Game Code §2067);
- Listed as rare under the California Native Plant Protection Act (Fish and Game Code §1900 et seq.). A plant is rare when, although not presently threatened with extinction, the species, subspecies, or variety is found in such small numbers throughout its range that it may be endangered if its environment worsens (Fish and Game Code §1901);
- Meet the definition of rare or endangered under CEQA §15380(b) and (d). Species that may meet the definition of rare or endangered include the following:
    - Species considered by the California Native Plant Society (CNPS) to be "rare, threatened or endangered in California" (Lists 1A, 1B and 2);
    - Species that may warrant consideration on the basis of local significance or recent biological information;
    - Some species included on the California Natural Diversity Database's (CNDDB) Special Plants, Bryophytes, and Lichens List (California Department of Fish and Game 2008);
    - Considered a locally significant species, that is, a species that is not rare from a statewide perspective but is rare or uncommon in a local context such as within a county or region (CEQA §15125 (c)) or is so designated in local or regional plans, policies, or ordinances (CEQA Guidelines, Appendix G). Examples include a species at the outer limits of its known range or a species occurring on an uncommon soil type.

The term "Special-Status Plants" is also used by BLM in their botanical survey guidelines (BLM 2009b). The BLM guidelines and definitions are also contained in the Energy Commission document Best Management Practices & Guidance Manual: Desert Renewable Energy Projects (CEC 2009).

Biological Resources Table 3 identifies the special-status plant species that were reported to occur, or potentially occur within ten miles of the proposed project area, based on surveys of the proposed project area and vicinity, and searches of the California Natural Diversity Database (CNDDB) and California Native Plant Society's (CNPS) Inventory of Rare and Endangered Plants. The table also includes species identified in public comments as having at least low potential to occur based on the presence of general habitat preferences or known distribution in the region; and species not contained in **Biological Resources Table 3** of the PSA (Basin & Range 2012x).

Biological Resources Table 3
Special-status Plant Species Known to Occur or Potentially Occurring in the HHSEGS Project Area

Common Name	***Scientific Name***	**Status[1]** **State/Fed/CRPR/CNDDB/BLM**
Mormon needle grass	*Achnatherum aridum*	__/__/2.3/S2?
Ivory-spined agave	*Agave utahensis* var. *eborispina*	__/__/1B.3/S2/S
Clark Mountain agave	*Agave utahensis* var. *nevadensis*	__/__/4.2/S3.2
Desert ageratina	*Ageratina herbacea*	__/__/2.3/S2

Smallest aliciella	*Aliciella humillima*	__/__/Proposed/__
Ripley's aliciella	*Aliciella ripleyi*	__/__/2.3/S2
Coyote gilia	*Aliciella triodon*	__/__/2.2/S2
Inyo onion	*Allium atrorubens* var. *cristatum*	__/__/4.3/S2
Nevada onion	*Allium nevadense*	__/__/2.3/S2
Small-flowered androstephium	*Androstephium breviflorum*	__/__/2.2/S2S3
White bear poppy	*Arctomecon merriamii*	__/__/2.2/S2.2
Mojave milkweed	*Asclepias nytaginifolia*	__/__/2.1/S2
Geyer's milk-vetch	*Astragalus geyeri* var. *geyeri*	__/__/2.2/S2
Borrego milk-vetch	*Astragalus lentiginosus* var. *borreganus*	__/__/4.3/S3.3
Curved-pod milk-vetch	*Astragalus mohavensis var. hemigyrus*	__/__/1B.1/S1
Providence Mountain milk-vetch	*Astragalus nutans*	__/__/4.3/S3.3
Nye milk-vetch	*Astragalus nyensis*	__/__/1B.1/S1
Preuss' milk-vetch	*Astragalus preussii* var. *preussii*	__/__/2.3/S1
Gravel milk-vetch	*Astragalus sabulonum*	__/__/2.2/S2
Tidestrom's milk-vetch	*Astragalus tidestromii*	__/__/2.2/S2
Scaly cloak fern	*Astrolepis cochisensis* ssp. *cochisensis*	__/__/2.3/S2.3
Pahrump silverscale	*Atriplex argentea* var. *longirichoma*	__/__/1B.1/S2/S
Three-awned gramma	*Bouteloua trifida*	__/__/2.3/S2?
Pine Creek evening-primrose	*Camissonia boothii* ssp *alyssoides*	__/__/4.3/S3.3
Booth's evening-primrose	*Camissonia boothii* ssp *boothii*	__/__/2.3/S2
Booth's hairy evening-primrose	*Camissonia boothii* ssp. *intermedia*	__/__/2.3/S2.3
Wheeler's skeleton weed	*Chaetadelpha wheeleri*	__/__/2.2/S2
Parry's spurge	*Chamaesyce parryi*	__/__/2.3/S1.3
California sawgrass	*Cladium californicum*	__/__/2.2/S2.2
Small-flowered bird's-beak	*Cordylanthus parviflorus*	__/__/2.3/S1S2
Tecopa bird's-beak	*Cordylanthus tecopensis*	__/__/1B.2/S1.2/S
Desert pincushion	*Coryphantha chlorantha*	__/__/2.1/S2
Hall's meadow hawksbeard	*Crepis runcinata* ssp. *hallii*	__/__/2.1/S1S2
Ribbed cryptantha	*Cryptantha costata*	__/__/4.3/S3.3
Las Vegas cryptantha	*Cryptantha insolita*	__/__/Proposed?
Gilman's cymopterus	*Cymopterus gilmanii*	__/__/2.3/S2.2
Purple-nerve spring parsley	*Cymopterus multinervatus*	__/__/2.2/S2
Panamint daisy	*Enceliopsis covillei*	__/__/1B.2/S2?/S
Ash Meadows daisy	*Enceliopsis nudicaulis* var. *corrugata*	__/**FT**/3.3/S1/S
Torrey's joint-fir	*Ephedra torreyana*	__/__/2.1/S1
Harwood's eriastrum	*Eriastrum harwoodii*	__/__/1B.2/S3/S
White-flowered rabbitbrush	*Ericameria albida*	__/__/4.2/S3.2
Narrow-leaved yerba santa	*Eriodictyon angustifolium*	__/__/2.3/S2?
Pahrump Valley buckwheat	*Eriogonum bifurcatum*	__/__/1B.2/S3/S

Reveal's buckwheat	*Eriogonum contiguum*	__/__/2.3/S2/S
Robust Hoffmann's buckwheat	*Eriogonum hoffmannii* var. *robustius*	__/__/1B.3/S2.3
Juniper sulphur-flowered buckwheat	*Eriogonum umbellatum* var. *juniporinum*	__/__/2.3/S1S2
Hairy erioneuron	*Erioneuron pilosum*	__/__/2.3S2S3
Copperwort	*Euphrosyne acerosa* (syn=*Iva acerosa*)	__/__/4.2/S3.2
Hot springs fimbristylis	*Fimbristylis thermalis*	__/__/2.2/S2.2
Kingston Mountains bedstraw	*Galium hilendiae* ssp. *kingstonense*	__/__/1B.3/S2.3/S
Desert bedstraw	*Galium proliferum*	__/__/2.2/S2
Golden-carpet gilmania	*Gilmania luteola*	__/__/1B.3/S2
Ash Meadows gumplant	*Grindelia fraxinipratensis*	__/**FT**/1B.2/S2/S
Prickle-leaf	*Hecastocleis shockleyi*	__/__/3/S3S4
Kingston Mountains ivesia	*Ivesia patellifera*	__/__/1B.3/S1.3/S
Cooper's rush	*Juncus cooperi*	__/__/4.3/S3.3
Depressed standing-cypress	*Loeseliastrum depressum*	__/__/4.3/S3?
Inyo blazing star	*Mentzelia inyoensis*	__/__/1B.3/S2.3/S
Wing-seed blazing star	*Mentzelia pterosperma*	__/__/2.2/S1.2
Spiny-hair blazing star	*Mentzelia tricuspis*	__/__/2.1/S2
Red four-o'clock	*Mirabilis coccinea*	__/__/2.3/S2
Utah mortonia	*Mortonia utahensis*	__/__/4.3/S3
crowned muilla	*Muilla coronata*	__/__/4.2/S3.2?
Amargosa nitrophila	*Nitrophila mohavensis*	**SE**/**FE**/1B.1/S1/S
Cave evening-primrose	*Oenothera cavernae*	__/__/2.1/S1
Beaver dam breadroot	*Pediomelum castoreum*	__/__/1B.2/S2
Spiny cliff-brake	*Pellaea truncata*	__/__/2.3/S2
Two-color beardtongue	*Penstemon bicolor* ssp. *bicolor*	__/__/Proposed?
Rosy two-toned beardtongue	*Penstemon bicolor* ssp. *roseus*	__/__/1B.1/S1
Armagosa beardtongue	*Penstemon fruticiformis* var. *amargosae*	__/__/1B.3/S2.3/S
Stephen's beardtongue	*Penstemon stephensii*	__/__/1B.3/S2/S
Utah beardtongue	*Penstemon utahensis*	__/__/2.3/S2
Desert rock daisy	*Perityle megalocephala* var. *intricata*	__/__/CBR
Death valley sandpaper plant	*Petalonyx thurberi ssp. gilmanii*	__/__/1B.3/S2.3
Spine-noded milk-vetch	*Peteria thompsoniae*	__/__/2.3/S1.3?
Sky-blue phacelia	*Phacelia coerulea*	__/__/2.3/S1.3
Clarke phacelia	*Phacelia filiae*	__/__/Proposed?
Death Valley round-leaved phacelia	*Phacelia mustelina*	__/__/1B.3/S1.3/S
Parish's phacelia	*Phacelia parishii*	__/__/1B.1/S1/S
Goodding's phacelia	*Phacelia pulchella* var. *gooddingii*	__/__/2.3/S2
Lobed ground-cherry	*Physalis lobata*	__/__/2.3/S1.3?
Desert popcorn-flower	*Plagiobothrys salsus*	__/__/2.2/S1.2?
Notch-beaked milkwort	*Polygala heterorhyncha*	__/__/S1.3?
Death Valley sage	*Salvia funerea*	__/__/4.3/S3.3
Johnson's bee-hive cactus	*Sclerocactus johnsonii*	__/__/2.2/S2.2

Desert wing-fruit	*Selinocarpus nevadensis (syn.= Acleisanthes nevadensis)*	__/__/2.3/S1
Desert winged-rockcress	*Sibara deserti*	__/__/4.3/S3.3
Rusby's desert-mallow	*Sphaeralcea rusbyi* var. *eremicola*	__/__/1B.2/S2/S
Small-flowered rice grass	*Stipa divaricata* (syn=*Piptatherum micranthum*)	__/__/2.3/S2S3
Small-flowered sand-verbena	*Tripterocalyx micranthus*	__/__/2.3/S1.3
Plummer's woodsia	*Woodsia plummerae*	__/__/2.3/S1.3?

Status Codes: [1]

Federal: **FE** = Federally listed endangered: species in danger of extinction throughout a significant portion of its range
FT = Federally listed, threatened: species likely to become endangered within the foreseeable future

State **SE** = State listed as endangered: native species or subspecies in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, over-exploitation, predation, competition, or disease.
ST = State listed as threatened: native species or subspecies that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by this chapter.
SC = State Candidate: that the commission has formally noticed as being under review by the department for addition to either the list of endangered species or the list of threatened species, or a species for which the commission has published a notice of proposed regulation to add the species to either list.
SR = State listed Rare: although not presently threatened with extinction, it is in such small numbers throughout its range that it may become endangered if its present environment worsens.

California Rare Plant Rank (CRPR)(formerly CNPS List)
In March, 2010, DFG changed the name of "CNPS List" or "CNPS Ranks" to "California Rare Plant Rank" (or CRPR). This was done to reduce confusion over the fact that CNPS and DFG jointly manage the Rare Plant Status Review groups (300+ botanical experts from government, academia, NGOs and the private sector) and that the rank assignments are the product of a collaborative effort and not solely a CNPS assignment. The old name gave the false impression that CNPS solely assigned the ranks and had excessive influence on the regulatory process. We did this in consultation and agreement with the CNPS Executive Director and the CNPS Board of Directors. Nothing about the actual process of rare plant review or rank assignment has changed and the same committee of experts from many organizations in addition to DFG and CNPS still review each change and ultimately assign the ranks.

1B = Rare, threatened, or endangered in California and elsewhere
2 = Rare, threatened, or endangered in California but more common elsewhere
3 = Plants which need more information
4 = Limited distribution – a watch list
CBR = Considered But Rejected
0.1 = Seriously threatened in California (high degree/immediacy of threat)
0.2 = Fairly threatened in California (moderate degree/immediacy of threat)
0.3 = Not very threatened in California (low degree/immediacy of threats or no current threats known)

CNDDB Element Rank (NatureServe State Rank)
The state rank (S-rank) is assigned much the same way as the global rank, but state ranks refer to the imperilment status only within California's state boundaries.

S1 = Critically Imperiled—Critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province.
S2 = Imperiled—Imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province.
S3 = Vulnerable—Vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
S4 = Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.
S5 = Secure—Common, widespread, and abundant in the state.

Bureau of Land Management (BLM)
S = BLM Sensitive; Species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA. BLM Sensitive species also include all Federal Candidate species and Federal Delisted species which were so designated within the last 5 years and CNPS List 1B plant species that occur on BLM lands.

Special-status Wildlife Species Definition

From the CDFG Special Animals List (CNDDB 2011) "*Special Animals"* is defined as a general term that refers to all of the taxa the CNDDB is interested in tracking, regardless of their legal or protection status. This list is also referred to as the list of "species at risk" or "special-status species". The Department of Fish and Game considers the taxa

on this list to be those of greatest conservation need. The species on this list generally fall into one or more of the following categories:

- Officially listed or proposed for listing under the State and/or Federal Endangered Species Acts;
- State or Federal candidate for possible listing;
- Taxa which meet the criteria for listing, even if not currently included on any list, as described in Section 15380 of the California Environmental Quality Act Guidelines. (More information on CEQA is available at http://ceres.ca.gov/topic/env_law/ceqa/guidelines/;
- Taxa considered by the Department to be a Species of Special Concern (SSC);
- Taxa that are biologically rare, very restricted in distribution, declining throughout their range, or have a critical, vulnerable stage in their life cycle that warrants monitoring. There may be taxa that fall into this category but are not included on this list because their status has not been called to our attention;
- Populations in California that may be on the periphery of a taxon's range, but are threatened with extirpation in California;
- Taxa closely associated with a habitat that is declining in California at an alarming rate (e.g., wetlands, riparian, old growth forests, desert aquatic systems, native grasslands, vernal pools, etc.);
- Taxa designated as a special-status, sensitive, or declining species by other state or federal agencies, or non-governmental organization (NGO).

Biological Resources Table 4 identifies the special-status wildlife that were reported to occur, or potentially occur within ten miles of the proposed project area, based on surveys, and searches of the California Natural Diversity Database (CNDDB 2012).

Biological Resources Table 4
Special-status Wildlife Known to Occur
or Potentially Occurring in the HHSEGS Area

Common Name	*Scientific Name*	Status[1] State/Fed/BLM
Insects		
Death Valley Agabus diving Beetle	*Agabus rumppi*	C2/__/__
Death Valley June beetle	*Polyphylla erratica*	SC/__/__
Amargosa naucorid bug	*Pelocoris shoshone*	SC/__/__
Carole's silverspot	*Speyeria zerene carolae*	FE/__/__
Fish		
Amargosa pupfish	*Cyprinodon nevadensis amargosae*	CSC __/ S/__
Pahrump poolfish	*Empetrichthys latos latos*	/_ FE _/__
Amargosa Canyon speckled dace	*Rhinichthys osculus ssp. 1*	__/CSC/__
Reptiles		
Desert tortoise	*Gopherus agassizii*	ST/FT/__
Banded Gila monster	*Heloderma suspectum cinctum*	__/SC/S
Birds		
Purple martin	*Progne subis*	CSC/__/__

Prairie falcon	*Falco mexicanus*	WL/_/CSC
Northern Harrier	*Circus cyaneus*	__/CSC/__
Western Burrowing owl	*Athene cunicularia hypugaea*	CSC/FSC/__
Short-eared owl	*Asio flammeus*	CSC/__/__
Golden eagle	*Aquila chrysaetos*	FP/BCC/__
Northern harrier	*Circus cyaneus*	CSC /__/__
Vaux's swift	*Chaetura vauxi*	CSC/__/__
Western yellow-billed cuckoo	*Coccyzus americanus occidentialis*	FPE/SE/__
Prairie falcon	*Falco mexicanus*	WL//SC
Gray-headed junco	*Junco hyemalis caniceps*	WL/FSC/__
Loggerhead shrike	*Lanius ludovicianus*	CSC/FSC/__
Brown-crested flycatcher	*Myiarchus tyrannulus*	__/CSC/__
Phainopepla	*Phainopepla nitens*	__/__/
Hepatic tanager	*Piranga flava*	WL/__/__
Summer tanager	*Piranga rubra*	CSC/__/__
Vermilion flycatcher	*Pyrocephalus rubinus*	CSC/__/
Brewer's sparrow	*Spizella breweri*	__/BCC/__
Bendire's thrasher	*Toxostoma bendirei*	CSC/BCC/S
Crissal thrasher	*Toxostoma crissale*	CSC/BCC/__
Le Conte's thrasher	*Toxostoma lecontei*	WL/BCC/S
Virginia's warbler	*Vermivora virginiae*	WL/BCC/__
Least Bell's vireo	*Vireo bellii pusillus*	FE**/SE/__
Gray vireo	*Vireo vicinior*	CSC/BCC/S
Mammals		
Townsend's big-eared bat	*Corynorhinus townsendii*	CSC/__/S
Pallid bat	*Antrozous pallidus*	CSC/__/S
Long-legged myotis	*Myotis volans*	CSC/__/__
Mexican free-tailed bat	*Tadarida brasiliensis*	CSC/__/__
California myotis	*Myotis californicus*	__/__/__
Big brown bat	*Eptesicus fuscus*	__/__/__
Western pipistrelle=Parastrelle	*Parastrellus hesperus*	__/__/__
Western small-footed myotis	*Myotis ciliolabrum*	__/__/S
Amargosa vole	*Microtus californicus scirpensis*	FE/SE/_
Kingston Mountain chipmunk	*Neotamias panamintinus acrus*	__/__/S
Nelson's bighorn sheep	*Ovis canadensis nelsoni*	__/__/S
American badger	*Taxidea taxus*	CSC/__/__
Kit fox	*Vulpes macrotis*	FM/__/__

Status Codes:

Federal: FE - Federally listed endangered: species in danger of extinction throughout a significant portion of its range
FT - Federally listed, threatened: species likely to become endangered within the foreseeable future
BCC: Fish and Wildlife Service: Birds of Conservation Concern: Identifies migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent highest conservation priorities <www.fws.gov/migratorybirds/reports/BCC2002.pdf>
**: USFWS Migratory non-game birds of management concern

State CSC = California Species of Special Concern. Species of concern to CDFG because of declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction.
SE - State listed as endangered
ST = State listed as threatened

WL = State watch list
FM: Protected furbearing mammal

BLM: Sensitive: Bureau of Land Management

BLM Manual §6840 defines sensitive species as"…those species that are (1) under status review by the FWS/NMFS; or (2) whose numbers are declining so rapidly that Federal listing may become necessary, or (3) with typically small and widely dispersed populations; or (4) those inhabiting ecological refugia or other specialized or unique habitats." www.blm.gov/ca/pdfs/pa_pdfs/biology_pdfs/SensitiveAnimals.pdf

Special-status Plants

No state or federally listed plant species occur within the project area, but 11 special-status plant species were found onsite that have a California Rare Plant Rank (CRPR, formerly CNPS List) of 1B or 2. The ranks are assigned under a collaborative effort between CDFG, CNPS, and the Rare Plant Status Review groups.

Plants with a California Rare Plant Rank of 1B are rare throughout their range with the majority of them endemic to California. Most of the plants that are ranked 1B have declined significantly over the last century.

Except for being common beyond the boundaries of California, plants with a California Rare Plant Rank of 2 would have been ranked 1B. From the federal perspective, plants common in other states or countries are not eligible for consideration under the provisions of the Endangered Species Act. Until 1979, a similar policy was followed in California. However, after the passage of the Native Plant Protection Act in 1979, plants were considered for protection without regard to their distribution outside the state.

From the *Inventory of Rare and Endangered Plants of California* (CNPS 2012)

> "With California Rare Plant Rank 2, we recognize the importance of protecting the geographic range of widespread species. In this way we protect the diversity of our own state's flora and help maintain evolutionary processes and genetic diversity within species. All of the plants constituting California Rare Plant Rank 2 meet the definitions of Sec. 1901, Chapter 10 (Native Plant Protection Act) or Secs. 2062 and 2067 (California Endangered Species Act) of the California Department of Fish and Game Code, and are eligible for state listing. It is mandatory that they be fully considered during preparation of environmental documents relating to CEQA."

The applicant conducted extensive offsite surveys to determine if the special-status plants found onsite were more common than previously known; the area is generally under-surveyed and several species had only recently been added to the California Natural Diversity Database (CNDDB 2012) and the California Native Plant Society *Inventory of Rare and Endangered Plants of California* (CNPS 2012). The effort included surveys in the following areas: Pahrump Valley, Stewart Valley, Chicago Valley, California Valley, the Ash Meadows area, Shadow Valley (north and south of I-15), Mesquite Valley, Mesquite Mountains, southern Nopah Range, Kingston Wash, Silurian Valley, Salt Spring Hills, Dumont Dunes area, and the Shoshone- Tecopa area. Many additional previously undocumented occurrences were found of several species, particularly the Pahrump valley buckwheat; however, no or few new occurrences were found for most of the 11 species.

The status, distribution, range and habitat preferences of the special-status plant species found onsite are described below. The CNDDB Element Rank (formerly NatureServe rank) is also provided in the species accounts below. The CNDDB Element Rank is an index of extinction risk within the state based on an internationally recognized methodology (Master et al. 2009). The numeric rank reflects several factors of rarity, threats, and population trend, which are scored and weighted, and include: range & extent; area of occupancy; population size; number of occurrences; number of occurrences or percent area with good viability/ecological integrity; environmental specificity; long- and short-term trend; threats (severity, scope, impact, and timing); intrinsic vulnerability, and other considerations (*ibid.*).

The rank definitions are provided below, as summarized in CDFGs *Special Plants List* (CNDDB 2012b).

> **S1** = *Critically Imperiled* — Critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province;
>
> **S2** = *Imperiled* — Imperiled in the state because of rarity due to very restricted range, very few populations(often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province;
>
> **S3** = *Vulnerable* — Vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation;
>
> **S4** = *Apparently Secure* — Uncommon but not rare; some cause for long-term concern due to declines or other factors;
>
> **S5** = *Secure* — Common, widespread, and abundant in the state.

CNDDB re-assessed and updated all the Element Ranks for each of the 11 species to reflect all new occurrence data, including new occurrences found by the applicant during the spring 2012 surveys.

Small-flowered androstephium (*Androstephium breviflorum)*

Small-flowered androstephium is a perennial herb (bulb) with a California distribution represented by over 100 occurrences in Riverside and San Bernardino counties. Due to the project's survey efforts, it is now also documented in Inyo County. It has been on the CNPS Inventory since 1974 and has a CRPR rank of 2, meaning it is rare, threatened, or endangered in California but more common outside California. It has a CNDDB Element Rank of S2S3, meaning the numeric rank is somewhere between an S2 and S3 rank (see definitions above).

Small-flowered androstephium also occurs in Arizona, Nevada, Utah, Wyoming, Colorado, and New Mexico. It blooms March to April in dry, loose sandy to rocky soils and on sand dunes and alluvial fans from about 700 to 4,800 feet elevation.

This species was mapped along the eastern half of the project site and in the 250-foot buffer along the California-Nevada border in Mojave Desert scrub habitat. The applicant

also found new occurrences offsite in southern Pahrump Valley and California Valley. Many new occurrences have been found in recent years and the project area includes only a very small portion of its total distribution in California. Some occurrences are threatened by solar energy development (CNPS 2012).

During the spring 2012 offsite surveys suitable habitat was found and surveyed but no additional occurrences of small-flowered androstephium were found.

Nye milk-vetch (*Astragalus nyensis)*

Nye milk-vetch was not known to occur in California until it was discovered onsite during the project surveys. During the 2011 offsite surveys, additional new occurrences were found offsite in southern and central Pahrump Valley, and a single individual found in Stewart Valley. Four new occurrences were found in Nevada. Larger occurrences were found north and south of the site. A total of 19 occurrences are now documented in California, one of which occurs on the project site.

Nye milk-vetch was added to the CNPS Inventory in December 2011. It has a CNDDB Element Rank of S1 and a CRPR Rank of 1B.1. In Nevada, this annual species occurs in the foothills of desert mountains on calcareous outwash fans and gravelly flats, sometimes in sandy soils or alkaline soils from 1,500 to 5,600 feet elevation. According to the Nevada Natural Heritage Program (NNHP 2010a), there are documented occurrences of Nye milk-vetch in Nye, Clark, and Lincoln counties, Nevada. Nye milk-vetch also occurs in Utah. In the project area, it was mapped in Mojave Desert scrub along the eastern half of the project site in the 250-foot buffer paralleling the California-Nevada border, and at several locations along the transmission line corridor in Nevada that would serve the project.

During spring 2012 offsite surveys, no additional occurrences of Nye milk-vetch were found; however, the applicant noted precipitation was well below normal for the season.

Preuss' milk-vetch (*Astragalus preussii* var. *preussii)*

Preuss' milk-vetch is a perennial herb now known from seven occurrences in Inyo and San Bernardino counties, two of which occur on the project site. There are two additional historic collections, including one in Panamint Valley that has not been observed since 1937. Preuss' milk-vetch is a CRPR List 2.3; it was added to the CNPS Inventory in 1988. Prior to the project surveys, it was known in California from only three locations: the Mesquite Lake and Mesquite Valley areas in San Bernardino County, and northwest of Panamint Valley in Inyo County (CCH 2012).Seven individuals were mapped on the project site during 2011 surveys and two additional localities of Preuss' milk-vetch, each consisting of a few plants, were found onsite near the eastern site boundary during 2012 surveys.

During the 2011 offsite surveys, Preuss' milk-vetch was found in several new locations in Inyo County and along the transmission line corridor in Nevada. In addition, during spring 2012 offsite surveys, one new occurrences of Preuss' milk-vetch was mapped in Mesquite Valley, representing approximately 20,000 plants. A new, but considerably smaller occurrence was mapped in Pahrump Valley. Preuss' milk-vetch also occurs in Arizona and Utah (CNPS 2012).

Preuss' milk-vetch grows in openings in shadscale scrub or Mojave Desert scrub, often in clayey or silty soils, between 2,460 to 2,560 feet elevation. Based on observations of *Astragalus* spp. fruits on the windward side of shrubs, the inflated, papery fruits of some *Astragalus* species may likely be dispersed by wind and also moved in washes when they are flowing.

Gravel milk-vetch (*Astragalus sabulonum)*

Gravel milk-vetch is an annual to short-lived perennial herb that blooms February to June in the eastern Mojave and Sonoran Deserts. Its range in California is restricted to Imperial, Riverside, San Diego, and Inyo counties. No new occurrences were found in Nevada during the surveys of the transmission alignment. In Arizona, Nevada, New Mexico, Utah, and Sonora, Mexico it is reported to also grow as a perennial, and occur in different habitats (Silverman pers. comm. 2012); in California it grows as an annual. It is most often found on sandy sites from 200 to 3,050 feet elevation. Gravel milk-vetch was mapped in Mojave scrub habitat near the center of the project site and along the southeastern portion as well as the 250-foot buffer paralleling the California-Nevada border. Offsite, it was also found in southern Pahrump Valley.

Gravel milk-vetch has a CNDDB Element Rank of S2, and a CRPR Rank of 2.2. It did not have conservation status at the time that the 2011 HHSEGS site survey, the offsite surveys, and the transmission corridor surveys were conducted; consequently, there were no focused surveys for the species in the earlier surveys. It was detected because the surveys were floristic; all species were identified to a level necessary to detect new or rare species, if present. Gravel milk-vetch was added to the CNPS Inventory in October 2011. It is now documented in California from eight recent occurrences, including four on the project site and one extirpated occurrence in the Coachella Valley. There are 11 additional historic occurrences in Calexico, Blythe, the Salton Sea basin, and Coachella Valley that have not been observed within the last 20 years.

No additional occurrences of gravel milk-vetch were found during the spring 2012 offsite surveys.

Tidestrom's milk-vetch (*Astragalus tidestromii)*

Tidestrom's milk-vetch is a perennial herb that blooms April to July on gravelly limestone slopes from 1,968 to 5,200 feet elevation in the San Bernardino, Clark, Kingston, and Ivanpah mountains of San Bernardino County. It has also been found in sandy washes and sandy-silty substrates in valley bottoms in Mojave Desert scrub. Tidestrom's milk-vetch has a CNDDB Element Rank of S2, and a CRPR Rank of 2.2. It also occurs in the Spring Mountains and other locations in Nevada. On the project site, it occurs predominantly in Mojave Desert scrub on the eastern half of the project site and in the adjacent 250-foot buffer paralleling the California-Nevada border.

During the 2011 project surveys, several new occurrences were found in Inyo County and along Tecopa Road in the project's proposed transmission corridor in Nevada. The applicant reports that it can be locally common on roadsides and grows along unpaved, infrequently used roads. Offsite surveys in 2012 mapped approximately 10 new localities of Tidestrom's milk-vetch in Shadow Valley, the Mesquite Mountains, and other locations. It was also found in southern and central Pahrump Valley and California

Valley. It can be misidentified with *Astragalus layneae*; many of the UC Riverside specimens for Layne's milk-vetch were misidentified specimens of Tidestrom's milk-vetch (HHSEGS 2011a, Appendix 5-2G), to which it resembles but differs in several fruit characters. A specimen of *Astragalus layneae* collected in 1991 on Santa Rosa Flat in Inyo County by Mary DeDecker (UCR141695) was recently annotated to *Astragalus tidestromii* by the U.C. Riverside herbarium Director (Andrew Sanders) (Consortium of California Herbaria 2012). This occurrence is distant from others known in Inyo County, and it may constitute an additional new CNDDB occurrence.

It was added to the CNPS Inventory in January 2009 and now has 59 documented occurrences, including two on the project site, and eight historical occurrences that have not been observed in 20 years or more. It is reported to be threatened by solar energy development, mining, road maintenance, and non-native plants (CNPS 2012).

Wheeler's skeletonweed (*Chaetadelpha wheeleri*)

Wheeler's skeletonweed is a perennial herb with a California range represented by 28 documented occurrences in Inyo, Lassen, and Mono Counties, five of which occur on the project site. Seven additional historic collections are documented in Eureka Valley, the foothills of the White Mountains, and Benton and Chalfant valleys in Mono County. Wheeler's skeletonweed has a CRPR Rank of 2.2; it also occurs in Nevada and Oregon. It has a CNDDB Element Rank of S1S2, meaning the numeric rank calculated somewhere between an S1 and S2 rank (see rank definitions in the introduction to this subsection).

Wheeler's skeletonweed occurs in sandy soils on desert dunes, Mojave Desert scrub, and Great Basin scrub from 2,788 to 6,234 feet elevation. Seeds are of Aster family species are ordinarily dispersed intact with the fruiting body (cypsela). Wind dispersal is common (anemochory), assisted by a hairy pappus. Another common dispersal agent is epizoochory, in which the dispersal unit sticks to the fur or plumage of an animal by hooks or barbs.

Wheeler's skeletonweed was added to the CNPS Inventory in January 2001. Prior to the project surveys, it was known in California mainly from the Death Valley region, and the nearest known occurrence to the project site was approximately 50 miles north (CCH 2012).

During 2011 surveys, Wheeler's skeletonweed was found in sandy-gravelly soils in Mojave Desert scrub in the eastern portion of the site, and within the 250-foot buffer. Wheeler's skeletonweed was also found in several locations within the project's proposed offsite transmission line corridor. During offsite surveys conducted in 2011 for this project, Wheeler's skeletonweed was found in several additional new locations in southern Pahrump Valley. During offsite surveys in 2012, one new occurrence (represented by a single plant) was observed in the BLM Pahrump Valley Wilderness.

Purple-nerve spring parsley (*Cymopterus multinervatus)*

Purple-nerve spring-parsley is a perennial herb with 22 documented occurrences in Inyo and San Bernardino Counties, one of which occurs in the southeastern portion of the project site. There are also nine historic collections in and around Joshua Tree National

Park and the Mojave National Preserve. It was added to the CNPS inventory in November 2008. It is has a CRPR Rank of 2.2; this species also occurs in Nevada, Arizona, New Mexico, Utah, Texas, and Baja California. It has a CNDDB Element Rank of S2.

Purple-nerve spring-parsley blooms March to April in sandy or gravelly soils in Mojave Desert scrub and pinyon-juniper woodland from 2,067 to 5,906 feet elevation. Fruits of desert cymopterus are fairly large and do not seem well adapted for dispersal over long distances. Fruits generally seem to fall relatively close to the parent plant. However, the fruits have a marginal wing that may facilitate dispersal by wind (NatureServe 2010). A single individual was mapped in Mojave Desert scrub habitat near the northeastern corner of the proposed southern solar field. Prior to project surveys, the nearest known occurrence was about 25 miles south in the vicinity of Clark Mountain. No individuals of this species were observed within the 250-foot buffer but several additional new offsite occurrences were discovered during 2011 surveys in the Pahrump Valley in Inyo County, California, and in Nye County, Nevada.

During offsite surveys in 2012, reference sites for this species were checked, and no plants were observed. Suitable habitat for this species was surveyed in Shadow Valley and Pahrump Valley but no new occurrences were found.

Pahrump Valley buckwheat (*Eriogonum bifurcatum)*

Pahrump Valley buckwheat is abundant in the southern and western portion of the project site in shadscale scrub. Numerous individuals were found offsite in southern, central, and northern Pahrump Valley, Stewart Valley, and Chicago Valley during the 2011 offsite surveys.

Pahrump Valley buckwheat is a late summer/early fall blooming annual herb found in San Bernardino and Inyo Counties. This species also occurs in Nevada. It occurs in sandy soils in chenopod scrub vegetation from 2,296 to 2,657 feet elevation. The seeds of *Eriogonum* species are dispersed by wind, rain, streams, and animals (Stokes 1936). Due to their high oil content, the seeds float and are readily moved by sheet flow during heavy rains. Stokes (1936) also cites birds and vehicles as likely dispersal vectors, particularly for annual species of *Eriogonum*. Wind is an effective dispersal agent for many species of *Eriogonum*.

Pahrump Valley buckwheat is a BLM Sensitive species and a CRPR Rank 1B.2; it has a global distribution restricted to Pahrump, Stewart, Mesquite and Sandy valleys, but it is also locally abundant, and common near the project site. Population census information from Nevada (NNHP 2010a) report 18 occurrences in Nevada representing approximately 1,609 or more acres (*ibid.*). It has a CNDDB Element Rank of S3, reflecting its narrow range but local abundance (see the description below of new occurrences found during the 2012 surveys).

Pahrump Valley buckwheat was mapped during the October 2010 and October 2011 (late season) surveys and the spring 2011 survey within the site and in the 250-foot buffer. The offsite surveys in California and Nevada confirmed the existence of large populations of Pahrump Valley buckwheat in previously known locations and new locations in Stewart Valley, northern and southern Pahrump Valley, and Chicago Valley.

The Chicago Valley occurrence is on the west side of the Nopah Range and represents an extension of this species into a new watershed west of its previously known range.

During offsite surveys performed in 2012, 20 new occurrences of Pahrump Valley buckwheat, an annual species, representing approximately 7.3 million plants were mapped in Pahrump, Stewart, Chicago, California and Mesquite valleys. Some of the 54 new localities consist of very large populations with millions of individuals. The new occurrences found in California Valley are the first records for Pahrump Valley buckwheat from this valley. Large areas of potentially suitable habitat in the center of California Valley were not surveyed due to access limitations, and this species may also occur there.

During 2012 offsite surveys, one existing population, CNDDB Element Occurrence No. 9 could not be relocated and is believed to be a misidentification of a similar appearing buckwheat (*Eriogonum deflexum* var. *rectum)*.

Goodding's phacelia (*Phacelia pulchella* var. *gooddingii*)

Goodding's phacelia is an annual herb with 16 documented recent occurrences, one of which is on the project site, and three older historic occurrences. It has a CRPR Rank of 2.3 and a CNDDB Element Rank of S2. It occurs in Inyo and San Bernardino counties in California, and in Nevada, Arizona, and Utah. It inhabits clayey, often alkaline soils in Mojave Desert scrub from 2,624 to 3,281 feet elevation. Goodding's phacelia has been on the CNPS inventory since 1994. Prior to the project surveys, it was known in California only from Mesquite Valley and Salsberry Pass in the Amargosa Mountains, south of Death Valley.

Within the study area, Goodding's phacelia is widespread and abundant. It was observed in Mojave Desert scrub and shadscale scrub in silty to sandy-gravelly soil and on gravelly flats onsite and in the 250-foot buffer. Goodding's phacelia was also found in a number of locations along the transmission line corridor in Nevada that would service the project, and at several additional new offsite locations in California in central Pahrump Valley, Stewart Valley, Chicago Valley, and California Valley. No new occurrences were found during the 2012 surveys.

Desert Wing-Fruit (*Acleisanthes nevadensis*)

Desert wing-fruit is a perennial herb that was previously known in California from a single location in Mesquite Valley near the California-Nevada border in Inyo County. Desert wing-fruit has a CRPR Rank of 2.2; it also occurs in Nevada, Arizona, and Utah. It blooms June to September and occurs in typically rocky soils in Mojave Desert scrub and Joshua tree woodland habitats from 3,805 to 4,100 feet elevation. It has been on the CNPS Inventory since 1984. Note that "*Selinocarpus"* (the former name) was recently changed to *Acleisanthes;* the name *Selinocarpus* still appears in some databases.

Seven new occurrences were found in California during the surveys of the project site, one of which occurs in the southwestern portion of the project site in both shadscale scrub and Mojave Desert scrub habitats. No individuals of this species were observed in the 250-foot buffer but several new occurrences were found along the proposed

transmission line corridor in Nevada that would serve the project. During offsite surveys conducted in 2011, desert wing-fruit was found in several new locations in southern and central Pahrump Valley in Inyo County, and along Excelsior Mine Road in San Bernardino County. Five new occurrences were found offsite in 2012.

Torrey's joint-fir (*Ephedra torreyana*)

Torrey's joint-fir is an evergreen shrub that grows from Texas south to Chihuahua, Mexico, and as far west as California's Great Basin Desert (NatureServe 2011). It was not known to occur in California until it was found in Inyo County in the silty soils northwest of the project in May of 2011. It was added to the CNPS inventory on February 8, 2012. It has a CRPR Rank of 2.1, and a CNDDB Element Rank of S1. Torrey's joint-fir is also found in Arizona, Colorado, Nevada, New Mexico, Texas and Utah, and is not ranked in any of those states (NatureServe 2012).

Five occurrences of Torrey's joint-fir were recorded in California on BLM lands along the California-Nevada border during the project surveys in 2011. A total of seven new occurrences of Torrey's joint-fir were mapped in 2012, including occurrences onsite in the southwest quarter of the site, near the eastern boundary, and offsite in Pahrump Valley. Suitable habitat in Stewart Valley, Mesquite Valley, Chicago Valley, California Valley and the Amargosa Valley/Ash Meadows areas were surveyed in spring 2012 but no new occurrences were found.

E*phedra* with dry, winged cone bracts are dispersed by wind (*E. torreyana* and *E. trifurca*); those with small, dry cone bracts and large seeds are dispersed by seed-caching rodents (e.g., *E. viridis* and *E. californica*) (Hollander, Wall & Baguley 2009).

Groundwater-dependent Ecosystems

Groundwater-dependent ecosystems (GDEs) are an important component of biological diversity in a desert region. Because they are rare or limited in distribution, they often support rare or special-status plants and animals. All GDEs depend upon groundwater for all or part of their survival. Characteristic GDEs include playa margin habitats, such as alkali sink scrubs and some saltbush scrubs, seeps and springs, spring pools, mesquite woodlands, riparian or "microphyll" woodlands, desert wash scrubs dominated by phreatophytes, palm oases, alkali meadows, and spring mounds.

GDEs are dominated or defined by "phreatophytes". Phreatophytes have deep roots that extend down to, and extract water from a periodically stable water supply, including the capillary fringe, *i.e.*, the zone just above the water table that is not completely saturated, where water is lifted up by capillary action, or surface tension (Brown et al 2007). Even though the groundwater may never be visible at the ground surface, as it is in a wetland or spring, phreatophytic ecosystems can still be groundwater-dependent (Naumberg et al 2005).

The use of groundwater may not be year-round by phreatophytes. In these instances, other water sources are used during the rainy season but groundwater is used in the dry season (Froend & Loomes 2004). In the project vicinity, for example, phreatophytes may utilize precipitation, stormwater runoff, or temporary ponding during storm events, but use and depend on groundwater the remainder of the year.

No GDEs occur on the project site, with the exception of a few widely scatted honey mesquite shrubs. The applicant documented approximately 4,000 acres of mesquite-dominant habitats *offsite* within an approximate five-mile radius of the project (CH2 2011g, Figure DR48-1; **Biological Resources Figure 1**). All of these occur in Nevada with the exception of a small area of mesquite and the non-native salt cedar along Stump Springs Wash in California. The nearest mesquite woodlands in California are located approximately 13 to 20 miles west of the project in the Tecopa area.

Other known phreatophytes documented to occur in the project vicinity during the surveys of the one-mile buffer include four-wing saltbush (*Atriplex canescens*), a common associate of the mesquite in the dune areas; allscale (*A. polycarpa*); bush seep-weed (*Suaeda moquinii*); desert baccharis (*Baccharis sergiloides*), and alkali goldenbush (*Isocoma acradenia*). With the exception of the mesquite, these are "facultative" phreatophytes.

Obligate versus Facultative Phreatophytes

Desert phreatophytes are a complex group of species with varied adaptive mechanisms to tolerate or avoid drought. They should not be considered simply as a group of species that avoid desert water stress by utilizing deep ground water unavailable to other desert species (Nilsen et al 1984). There are two types of phreatophytes:

1) *Obligate phreatophytes* are deep rooted plants that only inhabit areas where they can access groundwater, via the capillary fringe, to satisfy at least some proportion of their environmental water requirement. Access to groundwater is critically important to their presence in a landscape. Mesquite are facultative phreatophytes in regions of higher rainfall (Arizona, New Mexico, etc.) but in California and Nevada they are considered obligate phreatophytes.

2) Facultative phreatophytes are deep rooted plant species that tap into groundwater, via the capillary fringe, to satisfy at least some portion of their environmental water requirement, but will also inhabit areas where their water requirements can be met by soil moisture reserves alone. That is, the species will be groundwater dependent in some environments, but not in others.

Characteristics of the Groundwater Basin that Supports the GDEs

The groundwater resources of the project area are located within the Pahrump Valley groundwater basin, one of several smaller basins that overlie the deeper and more laterally extensive regional aquifer known as the Death Valley Regional Flow System (DVRFS). Groundwater flow in the DVRFS is composed of several interconnected, complex groundwater flow systems (Belcher & Sweetkind 2010); groundwater flow occurs in relatively shallow and localized flow paths (herein referred to as the "local aquifer" or "local basin") underlain by the deeper, regional flow paths (the "regional aquifer"). Regional groundwater flow is predominantly through a thick Paleozoic carbonate rock sequence (also referred to as the *carbonate aquifer*). The regional aquifer sustains numerous springs, primarily in adjacent basins, such as the Amargosa Valley to the west, that are home to many threatened and endangered species.

Pahrump Valley is a topographically closed bi-state basin bounded by the Spring Mountains, Nopah ranges, and the Kingston Range). The 650 square mile basin is filled with alluvium to a depth of about 2,000 feet. Groundwater associated with the Pahrump Valley basin-fill aquifer – the aquifer from which the project will pump groundwater -- supports a 9,000-acre system of groundwater-dependent mesquite woodlands, seasonal and permanent seeps and springs.

The aquifers are affected by complex geologic structures from faulting and fracturing that can enhance or impede flow (*ibid.*). The DVRFS regional groundwater flow system includes several large valleys that contain playas that act as catchments for surface water runoff. Some of the playas (former Pleistocene lakes) have been deformed by Quaternary faulting and contain springs where groundwater is forced to the surface by juxtaposed lake and basin-fill deposits (Belcher & Sweetkind 2010).

In the project area, the “Stateline Fault”, also known as the “Pahrump-Stewart Valley Fault Zone” runs parallel to the California-Nevada state line and appears to divide the Pahrump Valley into two groundwater sub-basins (see **WATER SUPPLY Figure 2**). In the northwest, limited water levels measured in basin-fill aquifer wells suggest that the fault zone does not impede groundwater flow through that portion of the valley (Comartin, 2010). In the southwest, where the project site is located, the fault may impede groundwater flow from the Spring Mountains west across the fault into the project area. However, it is likely that the fault represents a partial barrier to flow; not a complete barrier (belcher pers. comm.).

The mesquite woodlands and coppice dunes east of the project are arranged linearly along or within the fault zone; no mesquite habitats are located west of the fault, with the exception of a few small stands around Pahrump Playa and along a few of the dry washes that intercept the dunes and extend west toward or into the project area.

The basin-fill aquifer is the primary groundwater supply and the sole source of water for Pahrump Valley; very few wells tap the deeper, regional aquifer (HHSEGS 2011a, Appendix 5.15D). Approximately 10,000 groundwater wells in Pahrump Valley pump from the basin-fill aquifer (Comartin 2010).

Seeps and Springs

Seven active or recently active springs are documented to occur within five miles of the project area: Brown’s Spring, Monica Spring, Cottonwood Spring, Mound Spring, Hidden Hills Ranch Spring, Stump Spring, and a fifth unnamed spring (USGS 2012; Malmberg 1967; Harrill 1986; Poff pers. comm. 2012). Manse Spring and several other large and small springs occur just beyond the five-mile radius study area. Malmberg (1967), Harrill (1986), and others indicate that most or all of these springs ceased to flow as a result of heavy groundwater pumping during the last century.

BLM reports that Stump Spring is discharging and supports three shallow, seasonal pools that range between 30 and 70 feet long, and one to two feet deep (Poff pers. comm.). BLM Southern Nevada District hydrologist conducted a reconnaissance-level survey in May 2012 to determine if there were any additional active seeps or springs that could potentially be affected by the project pumping. BLM found that three active *seasonal* seeps within an approximate five-mile radius of the project. Two of these

supported healthy wetland-riparian vegetation; the third spring appears to have at least minor intermittent flow that was significantly greater historically. Other sites were suspected to contain seeps or springs, based on aerial photo signatures or documented historic spring sites, but were not ground-truthed or re-visited because they occur on private land (Poff 2012).

Geographic Scope of the Analysis

Groundwater in the local Pahrump Valley basin aquifer is recharged from the Spring Mountains, located 13 miles east in Nevada. Groundwater in Pahrump Valley that is not discharged in the valley (e.g., through springs or playas) is believed to flow southwest through the Nopah Mountains into basins at lower elevations (HHSEGS 2011a, Appendix 5.15D; Belcher & Sweetkind 2010).

The focus of staff's groundwater analysis is the basin-fill aquifer from which the project will pump groundwater for mirror-washing, boiler make-up, and construction needs, and the cone of depression (drawdown zone) surrounding the project wells (see the **Water Supply** section of the FSA). The hydraulic connections and effects of groundwater pumping on flow paths between Pahrump Valley, the Amargosa River, and more distant springs supported by discharge from the deeper, more laterally extensive carbonate aquifer (or regional aquifer) are not well understood. Although the applicant has stated that project pumping will not affect the Amargosa River or the groundwater-dependent resources of area springs (CH2 2011f, DR-82), the applicant's groundwater assessment acknowledges that the hydrogeology of the Pahrump Valley groundwater basin is complex and the project site's connectivity to the larger basin is not fully understood (HHSEGS 2011a). The groundwater assessment adds that the project's use of groundwater may result in offsite impacts on existing domestic pumpers south of the project site and potentially throughout the larger groundwater basin (HHSEGS 2011a, Section 5.15). Therefore, the geographic scope of this analysis also includes a discussion of more distant groundwater-dependent species and habitats connected to or supported by the larger, regional groundwater basin (DVRFS). Water Resources staff analysis of impacts to local groundwater resources, and the Amargosa River, located 20 miles west, is contained in the **Water Supply** section of this FSA.

Local Groundwater-dependent Ecosystems - Stump Spring ACEC, Unnamed Seasonal Springs, and Associated Mesquite Habitats

This subsection describes the groundwater-dependent resources documented to occur within the cone of depression identified by staff in its independent analysis of the project's pump test data (see the Water Supply section of the FSA). Springs, mesquite habitats, and other GDEs associated with the broader or more laterally extensive regional aquifer, or beyond the five to seven mile radius of the project, are discussed under "Regional Groundwater Resources", following this subsection.

The "Pahrump-Stewart Valley Fault Zone, or Stateline Fault zone, which runs along the eastern project boundary at the California-Nevada state line, supports a broad but discontinuous zone of groundwater-dependent habitats that extend north to Pahrump, south toward the Kingston Range, east to the medial position of the Spring Mountains alluvial fan, and west to the California-Nevada state line. Over 4,000 acres of groundwater-dependent mesquite habitats occur within the five mile study area (CH2

2011g, Figure DR48-1; **Biological Resources Figure 1**). These occur in two forms: shrubby mesquite thickets on coppice dunes, and taller, lush and dense mesquite woodlands up to 15 feet in height along the deeply incised washes. The position of the wash thalweg 10 or 20 feet below the base of the dunes, in some examples, may afford these habitats better access to groundwater and account for their taller habit; the ephemeral hydrology of the washes is not adequate to support the mesquite, which require year-round access to either groundwater or soil moisture. The coppice dunes and associated shrubby mesquite habitats occur in very close proximity to the project boundary, as little as 600 feet from the project boundary and less than a mile from the proposed project pumping wells.

Groundwater-dependent vegetation was not found around the playa perimeter with the exception of a few widely scattered, very small stands of mesquite and bush seepweed scrubs located approximately 5 to 7 miles from the project site.

The depth to the groundwater table is unknown except at a few widely scattered well sites across the southern portion of the valley. No previous studies have been conducted in the mesquite habitats east of the project; nor has the applicant provided any direct evidence of the depth to groundwater at these sites. The project pump tests were located in dry desert scrubs on the west side of the fault zone and thus provide no reliable data on groundwater elevations at the GDEs. The Stump Spring monitoring well is located approximately one mile from the site of the spring and may not represent the groundwater elevation at the spring, in the washes, or along the coppice dunes of mesquite associated with the fault zone. Because of the geologic and hydrogeologic complexity of the area and because of the historic groundwater decline in the northern portion of the valley (i.e., near the northern portion of the project), it is likely that the depth the groundwater may be quite variable. Thus, the position of the groundwater table relative to the effective rooting depth of the mesquite can *only* be determined through groundwater monitoring and/or examination of soil cores excavated at the GDEs.

At least four active seeps and springs also occur within five to seven miles of the project (Stump Spring and three unnamed seeps). All occur within the fault zone, or east of the fault zone, in Nevada. Stump Spring, one of the four active springs within the study area, is located south of Tecopa Road approximately two and a half miles east of the project's southeastern corner, and is contained within a BLM Area of Critical Environmental Concern (ACEC) of the same name. Stump Spring is described as having "significant wildlife value" and was designated as a conservation priority in the BLM-Clark County Mesquite-Acacia Conservation Management Strategy (CMS) for the Clark County Multiple Species Habitat Conservation Plan (MSHCP) (Crampton et al. 2006). Stump Spring supports several seasonal pools along the largest wash that provide critical open water habitat during a period that persists from December to July in normal rainfall years.

The proximity of these seeps and springs to the mesquite habitats significantly increases the value of the mesquite to wildlife; however, even in the absence of surface water, mesquite have exceptional value to wildlife (Beedy pers. comm.; Crampton et el. 2006). Many special-status wildlife species have moderate to strong associations with mesquite (Crampton et al. 2006); some of which have been observed in the project

vicinity and others that have potential to use these significant desert resources, at least seasonally. Common and special-status wildlife associated with mesquite habitats in southern Nevada (Crampton et al. 2006) are discussed in detail below.

Mesquite Value to Wildlife

Mesquite woodlands have exceptional ecological importance in an arid region otherwise lacking a tree-dominated habitat, providing nesting opportunities for many bird species and other structural elements of food, cover, nesting and breeding habitat that are quite distinct from the surrounding uplands of sparse, dry desert scrubs. The dense, shrubby mesquite on the dunes just east of the project also provide cover, food sources, and other habitat values that are quite distinct from the surrounding sparse desert scrub, and distinct from the taller mesquite woodlands that occur along the washes.

The stabilized dunes provide ideal sites for burrowing fauna due to the lack of stones, abundant coarse material, and shade provided by the shrubs (Huang et al. 2011). Bioturbation by burrowing animals is extensive at the base of the mesquite on coppice dunes, but the lush, dense, and taller woodlands along the area washes may be more valuable to avian species requiring taller trees of a larger stem diameter.

Mesquite and acacia woodlands occupy less than one percent of the land area in Clark, southern Nye, and southern Lincoln counties, yet these habitats support a disproportionately greater number of wildlife species than the surrounding desert scrub (Crampton et al. 2006). At least 30 common and special-status species of birds have been found breeding in southern Nevada mesquite habitats, including several Clark County MSHCP covered and evaluation species (*ibid.*) and BLM Sensitive species. Among these species, phainopeplas are the most dependent on mesquite; their diet consists almost exclusively of the berries of desert mistletoe which only grows on mesquites and acacias.

The butterflies Western Great Purple Hairstreak(*Atlides halesus*) and Western Palmer's Metalmark (*Apodemia palmeri*)] and several species of bees (*e.g*. *Perdita ashmeadi simulans* and *Perdita dificilis*) are specialists on the nectar of mesquite or its mistletoe and/or use these plants as larval host plants (Crampton et al. 2006). A rare, Inyo County-endemic wasp (*Bembix inyoensis*), known from only two other sites in Death Valley and Panamint Valley, occurs on habitat (stabilized mesquite dune scrubs) identical to that found just off the project's eastern boundary and is "highly likely to occur there" according to the species' author (Kimsey pers. comm.; Kimsey & Kimsey 1981; Kimsey, Kimsey & Toft 1981). Ant abundance and species richness tend to be greater in mesquite-dominated sites, and mesquite dunes also harbor more rare ant species than inter-dune areas. Termites are also more abundant in mesquite dunes (Crampton et al. 2006). These habitats may also support additional species with restricted habitat requirements such as LeConte's thrasher, desert kangaroo rat, and desert pocket mouse (CEC 2011w).

Mesquite habitats also provide important breeding, foraging, and protection for a wide variety of common wildlife species. The fruit of honey mesquite is valuable forage for wildlife; it is quite predictable, even in drought years, providing an abundant and nutritious food source annually for numerous wildlife species such as kangaroo rats,

mice, ground squirrels, quail, black-tailed jackrabbit, mule deer, and others (Steinberg 2001).

More than 40 plant and animal species have been identified as being associated with, or dependent on mesquite and/or acacia habitats in southern Nevada for foraging, breeding, resting, and refuge (Crampton et al. 2006). **Biological Resources Table 5**, below, lists wildlife described in the Mesquite-Acacia Conservation Management Plan as having a moderate to strong affinity to (and in some cases dependence on) mesquite. Systematic surveys of the mesquite habitats for the species listed below were not conducted; however, some species below were incidentally observed during the project surveys for other special-status species (HHSEGS 2011a); others have potential to occur based on the presence of suitable habitat. Desert tortoises have also been observed using the mesquite dune scrub habitat adjacent to the project (Poff pers. comm.).

Biological Resources Table 5
Wildlife Species with a Moderate-to-Strong Association with Mesquite in Southern Nevada (Crampton et al. 2006)[1]

Common Name (Scientific name)	Species Population Trend[2]	Status[3] Fed/State/Other
Species with Strong Association with Mesquite		
Birds		
Ash-throated flycatcher(*Myiarchus cinerascens*)	Stable in Nevada, Mojave	__/__/NV PIF
Bendire's thrasher(*Toxostoma bendirei*)	Declining in US range	__/__/ CC Evaluation Species.
Black-tailed gnatcatcher (*Polioptila melanura*)	Nearly significant decline in US range	__/__/__
Crissal's thrasher (*Toxostoma crissale*)	Not known; possible decline in western US	__/__/BLM
Phainopepla (*Phainopepla nitens*)	Declining in Mojave, western US	__/__/BLM/ CC Covered Species
Verdin (*Auriparus flaviceps*)	Declining in US range	__/__/__
Abert's towhee (*Pipilo abertii*)	Endemic to the desert southwest	__/__/__
Vermillion flycatcher (*Pyrocephalus rubinus*	US range stable	__/__/__ CC Covered Species
Lucy's warbler (*Vermivora luciae*)	Stable across range but declining locally	__/__/BLM Sensitive/ NV PIF
Insects (Butterflies)		
Western great purple hairstreak (*Atlides halesus*)	Host plant, nectar	__/__/__
Leda hairstreak (*Ministrymon leda*)	Host plant, nectar	__/__/__
Western Palmer's hairstreak (*Apodemia palmeri*)	Host plant, nectar	__/__/__
Insects (Bees)		

Common Name (Scientific name)	Species Population Trend[2]	Status[3] Fed/State/Other
Perdita spp.(12 species)	Pollen specialist	__/__/__
Colletes algarobiae	Pollen specialist	__/__/__
Hyaleus sejunctus	Pollen specialist	__/__/__
Megachile odontostoma	Pollen specialist	__/__/__
Ashmeadiella prospidis	Pollen specialist	__/__/__
Bembix inyoensis	Mesquite dune scrubs	Rare Inyo Co. endemic[4]
Species with Moderately Strong Association with Mesquite		
Arizona Bell's vireo (*Vireo bellii arizonae*)	Declining throughout US range	__/__/__ CC Covered Species
Black-throated sparrow (*Amphispiza bilineata*)	Significant decline in US range	__/__/__
Ladder-backed woodpecker (*Picoides scolaris*)	Declining in US, including the western US	__/__/__
LeConte's thrasher (*Toxostoma lecontei*)	Declining in the Sonora & Mojave Deserts	__/__/BLM Sensitive
Ladder-backed woodpecker (*Picoides scolaris*)	Declining in US, including the western US	__/__/__
Summer tanager (*Piranga rubra*)	Increasing in the US	__/__/__ CC Covered Species
Verdin (*Auriparus flaviceps*)	Declining in US	__/__/__
Long-eared owl (*Asio otus*)	Stable to declining	__/__/BLM Sensitive
Western screech owl (*Otus kennicottii*)	Not known (stable or declining)	__/__/BLM Watch
Western bluebird (*Stalia mexicana*)	Significant decline in western US	__/__/NEV PIF
Pale Townsend's big-eared bat (*Corynorhinus townsendii pallescens*)	Not known	__/__/BLM Sensitive CC Evaluation Species NV Div. Wildlife
California leaf-nosed bat (*Macrotus californicus*)	Not known	__/__/BLM Sensitive NV Div. Wildlife

[1] Cramton, L., Krueger, J. and D. Murphy. 2006. *Conservation Management Strategy for Mesquite and Acacia Woodlands in Clark County, Nevada*. Bureau of Land Management, Las Vegas Field Office. March 2006. Information on rarity of *Bembix inyoensis* provided by Lynn Kimsey, UCD Entomology Department (Kimsey pers. comm. 2012)
[2] Sauer, J. R., J. E. Hines, J. E. Fallon, K. L. Pardieck, D. J. Ziolkowski, Jr., and W. A. Link. 2011. *The North American Breeding Bird Survey, Results and Analysis 1966 - 2010*. Version 12.07.2011 USGS Patuxent Wildlife Research Center, Laurel, MD
[3] BLM = BLM Sensitive; CC = Covered or Evaluation species under Clark County MSHCP; NV PIF = Nevada partners in Flight
[4] Information on rarity of *Bembix inyoensis* provided by Lynn Kimsey, UCD Entomology Department (Kimsey pers. comm. 2012)

Cultural Significance of the Mesquite

Mesquite habitats have significant cultural importance (UMICH 2012). The seeds of all three species were ground by indigenous people into a meal that was baked into cakes, and the honey from nectar produced by the plants was also an important staple. The bark and leaves have a variety of medicinal uses. The wood was used for structures, carving and fuel, and the leaves and seeds are important livestock and wildlife forage. The significance of the Stump Spring cultural resources are discussed in the Cultural Resources section of this FSA and in a May 18, 2012 submittal by the applicant on the area paleobotanical resources (CH2 2012ii).

Potential for Ancient Mesquite Clones

The applicant's paleo botanical consultant speculated that the mesquite associated with the dunes may be clones of great antiquity; as much several thousand years old, assuming the mesquite pre-date the dunes (CH2 2012ii)

The coppice dunes are estimated to have developed along the fault zone as the Pleistocene lake retreated, and the exposed sands, and sands eroded from the sparsely vegetated hill slopes that developed under the new arid climate accumulated around the mesquite associated with the fault-induced springs (Brady pers. comm. 2012). Mesquite are adapted to sand burial by forming new roots and shoots from buried branches that continue to grow as the sand accumulates around them. The development of coppice dunes may have fostered the development of mesquite clones, or off-shoots from a single parent that are genetically identically and connected to the older, original, and now dead parent plant at the base of the dunes, but this has not been established by DNA testing or radiocarbon analysis. Given that mesquite seedlings are very unlikely to germinate in sand dunes (Keeler-Wolf pers. comm. 2012), and layer readily in sand, which allows them to continue vegetatively without successful seedling recruitment, it is possible, or likely, that the mesquite pre-date the dunes (*ibid.*), which are estimated in the paleo resource report to be several thousand years old or older. In similar settings (coppice dunes), creosote clones reach ages of several thousand years (McAuliffe et al. 2007).

Regional Groundwater Resources - Amargosa Wild and Scenic River and the Amargosa Area of Critical Environmental Concern

This section describes, briefly, resources that occur beyond the cone of depression, or potential drawdown area estimated by staff in **Water Supply Figures 19** and **20** but are believed to be supported by the deeper, regional flow paths (the "regional aquifer") that underlie the basin-fill aquifer (shallow aquifer) from which the project will pump groundwater.

The Amargosa Area of Critical Environmental Concern (ACEC) covers approximately 21,552 acres of BLM-managed public lands on the Amargosa River in southeastern Inyo County, and is managed pursuant to an Implementation Plan (BLM 2007) and the BLM's NEMO plan (BLM 2001; BLM 2002). The ACEC is composed of three distinct geographic units. The 15,964 acre Central Amargosa Unit includes the Amargosa Canyon, Grimshaw Lake Natural Areas, and lands in China Ranch Wash and the Tecopa area. The Central Amargosa Unit is located approximately 20 miles west of the project site. A spring-fed tributary to the Amargosa River occurs in California Valley approximately 11 miles southwest of the project site.

Twenty-six miles of the Amargosa River, from Shoshone to State Dumont Dunes, is a federally designated Wild and Scenic River. Designation of a river puts certain constraints on development. These constraints prohibit activities and uses that may adversely affect the potential suitability of the river segment at the recommended level of protection (wild, scenic or recreational).

The Amargosa River is believed to be wholly supported by groundwater discharge in the form of seeps and springs. The tributary to the Amargosa River located in California

Valley 11 miles west of the project is also assumed to be supported by groundwater. The river begins near Beatty, Nevada, and terminates in Death Valley National Park at Bad Water.

The region has exceptional ecological values, as year-round water flow on some spring-supported reaches feeds wetlands and riparian habitat that support wildlife species unable to exist in a typical arid desert setting. The Amargosa is a unique aquatic system; most of its course is underground. Where it surfaces it supports ecologically rich oases such as Ash Meadows and the Oasis Valley in Nevada, and Tecopa, Shoshone and the Amargosa Canyon in California. As a result of their isolation, each oasis contains species and natural communities that exist nowhere else on earth:

- Seven listed species, five species of special concern and three BLM sensitive species reside in habitat created by waters from the Amargosa;
- A lush riparian zone is located along the Amargosa River that supports federally listed species such as the southwestern willow flycatcher (*Empidonax traillii extimus*)and least Bell's vireo(*V. bellii pusillus*), as well as numerous avian species listed by the CDFG as Species of Special Concern;
- The yellow-billed cuckoo, a federal candidate for listing has been found within the riparian areas of Amargosa Canyon;
- Other emergent wetland habitats adjacent to the river in the Tecopa Hot Springs area support the endemic Amargosa vole (*Microtus californicus scirpensis*). Critical habitat for this subspecies of the California vole has been established within the Grimshaw Basin and northern end of the Amargosa Canyon;
- Unique, alkali flats (at lower Carson Slough) located about five miles northeast of Death Valley Junction support populations of the federally endangered Amargosa niterwort (*Nitrophila mohavensis*). This species has also been found on similar habitats in the Tecopa Hot Springs area in Grimshaw Basin. The lower Carson Slough is located in an area that receives surface and subsurface flows from springs in Ash Meadows, Nevada. The slough serves as the point where surface and subsurface flows from Ash Meadows, and flows from the main Amargosa River come together. Wet salt grass meadows located in the lower Carson Slough also support populations of the federally endangered Ash Meadows gumplant (*Grindelia fraxinipratensis*), and possibly populations of the federally threatened spring-loving centaury (*Centaurium namaphilum*);
- Other groundwater-dependent species, listed by the BLM as sensitive, include populations of the Amargosa River speckled dace (*Rhinichthys osculus* ssp. 1) and the Amargosa pupfish (*Cyprinodon nevadensis amargosae*) in the Amargosa Canyon. Populations of Tecopa bird's beak (*Cordylanthus tecopensis*) have been found in the Grimshaw Basin and at Lower Carson Slough;

Additional groundwater-dependent resources are found at China Ranch Spring, Resting Spring, and Willow Spring in the Tecopa area, located between 13 and 20 miles west of the project in California. They support exceptional stands of mesquite and a variety of special-status species.

In California, all mesquite habitats are considered rare and sensitive natural communities (Sawyer et al. 2009; CDFG 2003); they are also rare in Nevada (Crampton et al. 2006).

Desert Washes

The project is located in the Pahrump Hydrologic Unit, a 140,196-acre watershed in Pahrump Valley. Waters on the project site drain the alluvial fan on the western flank of the Spring Mountain in Nevada, approximately 13 miles east of the project site. The watershed is a closed basin (i.e., it has no outlet); the receiving basin for the project waters and all other surface runoff in the watershed is the Pahrump Playa located approximately three miles northwest of the project site. It is a “dry playa” meaning groundwater is not shallow; however, the playa (and the washes that normally terminate before reaching the playa) periodically flood during larger storm events.

Regulatory Setting

The U.S. Army Corps of Engineers (USACE), the CDFG, and the Regional Water Quality Control Board have a shared, and somewhat overlapping, regulatory responsibility for the protection of surface waters. Desert washes have more limited protection under Section 404 of the Federal Clean Water Act, where the lateral limit of jurisdiction under Section 404 of the Clean Water Act ends at the *ordinary high water mark* (OHWM) of the stream. Waters of the State are defined by and regulated under the Porter-Cologne Water Quality Control Act. In addition, some Waters of the State are regulated under California Fish and Game Code (FGC), Sections 1600-1616 and implemented by CDFG through its Lake and Streambed Alteration (LSA) Program.

Porter-Cologne was the authorizing legislation for the Water Quality Control Act (California Water Code Division 7, Water Quality Act). The Porter-Cologne Water Quality Control Act regulates discharges of waste and fill material to Waters of the State including "isolated" waters and wetlands; thus, features delineated as “non-jurisdictional” Waters of the U.S. may be subject to regulation by the Regional Water Quality Control Board (RWQCB) under the Porter-Cologne Water Quality Act. Waters of the State defined in Porter-Cologne (Section 13050(e)) include “any surface water or ground water, including saline waters, within the boundaries of the state.” Water quality issues are addressed in the Clean Water Act Section 401 Water Quality Certification and would apply for placement of fill in any non-federal waters regardless of size or properties of the drainage (see **Water Resources** section of this FSA).

Water quality issues for Waters of the U.S. will be addressed in the Clean Water Act Section 401 Water Quality Certification; the RWQCB will coordinate with the Energy Commission to address placement of fill in any non-federal waters regardless of size or properties of the drainage (see Water Resources section of this FSA).

California Fish and Game Code Policy and Practice

Fish and wildlife resources are held in trust for the people of the state by and through the CDFG (Fish and Game Code Section 711.7). CDFG is responsible for conserving, protecting, and managing fish, wildlife, native plants, and the habitat necessary for biologically sustainable populations of these species (Fish and Game Code Section 1802).

Fish and Game Code Chapter 6, Fish and Wildlife Protection and Conservation, Section 1600 *et seq* was enacted to provide for the conservation of fish and wildlife resources associated with stream ecosystems. The Fish and Game Code further defines fish and wildlife to include: "*...all wild animals, birds, plants, fish, amphibians, invertebrates, reptiles, and related ecological communities, including the habitat upon which they depend for continued viability."* (Fish and Game Code Division 5, Chapter 1, section 45, and Division 2, Chapter 1, section 711.2(a), respectively). "*Fish means wild fish, mollusks, crustaceans, invertebrates, or amphibians, including any part, spawn or ova thereof."* (FGC, Division 5, Chapter 1, section 45).

While Fish and Game Code sections 1600 e*t seq*. do not include a definition for "stream", it has been the practice of the Lake and Stream Bed Program to define a stream as: a body of water that flows perennially, intermittently, or ephemerally. Streams include a channel, banks, bed, and floodplains where present (Vyverberg pers. comm.).

Fish and Game Code jurisdiction is not predicated on: the size of a stream; the morphology of a stream or how well-defined the banks area; the cross-sectional area occupied by particular flow events; the time period between flow events; nor the consistency of flow (Vyverberg 2010b). Streams that are afforded protection under FGC Section 1600 et seq are those bodies of water associated with a local biological community, or that contribute to the chemical, physical, or biological integrity of downstream waters or ecosystems. Whether flow is ephemeral, intermittent or perennial, streams, their sources (e.g., swales, springs, ponds, lakes, marshes, wetlands, or other such features), floodplains, and associated ecosystems (i.e., the living flora and fauna, and physical processes that sustain their habitats) are all considered integral parts of a stream system and are extended protection accordingly.

Waters of the U.S. Delineated on the Project Site

Sixty-nine ephemeral streams totaling 13.92 acres were documented in the Jurisdictional Delineation Report for Waters of the U.S. (HHSEGS 2011a, Appendix 5-2E) based on federal delineation guidelines (USACE 2008). A total of six of the 69 features are blue line streams as depicted on the USGS topographic maps of the project area. However, in a December 14, 2011 correspondence from the USACE Ventura Regulatory Field Office, the Corps determined that only two of the 69 features were subject to USACE jurisdiction (URS 2012b). The applicant's delineation estimated 0.42 acres of Waters of the U.S. within the project boundary.

On March 23, 2012, the applicant submitted a Preliminary Delineation of Jurisdictional Waters of the State (URS 2012b) regulated under Fish and Game Code Section 1600 *et seq*. The delineation report concluded that 23.21 acres of state jurisdictional waters are located within the project boundary, including 80 single-thread streams. An additional 5.85 acres of braided streams were delineated. The report also identified other areas as non-jurisdictional features, including "pooled areas" that inundate only during storm events and include depressions in roads or along road edges, the outlet of washes, and the large clay pans (identified on the delineation maps as "problematic alkaline sink areas"), and "relicts from previous hydrological events or manmade disturbance." Representative photos of the delineated features are provided in the Preliminary

Delineation of Jurisdictional Waters of the State (URS 2012b). No features were delineated downstream of the project except for one drainage adjacent to Avenue D.

Staff disagreed with the applicant's delineation of jurisdictional Waters of the State. During a field verification of the delineation conducted by staff and a representative from CDFG Regional Office in Bishop, several additional, previously unmapped streams were documented; features that are functionally and morphologically identical to features that were delineated by the applicant. The delineation map and total acres was accordingly revised by the applicant and is provided as **Biological Resources Figure 7.** The total revised area for the jurisdictional delineation does not include portions of streams located outside the state.

Characteristic hydrology indicators, fluvial indicators and other geomorphic features used in staff's identification of state waters include: channel morphology; inundation or saturation (the site received one-quarter-inch of rain the day before the site visit); recent deposition; ripples; changes in vegetation species composition, structure or density (relative to the adjacent creosote uplands); wrack; mud drapes; changes in sediment texture; sediment sorting; scour or shelving; gravel ramps; and a change in soil color. Photos were taken of many of the indicators and features.

Characteristics of the Project Waters

Desert washes may be ephemeral, intermittent, or perennial, although ephemeral streams are the most common stream type in the desert region of California (Vyverberg 2010a). All features delineated on the project site are ephemeral. Ephemeral streams only flow during and shortly after rainfall events; intermittent streams flow continuously only in places where they receive water from a groundwater source (*ibid.*).

Waters on the project site are characteristic of alluvial fan distributary channel networks, where braided, sometimes discontinuous channels and single-thread channels occur in combinations and in a distinctive pattern reflective of the depositional processes active on alluvial fans. Photos of characteristic stream forms found on the project site are provided in **Biological Resources Figure 3**. The sparse vegetation on alluvial fans, lack of soil, high erosion rates, localized runoff, and downstream decreases in stream flow lead to closely spaced, smaller channels in high drainage density (Bull & Kirkby 2002), unlike the single thread channels found farther upstream. Channel migration, or avulsions are common—a response to channels blocked by sediment accumulations from previous small flows—and produce the divergent channel networks that decrease in density at the headwaters. In general, alluvial fan channels become increasingly less defined as they flow down the fan (Vyverberg 2010), confinement is lost and the channels dissipate. Undefined features (sheetflow) were not included in the delineation of state waters.

Desert washes are important to groundwater recharge; for example, the contribution of alluvial fan stream flow to groundwater from transmission losses in the unconsolidated sediment of the channel bed accounts for 90 percent of the recharge to the groundwater aquifer in the Amargosa River basin above Shoshone (Osterkamp et al. 1994).

During the field verification of state waters, staff and CDFG noted the washes offer habitat functions and values distinct from the surrounding upland. Where there are

concentrations of water, the vegetation is denser, more robust, which in turn provides more shade, escape cover, seed and other food sources, including insects. The washes also have greater plant species diversity; germination of rattlesnake weed (*Chamaesyce albomarginata*), a preferred desert tortoise food, was abundant in the lower reaches of many channels, particularly at the terminus of the streams where soils remain saturated longer. Bunchgrasses (*Sporobolus airoides, Pleuraphis rigida*) are more abundant on some washes. The terminus of these streams held water longer and thus provided sources of temporary pooling and access to water. Staff noted higher mammal density on the streams and their active floodplains, evidenced by greater bioturbation and more abundant coyote scat. These observations are consistent with descriptions of desert washes habitat values in the literature; literature representing decades of observations and surveys (Levick et al. 2008; Baxter 1988; Kirkpatrick et al. 2007; Kubick & Remsen 1977; Tomoff 1977; Daniels & Boyd 1979, and others).

Special-status Wildlife Species

The applicant conducted several focused or protocol based surveys of the project site in 2010, 2011, and 2012. These included protocol surveys for the desert tortoise and burrowing owl; focused surveys for the golden eagle; point counts for migratory birds, and acoustic surveys for bats (electronic and monitoring and acoustic recording). Some of the species detected or that have the potential to occur in the project area are described further below.

Special-status Wildlife Species - Reptiles

Desert Tortoise

Desert tortoises are present on the proposed project site and are known to occur in adjacent habitat. Protocol surveys conducted by the applicant in 2011 detected two desert tortoises within the project footprint and six desert tortoises within 150 meters of the project boundary (HHSEGS 2011a). An additional seven animals were identified along the (Zone of Influence) ZOI transects. The desert tortoise was California state-listed as threatened on August 3, 1989. The Mojave population was federally listed as threatened on April 2 1990. Critical habitat for this species was established February 8, 1994 (55 FR 12178).

The desert tortoise is a large slow growing herbivorous reptile that is well adapted to a variable and often harsh desert environment (USFWS 2011). In the United States the desert tortoise's range includes portions of the Mojave and Sonoran desert regions of southern California, southern Nevada, southwestern Utah, and western Arizona. In Mexico, the species is found throughout most of Sonora and into portions of Sinaloa. Based on genetic differences there are two recognized populations of desert tortoise in the United States; these are the Mojave and Sonoran populations (USFWS 2011). Recently, genetic data suggest these groups are unique species. Although the species often look similar, the differentiation between the Mojave and Sonoran assemblages of the desert tortoise are supported via multiple forms of evidence, including morphology, ecology, and genetics (Weinstein and Berry 1987; Lamb et al. 1989; Lamb and Lydehard 1994; Berry et al. 2002; Van Devender 2002a; 2002b; Murphy et al. 2007). The Mojave population includes those animals living north and west of the Colorado River in the Mojave Desert of California, Nevada, Arizona, southwestern Utah, and in the Colorado Desert in California (a division of the Sonoran Desert).

The Mojave population is further classified by Recovery Units. The USFWS 2011 Recovery Plan identifies five recovery units for the Mojave population of desert tortoise. These include the Upper Virgin River; Northeastern Mojave; Eastern Mojave; Western Mojave; and Colorado Desert. Although the Recovery Unit designation does not provide special legal protection, the USFWS defines recovery units as special units that are geographically identifiable and are essential to the recovery of the entire listed population; that is recovery units are individually necessary to conserve the genetic, behavioral, morphological, and ecological diversity necessary for long-term sustainability of the entire listed population (USFWS 2011a). The proposed project is located in the Eastern Mojave Recovery Unit.

Range wide, desert tortoises occupy a variety of physical locations including alluvial fans, washes, canyon bottoms, rocky hillsides, and bajadas. In the Mojave population desert tortoises are most commonly observed in desert scrub communities dominated by creosote bush, burrobush (*Hymenoclea salsola*), Mojave yucca (*Yucca schidigera*), and blackbrush (*Coleogyne ramosissima*). At higher elevations, Joshua tree (*Yucca brevifolia*) and big galleta grass are common indicators of tortoise habitat (USFWS 1994b). However, the species is also known to occur in a variety of desert scrub communities and microphyll woodlands (USFWS 1994b).

An important functional component that characterizes desert tortoise habitat is the availability of preferred forage particularly annual forbs, native grasses, and succulents (i.e., cactus). While many species of plants are taken forbs are preferred over grasses and green vegetation is preferred over dry (Zeiner et al. 1988). Some of the preferred forage species for desert tortoises in the Mojave Desert include various species of milk-vetch (*Astragalus* spp.) primrose (*Camissonia* spp.), spurges (*Euphorbia* spp.), lotus (*Lotus* spp.) and wishbone (*Mirabilis* sp.) (Jennings 1993). Jennings (1997) noted that about 70 percent of the bites taken by observed tortoises were on annual plants. Friable soils, such as sand and fine gravel, are an important habitat component, particularly for burrow excavation and nesting. The presence of soil suitable for digging burrows is considered a limiting factor to desert tortoise distribution (USFWS 2011a). Burrows provide shelter from predators and thermal stress in areas where ground temperatures may range from below freezing to over 140° F. Depending on the location desert tortoises can construct and maintain a series of single-opening burrows, and may use between seven to 12 burrows at a given time (Barrett 1990; Bulova 1994).

Desert tortoises in the Mojave Desert are generally active between April and June, with a secondary activity period from September through October. Desert tortoises in the Eastern Recovery Unit, which includes the project area, are also active during the late summer months in response to seasonal rainfall. Because up to 40 percent of the annual precipitation falls in response to summer monsoons; the region supports two distinct annual floras on which tortoises can feed (USFWS 2011a).

During inactive periods, tortoises hibernate, aestivate, or rest in subterranean burrows or caliche caves, spending as much as 98 percent of their time underground (Marlow 1979; Nagy and Medica 1986). During active periods, they usually spend nights and the hotter portion of the day in their burrow. However, desert tortoise activity is seasonally variable and peak adult and juvenile activity typically coincides with the greatest annual forage availability during the early spring and summer. Studies conducted at Fort Erwin

in 2010-2011 detected that desert tortoises can also be active during winter months. In this study 9.8 percent (37 of 377) of desert tortoises displayed some winter activity, and 11 were active on more than one occasion. Desert tortoises were identified above ground in small numbers equally between December and January and January and February, typically the coldest months of the year (USGS 2011).

Tortoise activities are primarily concentrated in core areas or home ranges. Although adult males can be aggressive toward each other during the breeding season, there can be a great deal of overlap in individual home ranges (USFWS 2011a). Annual home ranges have been estimated between 10 and 450 acres and are age, sex, seasonal, and resource density dependent (USFWS 2011a). More than 1.5 square miles of habitat may be required to meet the life history needs of a tortoise and individuals have been known to travel more than 7 miles at a time (BLM 2001). In drought years, the ability of tortoises to drink while surface water is available following rains may be crucial for tortoise survival. During droughts, tortoises may be required to forage over larger areas, increasing the likelihood of encounters with sources of injury or mortality including humans and other predators.

The desert tortoise is a long lived species that requires 13-20 years to reach sexual maturity. The species has low reproductive rates during a long period of reproductive potential, and individuals experience relatively high mortality early in life (USFWS 2011a). Copulation typically begins in late March or early April but can occur during the spring, summer, or fall (Black 1976; Rostal et al. 1994). Eggs are laid in late May to July and hatch after approximately three to four months (Stebbins 1985; Zeiner et al. 1988). Multiple clutches (two or rarely three) occur in favorable years (Stebbins 1985). Failure of rainfall and consequent scarcity of plants may result in reproductive failure for desert tortoise (Zeiner et al. 1988).

Desert tortoise have several natural predators including common ravens, desert kit foxes (*Vulpes macrotis*), American badgers (*Taxidea taxus*), roadrunners (*Geococcyx californianus*), and coyotes (*Canis latrans*). Bobcats and mountain lions are also known to prey on this species. A variety of birds prey on desert tortoise including red-tailed hawks, golden eagles, loggerhead shrikes (*Lanius ludovicianus*), American kestrels (*Falco sparvarius*), and burrowing owls (Boarman 1993). Birds typically prey upon two to three-inch long juveniles, which have a thin, delicate shell (USFWS 1994). In addition, non-native species including dogs are a known source of mortality for desert tortoise (USFWS 2011a).

The decline of desert tortoise populations have been attributed to a number of factors including habitat loss or degradation from grazing, housing, mining, infrastructure, energy development, and the conversion of native habitat to agriculture purposes. Off highway vehicle use and the acquisition of lands for military training has also degraded habitat for this species. Also cited as threatening the desert tortoise's continuing existence were illegal collection, upper respiratory tract disease (URTD), and predation on juvenile desert tortoises by common ravens *(Corvus corax)*. Fire is an increasingly important threat to desert tortoise habitat. Over 500,000 acres of desert lands burned in the Mojave Desert in the 1980’s. An additional 404,685 hectares (1,000,000 acres) of Mojave Desert vegetation burned in wildfires in 2005 and 2006, fueled largely by invasive, non-native grasses (USFWS 2011a). Fires in Mojave Desert scrub degrade or

eliminate habitat for desert tortoises (USFWS 1994, Appendix D). Drought and subsidized predation have also been recognized to be sources of mortality for this species.

Critical Habitat

The nearest designated desert tortoise critical habitat for this species is located approximately 20 miles south of the project site within the Shadow Valley Unit.

Banded Gila Monster

The banded Gila monster (*Heloderma suspectum cinctum*) is considered rare in California with only 26 credible records of the species documented within the past 153 years (Lovich and Beaman 2007). This large and distinct lizard is difficult to observe even in areas where they have been recently recorded. As a result, little is known about this species' distribution, population status, and life history in California. Most of the historical observations in California occurred in mountainous areas of moderate elevations with rocky, incised topography, in large and relatively high ranges as well as riparian areas (*ibid.*). Despite the widespread distribution of potential habitat throughout the California desert, the few documented observations suggest the California populations may be confined to the eastern portion of the California desert (*ibid.*), and the current distribution is apparently a function of summer rainfall. As reported by Lovich and Beaman (2007), all California Gila monster observations except one (Mojave River) occurred east of the 116° longitude in areas that received at least 25 percent of their annual precipitation during the summer months. Throughout their range, Gila monsters appear to be most active during or following summer rain events.

The species is known from Nevada in nearby Clark and Nye Counties and from the Kingston Mountain Range in Inyo County (Lovich and Beaman 2007). Banded Gila monsters were not detected onsite during surveys and are expected to have a low potential to occur on the project site.

Mojave Fringe-Toed Lizard

Mojave fringe-toed lizards (*Uma scoparia*) are known almost exclusively from California, primarily in San Bernardino and eastern Riverside Counties, but are also found to the north in southeastern Inyo County and historically to the west in eastern Los Angeles County (Jennings and Hayes 1994). Murphy et al. (2007) identified two maternal lineages of this species; the northern lineage is associated with the Amargosa River drainage system, and the southern with the Mojave River drainage system, Bristol Trough, Clark's Pass (including Palen Lake and Pinto Wash), and the Colorado River sand transport systems.

The Mojave fringe-toed lizard is found in arid, sandy, sparsely vegetated habitats and is associated with creosote scrub throughout much of its range (Norris 1958; Jennings and Hayes 1994). This species is restricted to habitats containing fine, loose, aeolian sand, typically with sand grain size no coarser than 0.375 mm in diameter (Turner et al. 1984; Jennings and Hayes 1994; Stebbins 1944). It burrows in the sand to avoid predators and to thermoregulate (Stebbins 1944), though it will also seek shelter in rodent burrows. Sand dunes provide the primary habitat for this species, although it can also be found in the margins of dry lakebeds and washes and isolated pockets against

hillsides (BLM 2005). The most important factor in this species' habitat is the presence of fine sands.

The Mojave fringe-toed lizard is widespread geographically across the Mojave and northern Colorado deserts, but its distribution is highly fragmented because it is restricted to habitats containing loose sand, which is patchily distributed (Murphy et al. 2007). Many local populations of this species occur on small patches of sand and are quite small. This fragmented pattern of distribution leaves the species vulnerable to local extirpations from additional habitat disturbance and fragmentation as well as stochastic events (*ibid.*). The loose wind-blown sand habitat, upon which the Mojave fringe-toed lizard is dependent, is a fragile ecosystem requiring the protection against both direct and indirect disturbances (Weaver 1981; Beatley 1994; Barrows 1996). Environmental changes that stabilize sand, affect sand sources, or block sand movement corridors will also affect this species (Turner et al. 1984; Jennings and Hayes 1994). Threats to this species include habitat loss or damage from urban development, off-highway vehicles, and agriculture. Aside from the direct loss of land, development can also increase access by predators, such as the common raven. Potential indirect disturbances are associated with the disruption of the dune ecosystem, sand sources, wind transport, and sand transport corridors

Potential habitat for this species has been mapped along portions of the California Nevada border (DRECP 2012). However, habitat for this species does not appear to occur on the project site. The soils associated with the project area are primarily silty sand and generally lack the depth to support this species. Therefore this species is not expected to occur on the project site.

Special-status Wildlife Species - Mammals

American Badger

American badgers were once fairly widespread throughout open grassland habitats of California. They are now uncommon, permanent residents throughout most of the state, with the exception of the northern North Coast area. Known to occur in the Mojave Desert, they are most abundant in the drier open stages of most shrub, forest, and herbaceous habitats that support friable soils. Cultivated lands have been reported to provide little usable habitat for this species however staff has observed badgers along the margins of agricultural fields that border natural lands. They feed mainly on small mammals, especially ground squirrels, pocket gophers, rats, mice, and chipmunks. This species captures some of its prey above ground including birds, eggs, reptiles, invertebrates, and carrion. Its diet will shift seasonally and yearly depending upon prey availability. Badgers are fossorial, digging large burrows in dry, friable soils and will use multiple dens/cover burrows within their home range. They typically use a different den every day, although they can use a den for a few days at a time (Sullivan 1996). Cover burrows are an average of 30 feet in length and are approximately 3 feet in depth. Natal dens are larger and more complex than cover dens. In undisturbed, high-quality habitat, badger dens can average 0.64 dens per acre, but are usually at much lower density in highly disturbed areas (*ibid.*).This species can be somewhat tolerant of human activities that do not disrupt their burrows. The applicant identified approximately 11 badger burrows in fair to good condition on the project site (HHSEGS 2011a). Another burrow was found in the ZOI. There were no live animals observed.

Desert Kit Fox

Desert kit fox is an uncommon to rare permanent resident of arid regions of the southern portion of California. The species occur in annual grasslands, or grassy open, arid stages of vegetation dominated by scattered herbaceous species. Kit fox occur in association with their prey base which is primarily cottontail rabbits, ground squirrels, kangaroo rats and various species of insects, lizards, or birds (Zeiner et al. 1990). Kit foxes are primarily nocturnal and friable soils are necessary for the construction of dens, which are used throughout the year for cover, thermoregulation, water conservation, and rearing pups. Kit foxes typically produce one litter of about four pups per year, with most pups born February through April (Ahlborn 2000). While the desert kit fox is not listed as a special-status species by the State of California or the USFWS, it is protected under Title 14, California Code of Regulations, Section 460. The California Fish and Game Code (§§ 4000 - 4012) defines kit fox as a furbearing mammal and restricts take of this species.

The applicant identified 46 desert kit fox burrow complexes (i.e., numerous burrows within a 3 to 250 square meter area used by a family group) on the project site. Nineteen burrow complexes appeared to be active in the season when the surveys were performed. Two young kit fox were seen at one of the active burrow complexes. Twenty-seven burrow complexes did not appear to be active however kit fox routinely occupy historic burrows. In addition to the kit fox burrow complexes, 30 single canid burrows (isolated and not associated with a burrow complex) were found. Of these, eight were identified as kit fox based on the presence of scat and/or tracks, two of which appeared to be active.

Nelson's Bighorn Sheep

The Nelson's bighorn sheep is a BLM Sensitive species and is considered fully protected by the State of California. The Nelson's bighorn sheep includes bighorns from the Transverse Ranges through most of the desert mountain ranges of California and adjacent Nevada and northern Arizona to Utah. Desert bighorn sheep is a term often used to refer to all the bighorn subspecies inhabiting the arid, sparsely vegetated desert environment of the extreme western and southwestern parts of the U.S. and northern Mexico. Three subspecies of bighorn sheep exist and include the Rocky Mountain, Sierra Nevada, and desert bighorn (National Wildlife Federation, accessed September 14, 2012). This species is widely distributed from the White Mountains in Mono County south to the Chocolate Mountains in Imperial County (CDFG 2012b). Locally, Nelson's bighorn sheep occur in mountain ranges surrounding the project site, including the Kingston Range to the south, Nopah Range to the west, and the Clark and Spring Mountains in Nevada (CDFG 2012b). The CDFG has further stated that genetic connectivity among these sheep populations is well known and supported by a rare, all white form of sheep, that are known to occur in each of those mountain ranges (Bleich pers. comm. 2012).

Bighorn sheep are typically found on open, rocky, steep areas used for escape cover with available water and herbaceous or shrubby vegetation for forage. Bighorn sheep are extremely agile in this type of habitat, allowing them to escape predators such as coyotes, eagles, and cougars (Wehausen 1992). So important is rugged habitat that a commonly used metric for predicting bighorn sheep occupancy is the slope of the

habitat. Habitat with a slope of 15 percent or greater is considered within the range of preferred habitat for this species (Dr. Wehausen, personal communication, August 2012).

Threats to Nelson's bighorn sheep include predation by mountain lions (*Felis concolor*) on bighorn sheep in Kingston, Clark, and Granite Mountains (Jaeger 1994; Wehausen 1996). In some areas, such as Granite Mountains, this has been documented to effect drastic population declines (Wehausen 1996). In fact, over the past 140 years, many bighorn sheep populations have disappeared over much of their California range (Buechner 1960; Wehausen et al. 1987a). While there is no single cause for these losses, pneumonia contracted from domestic sheep probably has been the greatest factor (Wehausen 2005).

Bighorn sheep graze on grasses and browse shrubs, particularly in fall and winter, and seek minerals at natural salt licks. Bighorn sheep have a large rumen, relative to body size, which allows digestion of grasses, even in a dry state (Hanly 1982). This gives them flexibility to select diets that optimize nutrient content from available forage. Consequently, bighorn sheep feed on a large variety of plant species and diet composition varies seasonally and among locations. While diet quality in the Mojave Desert varies greatly among years, it is most predictably high in late winter and spring (Wehausen 1992), and this period coincides with the peak of lambing. Desert bighorn have a long lambing season that can begin in December and end in June in the Mojave Desert, and a small percentage of births commonly occur in summer as well (*ibid.*).

High rainfall and abundant forage are a good time for sheep, usually males, to make long-distance dispersal movements, which are important to maintaining genetic connectivity of metapopulations as well as colonizing new habitat. This intermountain travel can be as important to the long term viability of populations as are the mountain ranges themselves (Schwartz et al. 1986, Bleich et al. 1990). Radio telemetry studies of bighorn sheep in various southwestern deserts, including the Mojave Desert of California, have found considerable movement of sheep between mountain ranges (Bleich et al. 1990). Consequently, intermountain areas of the desert floor that bighorn traverse between mountain ranges can be as important to the long term viability of populations as are the mountain ranges themselves (Schwartz et al. 1986, Bleich et al. 1990). However, this movement is typically constrained by perennial water sources (Turner et al 2004).

Proximity to perennial water has been found to be the best predictor of bighorn sheep presence (Turner et al, 2004), found that 97 percent of sheep observations were within three kilometers of perennial water sources. This study was conducted in the Santa Rosa Mountains, in less arid climate. In the desert region, few perennial water sources exist, and local sources become more important. Interestingly, male and female bighorn sheep inhabiting desert ecosystems can survive without consuming surface water (Krausman et al. 1985), and males appear to drink infrequently in many situations (Jaeger et al., 1991; Bleich et al., 1996); however, there are no known large populations of bighorn sheep in the desert region that lack access to surface water.

Of the locally known populations of bighorn sheep, known perennial water sources are primarily found within mountain ranges and consist of surface flow. Perennial water in

the Nopah Range is known to be limited although water sources in the Kingston ranges are somewhat more plentiful (Glenn Sudemeier, personal communication). The placement of three artificial guzzlers, or watering systems, has been noted to expand occupied sheep habitat in the southern Nopah Range (ibid).

Stump Spring, located eight miles from the Kingston Range is approximately two and a half miles east of the project site and provides surface water from December to July. However, because sheep are known to avoid deeply incised washes where visibility is poor and vulnerability to predation is high, valley floor water sources such as Stump Spring and the mesquites located east of the project within Nevada are not expected to be frequented by bighorn sheep (Dr. Wehausen, personal communication).

Bighorn sheep pellets and a horn fragment were found on the site during late-season plant surveys (HHSEGS 2011a). In addition the Nopah Range to the west and the Kingston Range to the south contain large herds of sheep (Vern Bleich, pers. comm. 2012). During helicopter surveys conducted by the applicant to identify golden eagle nests, biologists noted 11 bighorn sheep at three mountain locations, ranging from seven to ten miles south and southwest of the project site (CH2 2012c). Although bighorn sheep are not expected to be present year round on the project site, the project area is likely periodically used for intermountain movement or foraging. Cover habitat for bighorn sheep is not present on the project site.

Pallid Bat

The pallid bat is a light brown or sandy colored, long-eared, moderate-sized bat that occurs throughout California with the exception of the northwest corner of the state and the high Sierra Nevada (Zeiner et al. 1990b). Pallid bats are most commonly found in oak savannah and in open dry habitats with rocky areas, trees, buildings, or bridges for roosting. These bats are frequently found around rock outcrops and water, but also in areas devoid of these features (O'Farrell and Bradley 1970; Findley et al. 1975). Roosting in rock crevices and man-made structures, males and female pallid bats are gregarious with members of the same sex (Hermanson and O'Shea 1983). Colonies can range from a few individuals to over a hundred (Barbour and Davis 1969) and usually this species occurs in groups larger than 20 individuals (Wilson and Ruff 1999). Although crevices are important for day roosts, night roosts often include open buildings, porches, garages, highway bridges, and mines. Pallid bats may travel up to several miles for water or foraging sites if roosting sites are limited. This bat prefers foraging on terrestrial arthropods in open habitats and regional populations and individuals may show selective prey preferences (Johnston and Fenton 2001). Pallid bat roosts are very susceptible to human disturbance, and urban development has been cited as the most significant factor contributing to their regional decline (Miner and Stokes 2005). Pallid bat is known to occur on the project site; detected using Anabat acoustic technology during monitoring during March, April, July, and September 2012 (CH2 2012nn).

Townsend's Big-eared Bat

The Townsend's big-eared bat is a colonial species that feeds primarily on moths and other soft-bodied insects. Females aggregate in the spring at nursery sites known as maternity colonies. Although the Townsend's big-eared bat is usually a cave-dwelling

species, many colonies are found in anthropogenic structures such as the attics of buildings or old, abandoned mines. Roost sites in California include limestone caves, lava tubes, mine tunnels, buildings, and other structures (Williams 1986). This species is found throughout Nevada, from low desert to high mountain habitats. This species is often concentrated in areas offering caves or mines as roosting sites and preferring caves and mines where the temperature is 54 degrees F. (12 degree C.) or less but usually above freezing Chung-MacCoubrey 1995. Radiotracking studies suggest that movement from a colonial roost during the maternity season is confined to within nine miles of the nursery. Townsend's big-eared bats are very susceptible to human disturbance, and females are known to completely abandon their young when disturbed. The loss of maternity and hibernation roosts has been cited as the most significant factor contributing to their decline throughout their range (Miner and Stokes 2005).

Townsend's big-eared bat was not detected over the project by the applicant during recent acoustic surveys. Roosting habitat does not exist on the project site.

Western Small Footed myotis

In the western United States, these bats are inhabitants of the deserts, semideserts, and desert mountains. Their daytime roosts may be in crevices and cracks in canyon walls, caves, mine tunnels, behind loose tree bark, or in abandoned houses. These bats hibernate in suitable caves or mine tunnels within the range occupied in summer. Bats observed in winter are often found wedged deeply into narrow cracks and crevices in the rock ceilings of old mines. When probed from these crevices they are able to fly, which indicates they do not go into a deep winter sleep. This species was detected on the project site in April and May of 2012, and again in September (CH2 2012nn).

Long-legged myotis

Long-legged myotis prefers to roost in abandoned buildings, cracks in ground, cliff face and other crevices including under the los bark of trees (Chung and Macaoubrey 1995). This species has not been detected on the project site.

Mexican free tailed bat

Mexican free-tailed bats are common in habitat that ranges from pinyon juniper woodlands, to desert grasslands, to arid desert. Preferred roosting for this species includes caves, mines, bridges, and occasionally buildings (Chung and Macaoubrey 1995). This species is uniquely adapted for fast and long distance flight. Hoffmeister (1986) reports these bats travel up to 50 miles to forage in a single night. Other features within grasslands provide additional types of roosting and foraging habitat. This species has been detected on the project site in February through September, and was not detected in December, 2011 or January, 2012.

Special-Status Bird Species

Golden Eagle

Throughout most of the western United States golden eagles are mostly year-round residents, breeding from late January through August with peak activity in March through July (Kochert et al. 2002). Migratory patterns are usually fairly local in California

where adults are relatively sedentary, but dispersing juveniles sometimes migrate south in the fall. This species is generally considered to be more common in southern California than in the northern part of the state (USFWS 2008).

Golden eagles need open terrain for hunting and prefer grasslands, deserts, savanna, and early successional stages of forest and shrub habitats. Golden eagles primarily prey on lagomorphs and rodents but will also take other mammals, birds, reptiles, and some carrion (Kochert et al. 2002). This species prefers to nest in rugged, open habitats with canyons and escarpments, with overhanging ledges and cliffs and large trees used as cover. Golden eagles were detected foraging over the project site; however nesting habitat does not occur near the site.

The applicant's January 2012 Golden Eagle Use Survey Report (CH2 2012g) presented the results of wintering golden eagle surveys, conducted to supplement pedestrian surveys originally performed in 2011. These surveys were conducted from December 20, 2011 to January 11, 2012. Biologists visited eight onsite observational points. A total of 13 eagle observations (12 during avian point counts or mid-day eagle surveys and one incidental observation) were recorded on five separate days. Eagles were mostly noted in flight, foraging over the site, and were observed perching on power poles.

Surveys that rely on single year nest observations may provide inaccurate data on eagle use. Aerial surveys for golden eagles were conducted by the applicant, in coordination with resource agencies between October 3rd to 7th, 2011 and from November 9th to 11th, 2011. Surveys were conducted by a qualified raptor biologist familiar with aerial survey protocol (CH2 2012c). Nineteen confirmed golden eagle nests were observed within 10 miles of the site, along with six unidentified raptor nests. Of these, none were determined by the applicant to be active nests. Nests were described as in poor to excellent condition, or as alternate locations.

Golden eagles are a long lived species and may use from three to 14 nests per territory. However, breeding may not occur every year depending on available forage and nests that appear inactive in a given year may be occupied the following year by breeding birds. This species is present in the region and although the applicant indicated the nests were not active, a single survey cannot be used to make this determination.

Western Burrowing Owl

Western burrowing owls, a California Species of Special Concern, inhabit arid lands throughout much of the western United States and southern interior of western Canada (Haug et al. 1993). In the Mojave Desert this species has declined because of human-induced causes such as loss and/or fragmentation of habitat, diminished prey base, and high populations of species that prey on burrowing owl eggs and young. In this portion of its range, some owls are migratory, while some are year-round residents.

Burrowing owls are unique among the North American owls in that they nest and roost in abandoned burrows, especially those created by California ground squirrels, kit fox, desert tortoise, and other wildlife. Burrowing owls have a strong affinity for previously occupied nesting and wintering habitats. They often return to burrows used in previous years, especially if they were successful at reproducing there in previous years (Gervais

et al. 2008). The breeding season in southern California generally occurs from February to August with peak breeding activity from April through July (Haug et al. 1993).

In the Mojave Desert, burrowing owls generally occur at low densities in scattered populations, but they can be found in much higher densities near agricultural lands where rodent and insect prey tend to be more abundant (Gervais et al. 2008). Burrowing owls tend to be opportunistic feeders. Large arthropods, mainly beetles and grasshoppers, comprise a large portion of their diet, along with small mammals such as mice and voles (*Microtus*, *Peromyscus*, and *Mus* spp.).Larger prey consumed includes reptiles and amphibians, young cottontail rabbits, bats, and birds. Consumption of insects increases during the breeding season (Haug et al. 1993).

Burrowing owl sign was detected during desert tortoise protocol surveys of the project site conducted from March 13, 2011 to May 18, 2011 (HHSEGS 2011a). The applicant detected eight burrows with burrowing owl sign (feathers, whitewash droppings, and/or pellets) on the project site. Section 5.2.6.7.2 of the AFC (HHSEGS 2011a) indicated that burrowing owls were observed in the proposed project site boundary, in the northwestern quarter of Section 16, and immediately west of the site. Burrowing owl sign was also detected adjacent to the project and within the 150 meters survey boundary. The exact number of owls observed was not quantified. The AFC (HHSEGS 2011a, Table 5.2-7) confirms burrowing owls were observed in 2010 and spring of 2011.

Short eared Owl

The short-eared owl is designated as a California Species of Special Concern. This species is a widespread winter migrant, found primarily in the Central Valley, the western Sierra Nevada foothills, and along the coastline. Short-eared owls typically occur as an uncommon winter migrant in southern California. This bird has also been periodically identified in the Pahrump and Amargosa River Valley. Primary habitats for this species include open areas with few trees, including annual and perennial grasslands, prairies, dunes, meadows, irrigated lands, and saline and fresh water emergent wetlands. Short-eared owl numbers have declined over most of the species' range due to destruction and fragmentation of grassland and wetland habitats. Nesting short-eared owls require open country that supports concentrations of microtine rodents and herbaceous cover sufficient to conceal their ground nests from predators (Holt and Leasure 1993). A single short eared owl was observed on the site by staff in April 2012; the bird was likely a migrant.

Loggerhead Shrike

Loggerhead shrikes are uncommon residents throughout most of the southern portion of their range, including southern California. In southern California they are generally much more common in interior desert regions than along the coast (Humpel 2008). In the Mojave Desert this species appears to be most numerous in flat or gently sloping deserts and desert/scrub edges, especially along the eastern slopes of mountainous areas (*ibid.*). Loggerhead shrikes initiate their breeding season in February and may continue with raising a second brood as late as July; they often re-nest if their first nest fails or to raise a second brood (Yosef 1996).

This species can be found within lowland, open habitat types, including creosote scrub and other desert habitats, sage scrub, non-native grasslands, chaparral, riparian, croplands, and areas characterized by open scattered trees and shrubs. Fences, posts, or other potential perches are typically present. In general, loggerhead shrikes prey upon large insects, small birds, amphibians, reptiles, and small rodents over open ground within areas of short vegetation, usually impaling prey on thorns, wire barbs, or sharp twigs to cache for later feeding (Yosef 1996). Loggerhead shrike were observed on the project site in several locations during April and May of 2011 site surveys.

Prairie Falcon

The prairie falcon inhabits dry environments in the North American west from southern Canada to central Mexico. It is They are rare in the arid southeast open habitat from annual grasslands to alpine meadows at all elevations up to 3,350 meters, but is associated primarily with perennial grasslands, savannahs, rangeland, some agricultural fields, and desert scrub areas. They require cliffs or bluffs for nesting though will sometimes nest in trees, on power line structures, on buildings, or inside caves or stone quarries. Ground squirrels and horned larks are the primary food source, but prairie falcon will also prey on lizards, other small birds, and small rodents.

Prairie falcon was observed on the project site and in adjacent areas in 2011. Two birds were observed in December, 2011, and January, 2012(CH2 2012g).

Crissal Thrasher

In California, the crissal thrasher is a year-round resident within very limited regions of the Mojave and Colorado deserts. In the greater vicinity of the project site, the species is known to occupy the New York, and Clark mountains, the Kingston Range, and Mesquite Lake, San Bernardino County; and north to the vicinity of Tecopa and Shoshone, Inyo County (Shuford and Gardali 2008). This species prefers dense, low scrubby vegetation, often riparian scrub or woodland at lower elevations and the low, dense scrub associated with arroyos at higher elevations in the Mojave Desert (Garrett and Dunn 1981, Cody 1999). No crissal thrashers have been observed on site to date (HHSEGS 2011a).

Le Conte's Thrasher

Le Conte's Thrasher is a permanent resident of the deserts of the southwestern U.S. and northwestern Mexico. The Le Conte's thrasher population densities are among the lowest of passerine (perching) birds, estimated at less than five birds per square kilometer in optimal habitats (Fitton 2008). This low population density decreases the probability of their detection during field surveys. An uncommon and hard-to-find bird, it characteristically exists only in low densities; in good habitat for the bird there may be only 10 adults per square kilometer (American Bird Conservancy 2012). This bird prefers a nest site of cholla cactus or dense, thorny desert shrub such as saltbush or shadscale, typically occupying sparsely vegetated habitat such as desert flats, dunes, or gently rolling hills.

An important habit component is accumulated leaf letter, since this species feeds almost entirely on arthropods taking shelter in this substrate. Le Conte's Thrasher also consumes plant seeds, and will take small snakes, lizards, and bird's eggs. Since this

species inhabits an environment where surface water is rare, all its basic water requirements are met through its diet. This bird was observed onsite during spring of 2011 (HHSEGS 2011a).

Bendire's Thrasher

Bendire's thrashers are known in California from scattered locations in Kern, Inyo, San Bernardino, and Riverside counties, and one documented outlier in San Diego County (Sterling 2008). In the Mojave Desert, this species favors Mojave Desert scrub, primarily in areas that contain large cholla, Joshua tree, Spanish bayonet, Mojave yucca, or other succulents (*ibid.*). The status of populations of this species is poorly understood, but threats are believed to be loss of habitat due to urbanization and agricultural development, harvesting of yuccas and cholla cacti, and off-road vehicle activity (*ibid.*). Bendire's thrasher is migratory to an unknown degree. Given the secretive nature of this species, much remains to be learned about feeding, breeding, and migratory behavior, as well as its range (American Bird Conservancy 2010). This species withdraws from the northern part of its range in the winter, and distribution during breeding is inconsistent. Bendire's Thrasher forages principally on the ground, feeding on arthropods, seeds and berries. This bird was observed onsite in spring of 2010 (HHSEGS 2011a). The applicant has indicated the observation of this species was incorrect and believes it may have been a misidentification. This species is more strongly associated with vegetation communities not present on the project site such as areas supporting large Joshua trees, cholla and other cacti. This species has not been observed on site during subsequent surveys conducted since 2010.

Northern Harrier

In western North America, the northern harrier breeds from northern Alaska south to Baja California, Mexico. This species does not commonly breed in desert regions of California, where suitable habitat is limited, but winters broadly throughout California in areas with suitable habitat. Northern harriers forage in open habitats including deserts, pasturelands, grasslands, and old fields. Because northern harriers rely on hearing to locate prey, they have unusual stiff feathers around the face, making them appear distinctly "owlish" (Cornell Lab of Ornithology 2012). Northern harriers were observed during spring 2011 surveys of the project site, and another 21 were observed during surveys for golden eagle, performed between December 20, 2011 and January 11, 2012 (CH2 2012g).

Phainopepla

This species in not considered rare in California and it is commonly found in southern California deserts and foothills. However, phainopepla is a covered species in the Clark County Multiple Species Habitat Conservation Plan. Phainopepla prefer open woodlands of oaks and other small trees, shrubs and chaparral; it is often associated with mistletoe berries. This species seems to thrive best in palm oasis, desert wash, and desert riparian habitats. In southern deserts, it has been noted that some individuals may leave from early May through September, moving to more western and northern parts of range. It is not known if phainopepla in the vicinity of the project site are year-round residents. Evidence suggests that some individuals may nest first on southern deserts and again in summering area in the same year (Hoffmann 1927; Grinnell and Miller 1944; McCaskie et al. 1979; Garrett and Dunn 1981; Ehrlich et al.

1988). This species has been observed onsite (HHSEGS 2011a), and is also known from the Stump Spring Area of Critical Environmental Concern in Nevada, and the Amargosa River in portions of both Nevada and California.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

The threshold for determining significance is based on the biological resources present or potentially present within the proposed project area in consideration of the proposed project description.

CEQA requires a list of criteria that are used to determine the significance of identified impacts. A significant impact is defined by CEQA as “a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project” (State CEQA Guidelines Section 15382).

Thresholds for determining CEQA significance in this section are based on Appendix G of the CEQA Guidelines (CCR 2006) and performance standards or thresholds identified by the Energy Commission staff. The determination of whether a project has a significant effect on biological resources is based on the best scientific and factual data that could be reviewed for the project. In this analysis the following impacts to biological resources are considered significant if the project would result in:

- a substantial adverse effect to plant species considered by the California Native Plant Society (CNPS), CDFG, or USFWS to be rare, threatened, or endangered in California or with strict habitat requirements and narrow distributions; a substantial impact to a sensitive natural community (i.e., a community that is especially diverse; regionally uncommon; or of special concern to local, state, and federal agencies);
- a substantial adverse effect to wildlife species that are federally-listed or state-listed or proposed to be listed; a substantial adverse effect to wildlife species of special concern to CDFG, candidates for state listing, or animals fully protected in California;
- substantial adverse effects on habitats that serve as breeding, foraging, nesting, or migrating grounds and are limited in availability or that serve as core habitats for regional plant and wildlife populations;
- substantially interferes with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- a substantial adverse effect on important riparian habitats or wetlands and any other “Waters of the U.S.” or state jurisdictional waters; or
- conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

ASSESSING DIRECT AND INDIRECT IMPACTS AND MITIGATION

Consistent with the requirements of CEQA and relevant regulations, the significance of potential impacts is evaluated through the application of the significance criteria

described above. The objective of the biological resources analysis is to identify potential adverse effects and/or significant impacts on biological resources.

Construction of the HHSEGS project includes the installation of heliostats, two power towers, electrical generation components as well as energy collection systems, access roads, and control buildings. Project construction would also require ancillary facilities including a water and gas pipeline and a 125-acre storm water retention area. The construction and operation of this large-scale solar generation facility includes a number of impacts to biological resources. The nature and type of the impact can depend on a number of factors including species life history characteristics, type of use of the habitat, and hydrology that is present at and near the project site. The following discussion provides an overview of the direct, indirect, and operational impacts that are expected to occur with the development of the proposed HHSEGS facility.

The California Environmental Quality Act (CEQA) Guidelines define “direct” impacts as those impacts that result from the project and occur at the same time and place. These include but are not limited to the removal of vegetation, disturbance to wildlife from construction activities, noise, lighting, dust, or the crushing of burrows. Indirect impacts are caused by the project, but can occur later in time or farther removed in distance while still reasonably foreseeable and related to the project. Indirect impacts can include the disruption of the native seed bank, the spread of invasive plant species, alterations in light regimes (i.e., shade from solar panels), or changes to soil or hydrology that adversely affect native species overtime. Indirect impacts may also include increased traffic and human disturbance. Operational impacts include both direct and indirect impacts that occur during the life of project operation, including maintenance activities.

Significance of impacts is generally determined by compliance with applicable LORS; however, guidelines adopted by resource agencies may also be used. This section analyzes the potential for direct and indirect impacts to biological resources from the construction and operation of the proposed project and provides mitigation, as necessary, in an effort to reduce the severity of potentially adverse impacts. If a significant impact is identified, appropriate mitigation to reduce impacts to below significance is then developed, in conformance with LORS. Within this section, if and where an adverse significant impact is identified appropriate mitigation and concomitant proposed condition of certification immediately follow, including supporting rationale for the effectiveness of the mitigation. The complete mitigation recommendations are found in the subsection entitled Proposed Conditions of Certification (COCs).

APPLICANT PROPOSED MEASURES

In order to reduce or avoid impacts to biological resources the applicant has proposed a series of Applicant Proposed Measures (APMs) that would be implemented during the construction and operation of the proposed project. The APMs are presented in Section 5.2.9 of the AFC and include a range of actions from broad general measures designed to protect biological resources to specific actions regarding survey requirements or plan development. APMs or mitigation strategies designed by the applicant are discussed, and if considered appropriate, are incorporated into the COCs recommended in the FSA. Where necessary, supplementary conditions are also introduced and recommended where APMs do not meet the criteria identified by CEQA as a defensible, enforceable mitigation measure. For example, measures would be considered

inadequate if they lack specificity regarding the timing of an action; do not contain clearly identified performance standards; do not identify the expected goals of a specific plan; or do not identify reporting standards.

SUMMARY OF IMPACTS

Biological Resources Table 6 summarizes the direct, indirect, and cumulative impacts to biological resources resulting from the proposed project, and includes suggested COCs to mitigate these impacts.

BIOLOGICAL RESOURCES Table 6
Overview of Significant Impacts and Conditions of Certification (COCs)

Impact	Conditions of Certification	Determination
Mojave Desert scrub **Direct Impacts:** Permanent loss of 1,580.5 acres, including 3,197 acres desert tortoise habitat, 1,580.5 golden eagle foraging habitat, and habitat for other special-status wildlife; fragmentation of adjacent wildlife habitat and native plant communities. Habitat common and widespread but impacts dependent wildlife, including special-status species. **Indirect Impacts:** Spread of non-native invasive plants; changes in drainage patterns downslope; increased risk of fire; disturbance (noise, lights) to adjacent wildlife; fugitive dust. **Cumulative Impacts:** Contributes to cumulatively considerable loss of habitat, fragmentation, and indirect effects from past, present, and foreseeable future projects in the California Desert region for dependent wildlife.	**BIO-12** requires offsite habitat acquisition and enhancement. **BIO-8** requires implementation of impact avoidance and minimization measures. **BIO-7** BRMIMP ensures implementation of all conditions of certification. **BIO-7** includes measures for dust control and fire prevention. **BIO-18** requires implementation of weed management plan to prevent spread into adjacent habitat. **BIO-21** requires a Designated Botanist to oversee measures for botanical resources for life of project.	Less than significant with conditions of certification
Shadscale Scrub **Direct Impacts:** Permanent loss of 1,616.5 acres, including 3,197 acres desert tortoise habitat, 1,616.5 golden eagle foraging habitat, and habitat for other special-status wildlife; fragmentation of adjacent wildlife habitat and native plant communities. Habitat common and widespread but impacts dependent wildlife, including special-status species. **Indirect Impacts:** Spread of non-native invasive plants; changes in drainage patterns downslope; erosion and sedimentation of disturbed soils; increased risk of fire; disturbance (noise, lights) to adjacent wildlife; fugitive dust. **Cumulative Impacts:** Contributes to cumulatively considerable loss of habitat, fragmentation, and indirect effects from past, present, and foreseeable future projects in the California Desert region for dependent wildlife.	**BIO-12** requires offsite habitat acquisition and enhancement. **BIO-8** requires implementation of impact avoidance and minimization measures, including fugitive dust control. **BIO-6, BIO-8,** and **BIO-18-** include measures for fire prevention. **BIO-18** requires implementation of weed management plan to prevent spread into adjacent habitat. **BIO-7** BRMIMP ensures implementation of all COCs. **BIO-21** requires Designated Botanist to oversee measures for botanical resources for life of project.	Less than significant with conditions of certification
Desert Washes (Waters of the State/Waters of the US) **Direct Impacts:** Permanent loss of habitat function and values for 23.21 acres of state waters (including 0.42 acres Waters of the US). Portion of hydrologic and geomorphic function maintained onsite and reflected in reduced mitigation ratio (from 3:1 to 2:1) **Indirect Impacts:** Onsite, altered surface drainage	**BIO-22** requires acquisition of compensation lands within Pahrump Valley or adjacent valleys at a 2:1 ratio. **BIO-22** also includes measures for minimizing impacts to hydrologic and geomorphic functions onsite and to adjacent offsite streams. **BIO-18** requires implementation of weed	Less than significant with conditions of certification

Impact	Conditions of Certification	Determination
patterns and groundwater recharge; upstream, noise, lighting, glare, human disturbance, potential head-cutting along pipeline trench through washes, diminished habitat value near the project on 0.4 ac. of washes delineated upstream and within California. **Cumulative Impacts:** Contributes to cumulatively considerable loss of desert wash habitat function and values, fragmentation, erosion/sedimentation, altered surface drainage and groundwater recharge patterns, and the spread of invasive weeds into desert washes from past, present, and foreseeable future projects in the Pahrump watershed. .	management plan that would prevent spread of invasive weeds into offsite washes (washes are a common vector for weeds). **BIO-7** BRMIMP ensures enforcement of all COCs. **SOIL-1** includes measures for erosion and sediment control.	
Groundwater-dependent Ecosystems **Direct Impacts:** None. Effects of pumping indirect (may take several-to-many years to propagate to the project boundary), sensitive resources located between one-half and five miles from the project wells. **Indirect Impacts:** Potential for significant indirect impacts to groundwater-dependent ecosystems (GDEs) from project pumping, from habitat loss to impaired habitat function and value for dependent wildlife, including special-status species; reduced cover of mesquite facilitated invasion of weeds and deflation of dunes; loss of a rare plant community; conflicts with BLM ACEC management goals and Clark County conservation management strategy for Stump Spring and Pahrump Valley area mesquite reduced plant cover which increases wind erosion, weedy species, increased risk of area fire from increase in vehicle traffic, etc.; impacts to special-status species inhabiting the GDEs. **Cumulative Impacts:** Even minor impacts cumulatively considerable due to ecological significance of habitat and its importance to BLM.	**WATER SUPPLY-4** requires groundwater elevation monitoring with triggers to stop, reduce, or modify pumping if trigger exceeded. **WATER SUPPLY-1** requires the acquisition and retirement of water rights to offset the project's contribution to the basin imbalance. **BIO-6, BIO-8, and BIO-18** include measures for fire prevention to protect adjacent mesquite washes and coppice dunes. **BIO-7** BRMIMP ensures enforcement of all conditions of certification. Under **BIO-21**, tasks requiring the expertise of a botanist must be conducted or supervised by a qualified botanist or vegetation ecologist. **BIO-23** requires monitoring to track the impacts of pumping to groundwater levels as they develop during the life of the project, and defines triggers for adaptive management to be implemented if data indicate impending adverse effects.	Less than significant with conditions of certification
Special-status Plants **Direct Impacts:** Loss of significant portion of California range of 4 species from project construction and operation. Potential accidental impacts to nine offsite occurrences in close proximity to project boundary during construction. **Indirect Impacts:** Potential indirect impacts to nine offsite occurrences in close proximity during operation from introduction and spread of non-native invasive plants; increased risk of fire; altered drainage patterns downstream of site; erosion and sedimentation of disturbed soils; accidental chemical and herbicide drift; disruption of photosynthesis and other metabolic processes from dust, disrupted reproductive process (pollination & dispersal). **Cumulative Impacts:** Contributes to cumulatively considerable direct and indirect effects from past, present, and foreseeable future projects in the California range of species and local population.	**BIO-20** requires compensatory mitigation for impacts to four species (gravel milk-vetch, Wheeler's skeletonweed; Preuss' milk-vetch, and Torrey's joint-fir) through acquisition and preservation offsite. Three offsite occurrences shall be protected for every S1 ("critically imperiled") species affected and two offsite occurrences protected for every S2 ("imperiled") species affected. Includes option to mitigate through restoration of at-risk offsite occurrences. **BIO-19** requires avoidance and minimization measures during life of project to protect nine offsite occurrences located in close proximity to the project boundary. **BIO-21** requires a qualified botanist conduct or supervise specific duties.	Less than significant with conditions of certification

Impact	Conditions of Certification	Determination
	BIO-22 requires compensation of washes in Pahrump Valley or adjacent valleys (washes are important dispersal pathways for rare plants). **BIO-18** requires implementation of weed management plan to prevent spread into offsite occurrences. **BIO-6, BIO-8, and BIO-18** include measures for fire prevention. **BIO-8** includes measures for fugitive dust control. **BIO-7** BRMIMP ensures enforcement of all COCs.	
Common Wildlife and Nesting Birds **Direct Impacts:** Potential mortality or disturbance during construction and operation, loss or fragmentation of habitat, displacement, and disruption of movement, and exposure to concentrated solar flux (nesting birds and flying insects). **Indirect Impacts:** Fragmentation of local population; introduction and spread of non-native invasive plants; increased risk of fire; noise, and light. Disruption of nesting and foraging behaviors. **Cumulative Impacts:** Contributes to cumulatively considerable loss of habitat, fragmentation, and indirect effects from past, present, and foreseeable future projects in the Pahrump Valley.	**BIO-1 through BIO-8** requires avoidance and minimization measures during life of project, construction monitoring, worker training, fugitive dust control, fire prevention and weed management. **BIO-16** requires pre-construction monitoring and avoidance for nesting birds. **BIO-15** the development of Avian, Bat, and Golden Eagle Protection plans.	Less than significant with conditions of certification, but see conclusions for **Migratory/ Special-Status Resident Avian Species** within this table.
Desert Tortoise **Direct Impacts:** Loss of 3,197 acres of desert tortoise habitat, potential mortality or disturbance during construction and operation, loss or fragmentation of habitat, displacement, and disruption of movement. Potential disturbance from translocation including mortality and the spread of disease. **Indirect Impacts:** Fragmentation of local population; introduction and spread of non-native invasive plants; increased risk of fire; noise, and light. Predation by ravens, road kill and fire. **Cumulative Impacts:** Contributes to cumulatively considerable loss of habitat, fragmentation, and indirect effects from past, present, and foreseeable future projects in the Eastern Mojave Recovery Unit.	**BIO-1 through BIO-8** requires avoidance and minimization measures during life of project, construction monitoring, worker training, fugitive dust control, fire prevention and weed management. **BIO-9** requires desert tortoise fencing and preconstruction clearance surveys. **BIO-10** requires the capture and translocation of desert tortoise and the development and implementation of a prescriptive translocation plan. **BIO-12** requires the acquisition of 6,358 acres of compensatory mitigation for the long term management of the species. **BIO-13** requires the development of a Raven Management Plan and the payment of a raven fee. **BIO-25** provides for an in-lieu fee and advanced mitigation option that the applicant may elect to implement as a form of mitigation.	Less than significant with conditions of certification
Kit Fox and American Badger **Direct Impacts:** Loss of 3,277 acres of desert habitat, potential mortality or disturbance during construction and operation, loss or fragmentation of habitat, displacement, and disruption of movement. Potential disturbance from passive relocation including mortality and the spread of disease. **Indirect Impacts:** Fragmentation of local population;	**BIO-1 through BIO-8** requires avoidance and minimization measures during life of project, construction monitoring, worker training, fugitive dust control, fire prevention and weed management. **BIO-9** requires desert tortoise fencing which will exclude badgers and kit fox from the project site.	Less than significant with conditions of certification.

Impact	Conditions of Certification	Determination
introduction and spread of non-native invasive plants; increased risk of fire; noise, and light. **Cumulative Impacts:** Contributes to cumulatively considerable loss of habitat, fragmentation, and direct loss of these species from past, present, and foreseeable future projects in the Pahrump Valley.	**BIO-12** requires the acquisition of 6,358 acres of compensatory mitigation for desert tortoise; however land acquisition and management will reduce impacts to these species. **BIO-14** requires that prior to ground disturbance, a qualified biologist perform a preconstruction survey for badger and kit fox dens in the project area, including areas within 250 feet of all project facilities, utility corridors, and access roads. Requires the development of Management Plan to address concerns related to passive relocation. **BIO-22** requires compensatory mitigation for state waters which will reduce habitat loss to these species. **BIO-18** requires a weed management plan be developed to minimize the spread of invasive plant species. **BIO-23** requires monitoring to track the impacts of pumping to groundwater levels as they develop during the life of the project, and defines triggers for adaptive management to be implemented if data indicate impending adverse effects.	
Nelson's bighorn sheep **Direct Impacts:** No direct loss of important spring foraging habitat. Potential disruption of habitat periodically used for intermountain movement. No direct impacts to known dispersal corridors. **Indirect Impacts:** Fragmentation of local population; introduction and spread of non-native invasive plants; increased risk of fire; and degradation of off-site springs or seeps. **Cumulative Impacts:** Contributes to cumulatively considerable loss of habitat, fragmentation, and direct loss of these species from past, present, and foreseeable future projects in the Pahrump Valley.	**BIO-1** through **BIO-8** requires avoidance and minimization measures during life of project, construction monitoring, worker training, fugitive dust control, fire prevention and weed management. **BIO-12** requires the acquisition of 6,358 acres of compensatory mitigation for desert tortoise; however land acquisition and management may preserve habitat for bighorn sheep. **BIO-22** requires compensatory mitigation for state waters which will reduce habitat loss for this species. **BIO-18** requires a weed management plan be developed to minimize the spread of invasive plant species. **BIO-23** requires monitoring of ground water to ensure impacts to ground water dependent vegetation does not result in habitat degradation for these species.	Less than significant with conditions of certification.
Special Status Bats **Direct Impacts:** No direct loss of maternity, day roosts, or hibernacula. Loss of foraging habitat. Bats that forage near the ground, such as the pallid bat, would also be subject to crushing or disturbance by vehicles driving at dusk, dawn, or during the night. Collision with facility structures. **Indirect Impacts:** the loss of foraging habitat due to type conversion, night time lighting that exposes bats	**BIO-1 through BIO-8** requires avoidance and minimization measures during life of project, construction monitoring, worker training, fugitive dust control, fire prevention and weed management. **BIO-16** the development of an avian and bat plan. **BIO-23** requires monitoring to track the impacts of pumping to groundwater levels	Less than significant with conditions of certification.

Impact	Conditions of Certification	Determination
to predation, and alteration in prey base. Degradation to Stump Spring AEC and associated mesquite thickets in Nevada. **Cumulative Impacts:** Contributes to cumulatively considerable loss of habitat, fragmentation, and direct loss of these species from past, present, and foreseeable future projects in the Pahrump Valley.	as they develop during the life of the project, and defines triggers for adaptive management to be implemented if data indicate impending adverse effects.	
Migratory/Special-Status Resident Avian Species **Direct Impacts:** Loss of 3,277 acres of desert habitat, potential mortality or disturbance during construction and operation, loss or fragmentation of habitat, displacement, and disruption of movement. Collision, electrocution, glare and exposure to solar flux. **Indirect Impacts:** Fragmentation of local population; introduction and spread of non-native invasive plants; increased risk of fire; and degradation of off-site springs or seeps. Weed abatement, mirror washing and maintenance. Glare or heat associated with the heliostats may also adversely affect bird's use of the site. **Cumulative Impacts:** Contributes to cumulatively considerable loss of habitat, fragmentation, and direct loss of these species from past, present, and foreseeable future projects in the Pahrump Valley.	**BIO-1** through **BIO-8** requires avoidance and minimization measures during life of project, construction monitoring, worker training, fugitive dust control, fire prevention and weed management. **BIO-8** also requires transmission lines and all electrical components to be designed, installed, and maintained in accordance with the Avian Power Line Interaction Committee guidelines. **BIO-15** the development of Avian, Bat, and Golden Eagle Protection plans. **BIO-16** requires pre-construction monitoring and avoidance for nesting birds. **BIO-23** requires monitoring to track the impacts of pumping to groundwater levels as they develop during the life of the project, and defines triggers for adaptive management to be implemented if data indicate impending adverse effects.	Potentially significant and unavoidable even with conditions of certification
Golden Eagle **Direct Impacts:** Loss of 3,277 acres of desert habitat, potential mortality or disturbance during construction and operation, loss or fragmentation of habitat, displacement, and disruption of movement. Collision, electrocution, glare and exposure to solar flux. **Indirect Impacts:** Fragmentation of local population; introduction and spread of non-native invasive plants; increased risk of fire; and degradation of off-site springs or seeps. Weed abatement, mirror washing and maintenance. Glare or heat associated with the heliostats may also adversely affect bird's use of the site. **Cumulative Impacts:** Contributes to cumulatively considerable loss of habitat, fragmentation, and direct loss of this species from past, present, and foreseeable future projects in the Pahrump Valley.	**BIO-1** through **BIO-8** requires avoidance and minimization measures during life of project, construction monitoring, worker training, fugitive dust control, fire prevention and weed management. **BIO-8** also requires transmission lines and all electrical components to be designed, installed, and maintained in accordance with the Avian Power Line Interaction Committee guidelines. **BIO-15** the development of an avian, bat, and golden eagle plan. **BIO-16** requires pre-construction monitoring and avoidance for nesting birds. **BIO-23** requires monitoring to track the impacts of pumping to groundwater levels as they develop during the life of the project, and defines triggers for adaptive management to be implemented if data indicate impending adverse effects.	Potentially significant and unavoidable even with conditions of certification
Wildlife Movement **Direct Impacts:** Placement of physical structures such as the solar arrays, buildings, or other facilities that block or impede movement. No direct impacts to	No specific conditions proposed.	Less than significant.

Impact	Conditions of Certification	Determination
known dispersal corridors. **Indirect Impacts:** Fragmentation of local population; introduction and spread of non-native invasive plants; increased risk of fire; and degradation of off-site springs or seeps. **Cumulative Impacts:** Contributes to cumulatively considerable loss of habitat, fragmentation, and direct loss of wildlife movement from past, present, and foreseeable future projects in the Pahrump Valley. Less than significant with COCs.		

SUMMARY OF FINANCIAL SECURITY AND NESTING MITIGATION REQUIREMENTS

Several of the recommended Conditions of Certification require the project owner to mitigate the project's impacts to biological resources by acquiring comparable lands and protecting them in perpetuity under a conservation easement. These conditions are referred to as compensatory mitigation and include:

- **BIO-12** (Desert Tortoise Compensatory Mitigation);
- **BIO-17** (Burrowing Owl Impact Avoidance, Minimization, and Compensatory Measures);
- **BIO-20** (Special-Status Plant Compensatory Mitigation); and
- **BIO-22** (State Waters Compensatory Mitigation and Avoidance & Minimization Measures).

Biological Resources Table 7 provides an estimate of the financial security deposit required prior to the start of ground-disturbing activities, and includes the estimated costs associated with the purchase, transaction, appraisal, escrow, and title insurance including mineral, oil, and gas rights. The estimate also addresses costs of initial enhancement (e.g., signs, fencing, and boundary/property line surveys); or restoration actions (e.g. removal of exotic species, debris, or decommissioning roads), management for ongoing activities (e.g., managing public access and enforcement); and monitoring the implementation, effectiveness, and compliance with the conservation goals and objectives of the mitigation.

For those projects using the Renewable Energy Action Team (REAT) National Fish and Wildlife Foundation (NFWF) Mitigation Account the budget includes the costs of administration of contracts and reporting. For all conditions of certification requiring habitat compensation, the estimated land acquisition costs and amount of the financial security shall be calculated based on the estimated cost per acre for Desert Tortoise mitigation (Condition of Certification **BIO-12**) as a best available proxy.

A number of comments were received from the public regarding the ability of the project owner to nest mitigation requirements. For example, impacts to desert tortoise, burrowing owls, and State waters require the acquisition and management of

compensatory mitigation lands to reduce impacts to less than significant levels. As described in **Biological Resources Table 7,** individually these conditions require the acquisition of lands to minimize project effects to less than significant levels. Although the project owner is required to provide a security deposit for each of the compensatory land requirements, it may be possible to achieve the mitigation for a number of resources through the acquisition of a single parcel (nesting). For the purposes of the FSA, staff considers the nesting of mitigation to be appropriate where the acquisition of lands for one species (i.e., desert tortoise) can be demonstrated to effectively reduce impacts for a different species or resource (i.e., desert washes or burrowing owls). Similar to conditions identified on the proposed project site, the potential compensation lands may support more than one of the affected resources. Therefore the project owner may fulfill the compensatory mitigation obligations for multiple species or resources on all or any portion of the proposed mitigation lands providing they meet all the selection criteria required in each applicable condition of certification. The separate financial security deposit for each compensatory mitigation obligation is required in the event that compensation lands cannot be found that meet the criteria for multiple species or habitats.

Biological Resources Table 7
Biological Resources Compensatory Mitigation
Summary of Compensation Lands Costs[1, 11]

	Desert tortoise compensation	Burrowing owl compensation	State Waters compensation
Number of acres	6,358	600	23.21
Estimated number of parcels to be acquired, at 40 acres per parcel[2]	159	15	1
Land cost at $1000/acre[3]	$6,358,000.00	$600,000.00	$23,210.00
Level 1 Environmental Site Assessment at $3000/parcel	$476,850.00	$45,000.00	$1,740.75
Appraisal at no less than $5,000/parcel	$794,750.00	$75,000.00	$2,901.25
Initial site clean-up, restoration or enhancement, at $250/acre[4]	$1,589,500.00	$150,000.00	$5,802.50
Closing and Escrow Cost at $5000/parcel[5]	$794,750.00	$75,000.00	$2,901.25
Biological survey for determining mitigation value of land (habitat based with species specific augmentation) at $5000/parcel	$794,750.00	$75,000.00	$2,901.25
3rd Party Administrative Costs (Land Cost x 10%)[6]	$635,800.00	$60,000.00	$2,321.00
Agency cost to accept land[7] [(Land Cost x 15%) x 1.17] (17% of the 15% for overhead)	$1,115,829.00	$105,300.00	$4,073.36
Subtotal - Acquisition and Initial Site Work	$12,560,229.00	$1,185,300.00	$45,851.36
Long-term Management and Maintenance Fund (LTMM) fee at $1450/acre[8]	$9,219,100.00	$870,000.00	$33,654.50
Financial Security Requirement Subtotal if the application-directed compensatory	**$21,779,329.00**	**$2,055,300.00**	**$79,505.85**

	Desert tortoise compensation	Burrowing owl compensation	State Waters compensation
mitigation option			
NFWF Fees			
Establish Project Specific Account[9]	$12,000.00	$12,000	$12,000.00
Call for and Process Pre-Proposal Modified RFP or RPF[10]	$30,000.00	$30,000.00	$30,000.00
NFWF Management fee For Acquisition and Enhancement Actions (Subtotal x 3%)	$376,806.87	$35,559.00	$1,375.54
NWFW Management Fee for LTMM account (LTMM x 1%)	$92,191.00	$8,700.00	$336.55
Subtotal of NFWF Fees if NFWF option selected	$510,997.87	$86,259.00	$47,712.09
TOTAL Estimated cost for deposit in project specific REAT-NFWF Account	**$22,290,326.87**	**$2,141,559.00**	**$123,217.94**

1. All costs are best estimates as of summer 2010. Actual costs will be determined at the time of the transactions and may change the funding needed to implement the required mitigation obligation. Note: regardless of the estimates, the developer is responsible for providing adequate funding to implement the required mitigation.
2. For the purposes of determining costs, a parcel is defined at 160 acres, recognizing that some will be larger and some will be smaller, but that 160 acres provides a good estimate for the number of transactions anticipated (based on input from CDD).
3. Generalized estimate taking into consideration a likely jump in land costs due to demand, and an 18-24 month window to acquire the land after agency decisions are made. If the agencies, developer, or 3rd party has better information on land costs in the specific area where project-specific mitigation lands are likely to be purchased, that data overrides this general estimate. Note: regardless of the estimates, the developer is responsible for providing adequate funding to implement the required mitigation.
4. Based on information from CDFG.
5. Two transactions at $2500 each: landowner to 3rd party; 3rd party to agency. The transactions will likely be separated in time.
6. Includes staff time to work with agencies and landowners; develop management plan; oversee land transaction; organizational reporting and due diligence; review of acquisition documents; and assembling acres to acquire.
7. Includes agency costs to accept the land into the public management system and costs associated with tracking/managing the costs associated with the donation acceptance, including 2 physical inspections; review and approval of the Level 1 ESA assessment; review of all title documents; drafting deed and deed restrictions; issue escrow instructions; and parcel mapping.
8. Estimate for purposes of calculating general costs. The actual long term management costs will be determined using a Property Assessment Report (PAR) tailored to the specific acquisition. Includes land management; enforcement and defense of easement or title [short and long term]; monitoring.
9. Each renewable energy project will be a separate sub-account within the REAT-NFWF account, regardless of the number of required mitigation actions per project.
10. If determined necessary by the REAT agencies if multiple 3rd parties have expressed interest; for transparency and objective selection of 3rd party to carryout acquisition.
11. Compensatory mitigation for special-status plants, as described in **BIO-20**, is based on the number of occurrences affected, to be replaced on an occurrence-for-occurrence basis--not acres of 'habitat' affected--mitigation lands must be occupied by the affected species. For example, under a 3:1 mitigation ratio for CNDDB S1-ranked species, three occurrences must be acquired and. CNDDB S2-ranked species are mitigated at a 2:1 ratio, that is, two occurrences must be acquired and protected for S2-ranked species affected.

Project Impacts to Common Wildlife and Wildlife Habitat

Construction of the HHSEGS facility would result in large scale direct, indirect and operational impacts to common wildlife and would result in the permanent or long-term land use conversion of primarily native vegetation and wildlife habitat.

TEMPORARY AND LONG-TERM IMPACTS

Impact analyses typically characterize effects to vegetation and wildlife habitat as either temporary or permanent. Permanent impacts are generally considered disturbances or land use conversion that would preclude most natural wildlife habitat function throughout the life of a project or longer. Temporary disturbance is generally understood as construction disturbance occurring on a site that may return to a more natural condition or may be actively revegetated or enhanced, returning to natural conditions within approximately five years. In desert ecosystems, the interpretation of permanent and temporary impacts needs to reflect the slow recovery rates of native plant communities and the subsequent loss of value to native wildlife. Natural recovery rates from disturbance in desert ecosystems depend on the nature and severity of the impact. Temporary habitat impacts such as vegetation removal and soil disturbance can take from 50 to 300 years for partial recovery and complete ecosystem recovery may require over 3,000 years (Lovich and Bainbridge, 1999). During this time the value of the habitat to wildlife is reduced and in some cases can no longer supports species that existed in those areas preceding the disturbance. In this analysis, an impact that might be considered temporary in other parts of California will be considered long-term or permanent due to these very slow natural recovery rates.

Permanent and long-term habitat loss, as defined by staff, includes any impacts that would not recover within five years. Staff considers that project impacts to habitat persisting throughout the life of the project and beyond are, for purposes of this analysis, permanent. In addition, staff considers that temporary project impacts to habitats that persist longer than five years are long-term. Construction and operation of the HHSEGS would have permanent impacts throughout the solar generator site and on any permanent new or widened access routes. In addition, the project would have long-term impacts where habitat is disturbed for temporary construction areas.

DIRECT IMPACTS TO WILDLIFE HABITAT

The term “habitat” refers to the environmental and ecological conditions where a species is found. Wildlife habitat is generally described in terms of vegetation, though a complete explanation often must encompass further detail, such as availability or proximity to water; suitable nesting or denning sites; shade; foraging perches; cover sites to escape from predators; soils that are suitable for burrowing or hiding; limited noise and disturbance; and many other factors that are unique to each species. Vegetation itself provides many aspects of habitat, physical structure, and biological productivity and food resources for many wildlife species. Further, vegetation often reflects other habitat components such as regional climate, soil productivity and texture, elevation, and topography. Thus, vegetation is a useful overarching descriptor for habitat and it is the primary factor in this analysis of impacts to wildlife habitat.

Native vegetation would be cleared and grubbed (i.e., shrubs and roots removed) for construction of permanent access roads, heliostat support installation, construction of solar towers, and other project facilities throughout much of the proposed solar generator site. Outside of access roads and maintenance tracks, vegetation would be cut to 12-18 inches to provide clearance for heliostat function, but would leave the root structure intact (HHSEGS 2011a). Similarly, grading plans have been designed to promote sheet flow and maintain natural features, with one notable exception, the 125-acre retention area which would impound water for approximately 24 hours following

large storm events. Specific details addressing the proposed retention pond is discussed further below under the subsection entitled Retention Pond.

Although the project proposes to utilize a “low impact design” which substitutes mowing for grading wherever possible, and maintains natural drainage features as much as possible; functional habitat values on the project site for most species of wildlife will be lost. Outside of access roads and maintenance tracks, vegetation may be cut to ground level as needed for construction but roots would be left intact, allowing for some regrowth. During project operations, vegetation would be cut or removed as needed to provide clearance for heliostat function and manage potential fire hazard. Native shrubs undergoing repeated mowing would be weakened and diminished in size, degrading or eliminating their value as wildlife habitat. Overall impacts of these construction, operation, and maintenance procedures would cause substantial degradation to native vegetation and wildlife habitat. However, to the extent that native shrubs persist on the site, they may have some benefit to soils and hydrology, by reducing likely soil erosion throughout the heliostat fields.

Construction of the proposed project would result in the direct loss of foraging habitat for a variety of wildlife from construction and operation of the facility and the permanent conversion of open space. How the project would affect individual species depends on many factors including how a species tolerates disturbance and the ability of a species to adapt to features such as the heliostat arrays, access roads, noise from electrical transformers and human presence. For some common species including small reptiles, mice, rabbits, ground squirrels, and some disturbance tolerant birds, the project would not lead to a substantial loss of foraging habitat and may in fact provide additional perches, refugia, and increased access to some prey. However, for other species, the project would likely eliminate foraging opportunities due to the presence of the project facilities. These species include animals excluded by the perimeter fencing such as coyotes, deer, desert kit fox, or badgers. Large aerial foragers such as golden eagles and various raptors are also expected to have reduced foraging opportunities on the project site both during construction and operation of the facility.

INDIRECT IMPACTS TO WILDLIFE HABITAT

Indirect impacts to foraging habitat could include alterations to existing topographical and hydrological conditions, increased erosion and sedimentation, and the establishment of noxious weed colonies. Indirect impacts may also result in the alteration of soils, such as compaction that could reduce burrowing opportunities for small mammals and degrade existing habitat. The placement of perimeter fencing will also degrade existing habitat value for some wildlife by providing roosting opportunities for some disturbance tolerant birds such as ravens which can result increased predation risk in adjacent lands. Trash left on the project site could also attract predators such as the common raven and coyote (Boarman, 2002).

Conclusions and Discussion of Mitigation for Wildlife Habitat

Construction of the proposed project would occur over a period of approximately 29 months and result in the disturbance to approximately 3,277 acres of wildlife habitat (including dirt roads and disturbed areas). This vegetation and habitat provides cover, denning or nesting sites, foraging areas, and other habitat functions for wildlife species, including special-status species, throughout the area. In some cases, habitat use is

seasonal (e.g., for migratory birds) or is limited to foraging but not nesting (e.g., for golden eagles or other wide-ranging cliff-nesting raptors). Remnant vegetation and habitat that remain post construction and throughout the operational life of the facility may be suitable for some common species, such as side-blotched lizard, house finch, and desert cottontail. However, during construction and operations, the remnant or recovering vegetation and habitat would be unsuitable for most species, particularly species with specific habitat requirements, including most special-status wildlife. The project's direct impacts to native vegetation and wildlife habitat would be significant and require compensatory mitigation. Staff recommends measures below to reduce, minimize, or offset these impacts. Implementation of Condition of Certification **BIO-12** (Desert Tortoise Compensatory Mitigation), described below under Impacts to Special-Status Species, requires the acquisition, protection and enhancement of desert tortoise habitat. Implementation if this condition would reduce impacts to wildlife habitat to less than significant levels.

DIRECT IMPACTS TO WILDLIFE

Project level effects to wildlife depend on many factors that include but are not limited to the species use of the site (i.e. home range); behavioral factors that result in wildlife seeking refuge rather than dispersing (i.e., site fidelity, behavior); a given species dispersal ability; ecological characteristics (i.e., fossorial, aerial dispersal, highly mobile); and the ability of the species to evade or disperse from the construction activity. Project level effects to wildlife are further influenced by factors such as the seasonal use of the site. For example some species including small mammals and many reptiles are year round residents with small or restricted home ranges while other species including foxes, badgers, and some birds may be periodic visitors or have large or overlapping home ranges. Other species such as large raptors limit their activity on the site to foraging. Likewise, many species of birds may be semi-permanent dwellers or seasonal residents (i.e., migratory birds) that are present either as breeding pairs or rely on the site for winter foraging.

Direct impacts to wildlife could include mortality from trampling or crushing; increased noise levels due to heavy equipment use; light impacts from construction during low-light periods; increased vehicular and human presence along existing access roads; displacement due to habitat modifications, including vegetation removal, alterations of existing soil conditions; fugitive dust; and increased erosion and sediment transport. Wildlife could also become entombed in burrows or be subject to increased risk of predation when flushed from cover by equipment or construction workers. Fires that occur as a result of construction activities can quickly spread to vegetation and displace or kill native wildlife.

Noise from clearing, grading and construction activities could also affect wildlife in adjacent habitats by interfering with breeding or foraging activities and movement patterns, causing animals to temporarily avoid areas adjacent to the construction zone. Refer to the **Noise** section of the FSA for more information. Nocturnal wildlife would be affected less by construction than diurnal species since construction would occur primarily during daylight hours. However, construction may also occur during dusk and dawn when many species are highly active. More mobile species such as birds and larger mammals would likely disperse into adjacent habitat areas during the land

clearing and grading phases of solar array and road construction. However, smaller animals would be less able to disperse. Additional information regarding project effects from noise and lighting is presented under the section entitled Project Operation Impacts and Mitigation, below. **Biological Resources Table 8** summarizes direct impacts to wildlife from construction activities.

Biological Resources Table 8
Examples of Direct Effects to Wildlife

Construction Activity	Type of Effect
Direct	
Grading, excavation, mowing, vegetation removal	Loss of foraging, sheltering, or breeding habitat Direct mortality to small and/or less mobile species Entombment or entrapment in pipes or excavations Increased risk of predation when flushed from cover Loss of small nests or young
Noise and Vibration	Interference with breeding, foraging and movement Avoidance of areas adjacent to the construction zone Temporary threshold shifts in hearing sensitivity and related loss of hearing resulting increased subjection to predation. Abandonment of burrows
Man-made sources of light	Increased risk of predation Avoidance of light areas Disturbance to nests and young
Vehicle Traffic	Direct mortality from road kill Avoidance of areas adjacent to traffic routes Disruption of breeding, foraging, and movement of bird species resulting in nest, roost, or territory abandonment and subsequent reproductive failure (during breeding season)
Fire	Habitat loss, degradation or vegetation type conversion Direct mortality Abandonment of habitat
Fugitive Dust	Adverse physiological effects, stress, reduced fitness Avoidance of project area
Perimeter Fence Construction	Restrict wildlife movement Disrupt home ranges or territories Trap wildlife within the enclosure

INDIRECT IMPACTS TO WILDLIFE

Indirect impacts can include the disruption of the native seed bank, the spread of invasive plant species, alterations in light regimes (i.e., shade from solar panels), or changes to soil or hydrology that adversely affect native species overtime. Indirect

impacts may also include increased traffic and human disturbance and the disruption of prey base or increased predation through alterations of the physical landscape from project features (i.e., fencing, heliostats, or power poles) that provide perch sites or shelter for predators.

Conclusions and Discussion of Mitigation for Wildlife

Construction-related effects to common wildlife are typically not considered significant under the CEQA. However, staff concludes that the scale and duration of construction (i.e., over 3,277 acres of land conversion over a period of 29 months); the variety of wildlife present at the project site; and the use of perimeter fencing, which will prevent many species from dispersing, would result in significant effects to common wildlife without implementation of mitigation measures.

By design, the project facility would include perimeter fencing to prevent desert tortoise and other species from entering the work area. Prior to construction, tortoises and other species (i.e. desert kit fox, American badger, and burrowing owl) inhabiting the project site would be relocated/translocated to suitable receptor sites (See impacts to desert tortoise below for a detailed discussion of desert tortoise relocation). With the exception of birds, this barrier would exclude or entrap wildlife at the project site. Therefore, during construction, terrestrial wildlife trapped within the perimeter fence would have limited dispersal ability. This would subject any trapped wildlife to repeated disturbance from construction and the use of roads to support maintenance activities. While many species of wildlife can tolerate human disturbance to some degree; implementation of the proposed project would result in an ongoing loss of wildlife from mowing, vehicle traffic, nest failure, and alteration of foraging habitat. The most likely long term effect of the project on wildlife trapped within the project by perimeter fencing is mortality from road traffic and the loss of habitat functions and value due to vegetation management.

The applicant has recommended general impact avoidance and minimization measures to reduce construction related impacts to common wildlife. These recommendations have been incorporated into conditions of certification, and enhanced where deemed necessary to reduce effects to common wildlife. These conditions of certification are designed to educate workers of the presence and sensitivity of wildlife that may occur in the project area; provide limitations on the work that may occur during the breeding season; require inspection for wildlife under vehicles; reducing or controlling fugitive and vehicle speeds; monitoring construction to reduce direct wildlife mortality; and the control of noxious weeds. The conditions also reduce impacts to common wildlife from the effects of noise and lighting.

The following conditions of certification would avoid or reduce impacts to general wildlife to less-than-significant levels: **BIO-1** (Designated Biologist Selection) which requires the designation of a lead project biologist ; **BIO-2** (Designated Biologist Duties) which outlines the duties performed during any site mobilization, ground disturbance, grading, construction, operation, closure, and restoration activities; **BIO-3** (Biological Monitor Qualifications); **BIO-4** (Biological Monitor Duties) in which the Biological Monitor assists the Designated Biologist during any site mobilization, ground disturbance, grading, construction, operation, closure, and restoration activities; **BIO-5** (Designated Biologist and Biological Monitor Authority) in which the Designated Biologist and Biological Monitor can call a halt to any activities that would be an adverse impact to biological

resources; **BIO-6** (Worker Environmental Awareness Program) in which workers on the project site or any related facilities are informed about sensitive biological resources; **BIO-7** (Biological Resources Mitigation Implementation and Monitoring Plan) which identifies all biological resources mitigation, monitoring, compliance measures, conditions of certification, and permits; **BIO-8** (Impact Avoidance and Minimization Measures) in which all feasible measures which avoid or minimize impacts to the local biological resources are incorporated in any modification or finalization of project design; **BIO-9** (Desert Tortoise Clearance Surveys and Fencing).

Potential impacts from the spread of invasive plant species and effects to locally important ground water dependent vegetation and seeps including the mesquite bosque located east of the project site and Stump Spring ACEC would be reduced to less than significant levels through the implementation of Conditions of Certification **BIO-18** (Weed Management Plan) and **BIO-23** (Ground Water-Dependent Vegetation Monitoring Plan. Implementation of these measures would reduce impacts of the proposed project to less-than-significant levels under CEQA.

Lighting may also be required to facilitate nighttime construction activities, which might disrupt the activities and affect behavior of nocturnal wildlife. As discussed in the Visual Resources section, construction lighting must be consistent with worker safety codes, directed toward the center of the construction site, shielded to prevent light from straying offsite, and task-specific. Condition of Certification **VIS-2** requires temporary lighting measures during construction activity and on the laydown area. See the Visual Resources analysis in this FSA for more details about proposed Condition of Certification **VIS-2**. With implementation of this measure, impacts to wildlife from construction lighting at the HHSEGS project would be reduced to less-than-significant levels under CEQA.

IMPACTS TO NESTING AND MIGRATORY BIRDS

The project site provides foraging, cover, and/or breeding habitat for a variety of resident and migratory birds. Localized water sources such as Stump Spring and other seasonal seeps and springs, private residences south of the site, and mesquite thickets east of the site also provide resources used by many species of birds. Bird species potentially affected include ground nesting species such as quail, night hawks and horned larks. Songbirds and several species of raptor are also known to forage at or near the project site. During surveys of the project site the applicant identified approximately 60 species of birds in the project area including a number of special-status bird species. Some of the known or expected species that may be impacted by the project include ground nesting species such as night hawks, poorwills, roadrunners, and horned lark, and various shrub nesters. The project's impacts to special-status birds are discussed under Special-Status Wildlife, below.

DIRECT IMPACTS TO NESTING AND MIGRATORY BIRDS

Direct impacts to nesting birds or raptors would be similar to those described for common wildlife and are identified in **Biological Resources Table 8**. This includes the loss of foraging and nesting habitat and disturbance from construction activities. Construction during the breeding season could also result in the displacement of breeding birds and the abandonment of active nests. Small well hidden nests could also

be subject to loss during construction of the proposed project. Similarly, increased noise levels from heavy equipment, increased human presence, and exposure to fugitive dust could displace native birds. Habitat fragmentation, degradation and shifts in vegetative structure will also directly affect nesting birds. In addition, noise and lighting effects have been demonstrated to adversely affect behavior, reproduction, and increase the risk of predation.

INDIRECT IMPACTS TO NESTING AND MIGRATORY BIRDS

Indirect impacts to nesting birds could include the loss of habitat due to the colonization of invasive plants and a disruption of breeding or foraging activity due to facility maintenance. Weed abatement, mirror washing (which occurs at night), and maintenance activities would likely limit the use of some areas as foraging or nesting habitat. Indirect impacts to nesting birds may also occur from the drawdown of surface and subsurface water in adjacent lands such as the mesquite thickets and Stump Spring ACEC.

Another indirect risk to birds during project construction is entrapment. Birds may become entrapped within vertical pipes used to support the heliostats. It appears that birds may descend into pipes either in search of nest cavities or food and become trapped within the pipes. Once inside the cavity, the birds cannot climb the slick interior or spread their wings to fly (Brean 2011). Animals that become entrapped in these pipes die from starvation and dehydration (American Bird Conservancy 2011). Vertical pipes have been found to be a significant threat to bird mortality in Nevada, where the wide-spread use of vertical PVC pipes for mining claims markers has led to the widespread mortality of thousands of birds that had become entrapped in them (American Bird Conservancy 2011). Some of the cavity-nesting birds protected under the Migratory Bird Treaty Act (MBTA) and California Fish and Game Code Sections 3503 and 3513 that have been found dead in these pipes include Say's Phoebes, owls, woodpeckers, kestrels, and ash-throated flycatchers (Brean 2011). To date, the Nevada Department of Wildlife (NDOW) has found over 3,000 fatalities in 10,000 removed pipes (Brean 2011). California Audubon also indicated that open pipes kill birds indiscriminately and that both common birds and protected species have been found among the layers of dead birds in open pipes (http://ca.audubon.org/workinglands-pipes.php). A single pipe on a preserve in Kern County contained the remains of numerous birds (http://kern.audubon.org/Audubon_Kern_River_Preserve_death_pipes.pdf).

Habitat Loss for Nesting and Migratory Birds

Implementation of the proposed project would result in the direct loss of approximately 3,277 acres of habitat that supports foraging for a variety of resident and migratory birds. Because of the large size of the project, direct effects would include the loss of foraging habitat. Construction of the project facility would require large scale land disturbance within the project site. Although the applicant has proposed to mow vegetation and allow some vegetation to persist within the heliostat field, the habitat remaining would be degraded and have the potential to type convert to more disturbance tolerant species. In addition, construction of the power towers, power plant, roadway, and various facilities would result in the removal of potential nesting habitat for most species of birds. The loss of habitat from the proposed project would be significant

absent mitigation. Conditions of certification required to reduce impacts to sensitive birds are described below.

Conclusions and Discussion of Mitigation for Nesting and Migratory Birds

The Point Reyes Bird Observatory (PRBO) has prepared a landscape analysis within the Desert Renewable Energy Conservation Plan (DRECP) planning area. This analysis identifies areas of high and low value to nearly 70 species. This review included common and special-status species that collectively utilize a range of habitat features. The PRBO ranked the Calvada Springs area of the Pahrump Valley near the project site in the lowest priority group. The study concluded that these low priority areas should be considered first for siting solar and other renewable energy installations to minimize impacts on breeding birds (Howell and Veloz 2011). However, at the project level, the existing mosaic of scrub communities, small washes, and adjacent mesquite habitat and mesquite dune scrubs are utilized by a wide range of species.

There is a growing body of evidence suggesting that populations of desert birds are at risk from invasive plants, wildfires, growing populations, and development. The Partners in Flight (PIF) North American Land Bird Conservation Plan characterizes species of the Southwestern Avifaunal Biome to have generally low population sizes, narrow distributions, high threats, and, when trend data exist, generally declining populations (Rich et al. 2004). Due to remoteness and difficult research conditions, bird populations found in Mojave and Colorado Desert habitats have poor or no trend data (Rich et al. 2004). Yet two of the top three fastest-growing metropolitan areas in the United States from 1990- 2000 (Las Vegas, NV and Yuma, AZ) are found within the area covered by this plan. In the western Mojave Desert, the population has tripled in the last twenty years (CalPIF, 2009). These pressures have been found to negatively impact desert bird populations (Latta et al. 1999). Bird species of the southwestern United States tend to have smaller populations and smaller breeding ranges, rendering these species more vulnerable to ecological stresses (Rich et al. 2004). Black-tailed gnatcatchers and black-throated sparrows have been found to be particularly sensitive to urbanization and the replacement of native desert scrub with exotic vegetation (Germaine et al. 1998 and Emlen 1974).

With the exception of a few non-native birds such as European starling, the loss of active bird nests or young is regulated by the federal Migratory Bird Treaty Act (MBTA) and Fish and Game Code Section 3503, though most native birds have no other special conservation status. The project's impacts to special-status birds are discussed under Special-Status Wildlife, below.

Implementation of the proposed project would result in direct, indirect and operational effects to nesting birds. During construction it is expected that most birds would disperse to adjacent habitat during the initial vegetation clearance for the proposed project. However, if site grading, brush removal, or construction were to occur during the nesting season, then it likely would destroy bird nests, including eggs or nestling birds.

Noise during construction may be loud enough to adversely affect bird nesting success. For most common species, staff concludes that this impact would be less than significant, but staff believes that it could significantly affect breeding habitat suitability for native birds, including special-status species. Construction activities would primarily

occur between 7:00 AM and 6:00 PM and would result in a short-term, temporary increase in the ambient noise level. Construction noises are anticipated to range from 43 decibels to 74 decibels at 1500 feet from the noise source (piece of construction equipment) (HHSG 2011a, Table 5-7-7).

Open pipes left over the weekend or for extended periods of time pose a documented mortality risk to birds and possibly some species of bats. It appears that construction of the heliostat field requires the placement of many cylindrical pipes to support the solar reflectors.

To reduce the potential for direct impacts to nesting birds the applicant has proposed mitigation measures to avoid and minimize project related effects. This includes conducting pre-construction nesting surveys, and the establishment of limited disturbance buffers, ranging from 250 to 500 feet around active nests depending upon the species. The approach proposed by the applicant is valid, but may be difficult to achieve due to the extended (i.e., 29 month) construction schedule, scale of the project (i.e., 3,277 acres), and the numerous common birds expected to nest within the area prior to and during construction. Staff considers it highly unlikely that nesting birds could be completely avoided if clearing and grubbing occur during the nesting season.

As described above, the construction and maintenance activities associated with the project are expected to exclude some species of birds that are less tolerant of anthropogenic disturbance. However, some species of birds will likely nest in the project area both during construction and operation of the facility. These include common ravens, horned larks, various raptors, and other birds. Depending on the species, birds may actively nest on the ground close to equipment, within the open metal framework of the heliostats, or on idle construction equipment. For example, staff has observed recent nesting activity at several solar and transmission line developments in the Mojave and Colorado Desert and within the Carrizo Plain. In these locations birds nested on the ground near solar panels, vehicles, foundations, construction trailers, and other equipment left overnight or during a long weekend. In areas where construction was phased (i.e., footings, or tower structures) birds quickly utilized these features as nest sites. Low-nesting species are susceptible to population suppressants such as alteration of predation pressures and increased anthropogenic disturbance/traffic (Emlen 1974). Ground-nesting gambel's quail, greater roadrunners, and black-throated sparrows, all species detected on the site, have been found to be especially sensitive to these urban predation and disturbance threats (Emlen 1974).

While many of the birds consisted of common ravens, house finches, and doves, these species are protected by the MBTA and relevant Fish and Game codes. The likelihood of encountering nesting birds either within the 250-500-foot disturbance buffer proposed by the applicant or on vehicles and equipment is considered high.

Birds have demonstrated a varying degree of tolerance to human disturbance. Where some species such as house finches display a tolerance for human activities and have been documented nesting on a variety of manmade structures (Hill 1993); other birds including some raptors are often displaced by construction and may have reduced nesting success. Emlen (1974) identified two factors key to the decline of native desert avifauna in urban habitats: changes in the nature and quality of vital resources, and changes in the nature and magnitude of population suppressants. A study of bird

buffers in the United Kingdom indicated that animals commonly move away from an approaching human or encroaching human activities such as recreation and this response can have adverse influences on, for instance, their feeding success (Burger & Gochfeld 1998, Fernández-Juricic & Tellería 2000), range use (Andersen et al. 1997), reproduction (Giese 1996, Miller et al. 1998), survival (Wauters et al. 1997, West et al. 2002) and abundance (Miller et al. 1998, Fernández-Juricic 2000, 2002). Studies near Tucson have shown that black-throated sparrows and black-tailed gnatcatchers in particular require undisturbed, native vegetation (Germaine et al. 1998). Post development, undisturbed native habitat is not expected to remain; however remnant strips of native vegetation may persist.

Urbanization also results in the alteration of vegetation structure important to desert avifauna (Germaine et al. 1998, Emlen 1974). Urbanization results in the rapid increase of foraging and watering opportunities, but these opportunities are generally skewed toward ground-foraging, seed-eating guilds (Beissinger and Osborne 1982, Emlen 1974). While this study focuses on more urban development such as residential housing; mowing, weed abatement, and human disturbance are expected to result in shifts in vegetation at the project site. This is, coupled with the expected level of disturbance at the site is expected to result in a transition to more disturbance tolerant species.

Project impacts to native birds can be reduced or offset through implementation of Conditions of Certification **BIO-1** through **BIO-8** (see Common Wildlife, above). These measures would require biological monitoring during construction activities, worker environmental awareness training, minimization of impact areas, and protection measures to prevent wildlife entrapment in trenches, pipes, or other facilities or supplies. In addition, some birds are capable of successfully nesting in close proximity to some forms of localized disturbance. Therefore staff has incorporated the applicant proposed measures into the recommended Conditions of Certification **BIO-15** (Avian Bat & Golden Eagle Protection Plan) and **BIO-16** (Pre-construction Nesting Bird Surveys), see discussion of impacts to sensitive birds. Condition of Certification **BIO-16** includes conducting pre-construction nesting surveys, and the establishment of limited disturbance buffers. The condition would require the applicant to survey the project area for nesting birds prior to construction, and to prepare and implement a nest management plan to ensure the protection of native birds and their nests. The Nest Management Plan would specify buffer areas for impact avoidance to nesting birds, dependent on the bird species or family, conservation status, and nature of disturbance. The Plan also would specify procedures for situations where it may be necessary to reduce buffer areas for certain low intensity construction activities.

Implementation of these conditions of certification would avoid direct impacts to nests, eggs, or young of migratory birds and would reduce the impacts of construction disturbance to nesting birds to less than significant levels under CEQA.

Species that utilize the project site for foraging but not nesting, such as coopers hawks or red-tailed hawks and wintering birds such as merlins, sharp-shinned hawks, and ferruginous hawks would not be directly affected; however, the loss of foraging habitat would be considered significant absent mitigation. Loss of nesting and foraging habitat for these special-status bird species would adversely affect populations of these species within the Pahrump Valley. As discussed in the cumulative impact subsection, the

project would be a contributor to the cumulative loss of biological resources, including these special-status bird species. Implementation of Condition of Certification **BIO-12** (Desert Tortoise Compensatory Mitigation) would reduce this habitat loss by the preservation of similar foraging areas. Implementation of this condition of certification would reduce impacts from the loss of habitat to less than significant levels under CEQA.

Indirect impacts to habitat from the drawdown of surface and subsurface water in adjacent lands such as the mesquite thickets and Stump Spring ACEC would be reduced to less than significant levels with the implementation of conditions of certification, **BIO-23** (Groundwater-dependent Vegetation Monitoring Plan) and **WATER SUPPLY-4** (groundwater monitoring.

Project Operation Impacts and Mitigation

The operation of the HHSEGS project would result in long term persistent impacts to biological resources both within the existing perimeter fence and in adjacent habitats. Operational impacts include both direct and indirect impacts to biological resources that occur during the life of project operation, including maintenance activities. Because many maintenance activities occur at night (i.e., heliostat washing) human activities may disrupt native species in adjacent habitat. These impacts would remain an ongoing source of disturbance for many wildlife species that occur within the fenced facility perimeter and in adjacent habitat.

Operational impacts to biological resources include disturbance to common and sensitive wildlife (discussed below) from vehicle traffic; maintenance and washing (i.e., each heliostat would be washed with a pressure washing unit approximately every 14 days [ca. 6,071 heliostats washed every night based on 85,000 heliostats/14 days]); mowing and herbicide application; night time lighting and maintenance activities (i.e., washing and maintenance); noise; collisions with structures; and exposure to solar flux. These impacts are discussed further below.

Roads

The proposed project would require construction of ring roads in the heliostat field and access by facility staff and maintenance personnel would increase existing traffic levels along Tecopa Road. Increased traffic and use of these roads during operation of the facility will result in the ongoing loss of common and sensitive wildlife.

The ecological effects of roads have been widely studied (Hoff and Marlow 2002; Trombulak & Frissell 2000; Findlay & Bourdages 2000; Jones et al. 2000; Parendes & Jones 2000; Haskell 2000; Vistnes & Nellemann 2001). These studies have identified seven general effects from roads that include: mortality from road construction and vehicle collisions; modification of animal behavior; changes to the physical and chemical environment; the spread of invasive species, and increased human access and use (Trombulak & Frissell 2000). The large size of the project (i.e., approximately 3,277 acres) coupled with the activities required to support the operation of the facility such as mowing, bi-weekly washing, and routine maintenance, would result in ongoing disturbance and mortality to wildlife that remain within the project perimeter. Given the multi-year phased implementation of the project there would also be substantial use of

access roads outside of the fenced project site. Staff considers impacts from operational traffic to be a significant impact to wildlife.

To minimize the risks of increased traffic fatality and other hazards associated with roads at the project site, the applicant has proposed a variety of general minimization measures which staff has incorporated into Condition of Certification **BIO-8**. These measures include confining vehicular traffic to and from the project site to existing routes of travel, prohibiting cross-country vehicle and equipment use outside designated work areas, and imposing a speed limit of 25 miles per hour within the project area, on maintenance roads for linear facilities, and on dirt access roads to the project site.

Noise

Operational noise from the HHSEGS is predicted to range from 90 dBA near certain equipment to roughly 65 dBA in areas more distant from any major noise source and would not exceed 54 dBA at the closest residence or 52 dBA at the St. Therese Mission (HHSG 2011a). Based on this data staff assumes both the facility site and surrounding area will be subject to ongoing noise greater than 65 dBA. No significant ground or air vibrations are expected to occur, nor are tonal noises, such as noise from motors and fans (*ibid.*). Noise from operation of the facility could discourage wildlife from foraging and nesting adjacent to the proposed project.

Noise may affect birds in several ways, including annoyance which causes birds to abandon nests that are otherwise suitable; raise the level of stress hormones, interfering with sleep and other activities; cause permanent injury to the auditory system; and interfere with acoustic communication by masking important sounds or sound components (Dooling 2006). Many bird species rely on vocalizations during the breeding season to attract a mate within their territory, and noise from construction could disturb nesting birds and other wildlife and adversely affect nesting and other activities. Reijnen et al. (1995) demonstrated that for two species of European warbler *(Phylloscopus* spp.), sound levels between 26 dB(A) and 40 dB(A) reduced breeding density by up to 60 percent compared to areas without disturbance. Studies have also shown that noise levels over 60 A-weighted decibels (dBA) can result in nest abandonment and intense, long-lasting noise can mask bird calls which can reduce reproductive success (Dooling and Popper 2007; Hunsaker 2001). In addition, 60 dBA has been used by the wildlife agencies and the Energy Commission as a reference point for evaluating noise impacts on wildlife. Staff considers noise impacts to most nesting birds above 60 dBA to be a significant impact.

Noise from daytime operation and nighttime washing and maintenance activities could affect wildlife in adjacent habitats by interfering with breeding or foraging activities and movement patterns, causing animals to avoid areas adjacent to the project. This could disrupt foraging, breeding, sheltering, and other activities. Nocturnal (i.e., active at night) wildlife would be affected less because the maintenance activates would occur in different locations each night. However, lighting and noise from the pressure washers would disrupt nocturnal animals in adjacent habitat and those that remain within the project fence line. Staff considers noise effects to be of a concern for wildlife located in and adjacent to the project site. Noise may result in significant impacts to wildlife or nesting birds along the perimeter of the project primarily along sensitive wash and mesquite habitat (located in Nevada).

Lighting

Bright lighting at night could disturb the nesting, foraging, or mating activities of wildlife and make wildlife more visible to predators. Night lighting could be especially disruptive to nocturnal animals, including desert kit fox and owls, which were observed onsite. Lighting may also increase the risk of predation of wildlife because they may be more detectable to nocturnal predators (USACE and CDFG 2009). Many insects are drawn to lights, and bats or other insectivores may be attracted to lighted construction areas which would increase the potential for disturbance and mortality. However, many small species, such as rodents, rabbits, snakes, and bats, are less active in bright lighting (Longcore and Rich 2004), which may be a biological adaptation to avoid predation during bright moonlight.

Night lighting could be disorienting to migratory birds and, if placed on tall structures, may increase the likelihood of collision, as discussed in the "Avian Collision and Electrocution" subsection of this section. Switched lighting would be provided for areas where continuous lighting is not required for normal operation, safety, or security; this would allow these areas to remain un-illuminated (dark) most of the time, thereby minimizing the amount of lighting potentially visible off site. These measures are described in Condition of Certification **VIS-2** (see the **Visual Resources** section). With implementation of this measure lighting impacts to wildlife would be minimized. Although facility lighting would be shielded it is expected that the project would be operated seven days per week. Maintenance activities would also occur seven days a week, including nighttime hours when mirror washing would be conducted. Light from these activities is expected to result in ongoing disturbance to wildlife both within the perimeter fencing and in adjacent habitat.

Impacts to Wildlife from Weed Management Activities

The applicant proposed weed management as an ongoing activity on the project site. This may consist of both mechanical weed removal and the application of herbicides. The use of herbicides to control weeds can be effective; however herbicides that are indiscriminately applied or that have residual toxicity could adversely impact native plants and wildlife, or negatively affect water quality. Some herbicides, such as pre-emergent herbicides designed to deter germination, have a residual toxicity that may be harmful to wildlife.

Wildlife could be exposed to herbicides in several ways, including direct spray; indirect contact through grooming or contact with affected vegetation; and ingestion of contaminated vegetation, prey species, and water. Small animals will generally receive a higher dose, in terms of body weight, than large animals for a given type of exposure (Durkin 2007). **Biological Resources Table 9** identifies the general effects of herbicides on wildlife.

Biological Resources Table 9
General effects of herbicides on wildlife

Herbicide	Effects on Vegetation	Effects on Wildlife
Chlorsulfuron	Rate and extent of uptake following foliar application varies by species Inhibits an enzyme that is essential for plant growth	Causes weight loss and decreased body weight gain in experimental mammals Appears to have low toxicity in mammals, birds, fish, and invertebrates
Clopyralid	Highly selective toxicity to terrestrial plants (primarily broadleaf species) Relatively non-toxic to aquatic plants and grasses Regulates plant growth by acting as a synthetic auxin, thus altering plant's metabolism and growth characteristics	Appears to be relatively non-toxic to terrestrial or aquatic wildlife May adversely affect liver and kidney weights and gastric epithelial tissue Appears to show no effect on viability of bird eggs and chick immune systems
*Dicamba**	Mimics plant hormone indole 3 acetic acid Mechanism appears to involve a stimulation of ethylene production leading to accumulation of abscisic acid and/or cyanide resulting in abnormal growth	Displays an apparent pattern of interspecies scaling, with smaller animals being less sensitive than larger animals Relatively non-toxic to mammals, fish, and amphibians Acute toxicity to birds appears to be generally low May reduce growth and stunt eye development in pre- and post-hatch birds
Glyphosate	Inhibits shikimic acid pathway, effectively blocking synthesis of certain phenolic compounds and aromatic amino acids Inhibits photosynthesis, respiration, and nucleic acid synthesis	May reduce food conversion efficiency leading to loss of body weight in mammals and birds Certain surfactants used with glyphosate are much more toxic to fish that others May cause histological changes in gills, kidneys, and liver of some fish
Imazapyr	Inhibits an enzyme that is essential for plant growth Practically non-toxic to conifers	Appears to be relatively non-toxic to terrestrial and aquatic animals
Picloram	More toxic to broadleaf plants than grasses Mimics naturally occurring auxins leading to uncontrollable and abnormal growth	Appears relatively non-toxic to terrestrial animals Moderately toxic to aquatic animals, particularly some fish May affect fry survival and growth in some fish
Triclopyr	Mimics indole auxin plant growth hormones causing uncontrollable growth At sufficiently high levels of exposure, abnormal growth is so severe that vital functions cannot be maintained and plants die	May cause developmental effects at levels that cause maternal toxicity in mammals May have adverse effect on mammalian kidney functions Higher concentrations may cause mortality or immobility in frog tadpoles

Herbicide	Effects on Vegetation	Effects on Wildlife
		Larger doses may cause a decrease in body length and smaller doses may lead to lethargic behavior in some fish Relatively non-toxic to birds

The functional value of the entire 3,277-acre project site would be lost for most species of wildlife. However, some disturbance-tolerant species, and the many small species trapped within the perimeter, including birds, small mammals, and reptiles, may be harmed by ongoing weed management activities, including the use of herbicides. Plants and wildlife that occur in close proximity to the project, or downstream of the project could also be directly or indirectly affected by herbicide use, including desert tortoise and other special-status species protected under a variety of LORS.

The known toxic effects of some herbicides on wildlife are summarized in **Biological Resources Table 9**. Staff considers potential impacts to wildlife from herbicide use to be significant, absent mitigation. To avoid potentially significant impacts, Condition of Certification **BIO-18** (Weed Management Plan)would require the project follow guidelines for protecting native species from herbicides recommended by The Nature Conservancy. These may include restricting herbicide use on windy days, controlling drift, prohibiting the use of pre-emergents and other herbicides with residual soil toxicity, prohibiting spraying or mechanical weed management near special-status species, and limiting weed management around the perimeter to isolated occurrences of highly invasive species. The use of herbicides in the project area would also be required to comply with regulations set forth by the U.S. Environmental Protection Agency (EPA) and California Department of Pesticide Regulation (CDPR).

Retention Area

Operation of the project would require the development of a 125-acre storm water retention area to manage stormwater runoff and protect downstream private lands from erosion and sedimentation. The retention area will occur on the western side of the project (CH2 2012ii) and would control peak flows that would occur from elevating the western perimeter roadway above the existing grade. The accumulated water would drain through an 18-inch culvert or infiltrate into the soil. Information in the AFC indicates that a 5 year storm could result in standing water over one foot deep, and water almost four feet deep could result from a 100-year storm. The applicant indicates that the retention area would drain completely within 24 hours with the installation of three 18-inch drain pipes (CH2 2012ii).

Water impounded in the retention area will adversely affect both native vegetation and wildlife. Small fossorial (i.e., burrowing animals), or species with limited dispersal abilities that remain within this area will be periodically lost during large storm events. This may include ground nesting birds. In addition, given the scarcity of water in the desert, many species of wildlife can be attracted to areas supporting large areas of standing water. Retention basins that hold water for extended periods of time would provide a potential water source in an otherwise arid region and could act as a subsidy to ravens. Since the retention area coincides with placement of heliostats, the location will be fenced from routine animal use; however, the retention basin may still attract

predators and other species, including waterfowl. In addition, small mammals, waterfowl, shorebirds, and other resident or migratory birds may attempt to access areas supporting ponded water despite the perimeter fencing. The project site is located in an area where ephemeral drainages from the surrounding mountains terminate, and localized flooding would be expected, and has been previously documented at the site (KCET 2012).

Successful eviction of kit fox, burrowing owl, and badger has been a continuing concern on large solar projects. At the Ivanpah Electric Generating System project, kit fox have been observed climbing eight foot chain link fence (Douglas Davis pers. comm. 2012). Burrowing owls have also entered pens where tortoises are held onsite, and where human presence is a daily factor. On the Genesis Solar Electric Generating Project (GSEP), the use of electrified fencing added to project perimeter fencing has also failed to deter kit fox from entering and exiting the site on a daily basis (GSEP Monthly Compliance Report 2012). While it is uncertain if the desert kit foxes are trying to return to previous occupied territories or seeking ponded water these areas remain an ongoing concern for staff. Another concern is the location of the retention pond along the western border of the project site where attraction to the ponds by birds would increase the possibility of collision with facility structures. Staff considers large areas of standing water, even for relatively short durations of time, to pose a potential risk to desert tortoise and other wildlife because of the potential subsidy these pools provide to ravens.

Implementation of **BIO-8** (Impact Avoidance and Minimization Measures) would minimize the potential for the project to provide further subsidies to ravens and other predators. This condition includes the requirement that standing water does not persist on the project site for more than 24 hours after a precipitation event. With implementation of this condition, impacts to wildlife from the retention basin would be considered less than significant.

Avian and Bat Issues

The project would introduce several factors which could cause injuries or even mortality to birds. Potential operational impacts include collision with the power tower or heliostats, risk of burns to birds that fly into the reflected sunlight between the heliostats and the power towers, electrocution, and disturbance from lighting. These are discussed further below.

Collisions, Lighting, and Glare

The project would include two power towers, heliostat fields, and ancillary equipment including boilers and control facilities. Onsite facilities range from a height of 750 feet (power towers), to 120 feet for boilers and the air-cooled condenser unit. Each of the heliostats is approximately 12 feet high. The remaining facilities are generally less than 80 feet in height (HHSG 2011a). All of these features would pose a potential collision risk for birds. Birds are known to collide with communications towers, transmission lines, and other elevated structures including buildings. Estimates of the number of bird fatalities specifically attributable to interactions with utility structures vary considerably. Nationwide, it is estimated that hundreds of thousands to as many as 175 million birds are lost annually to fatal collisions with transmission and distribution lines (Erickson et

al., 2001). Numerous studies have also documented extensive avian collision mortality associated with buildings and similar structures such as smokestacks or monuments (*ibid*). In California, even general estimates are unavailable, although it is plausible that such collisions result in the deaths of hundreds of thousands of birds each year (Hunting, 2002).

Collisions typically result when the structures are invisible (e.g., bare power lines or guy wires at night), deceptive (e.g., glazing and reflective glare), or confusing (e.g., light refraction or reflection from mist) (Jaroslow 1979). Collision rates generally increase in low light conditions, during strong winds, and during panic flushes when birds are startled by a disturbance or are fleeing from danger. The Avian Power Line Interaction Committee (APLIC) has determined that collisions are more probable near wetlands, within valleys that are bisected by power lines, and within narrow passes where power lines run perpendicular to flight paths (APLIC 1996). Collisions are more probable near wetlands, valleys that are bisected by power lines, and within narrow passes where power lines run perpendicular to flight paths. Passerines (e.g., songbirds) and waterfowl (e.g., ducks) are known to collide with wires (APLIC 2006), particularly during nocturnal migrations or poor weather conditions (Avery et al. 1978).

Diurnal birds, or those active during daylight hours, could also collide with tall structures. Staff has concluded that the risk of such impacts is low. Most diurnal bird collisions with tall structures are associated with guyed towers in poor visibility conditions such as fog or inclement weather (Manville 2001). The HHSEGS project does not include guyed structures. While the project would not have evaporation ponds that could attract birds to the site, it would contain a 155 acre stormwater retention basin that would hold water for up to 24 hours after seasonal rainfall. In addition, dust storms and or windy days may increase particles in the air, which in turn reflect the solar energy and could increase the collision risk for birds.

To date little is known regarding the avian response to glare from solar technology. However, it is likely that glare will affect birds to some degree. In the same way that large mirrored buildings may be confused by birds as open sky; the mirrors will reflect light and take on the color of the image being reflected. This may result in birds confusing the heliostats as either open sky or water and increase the collision risk. Bird response to glare is not well understood. Staff has reviewed research by McCrary et al. (1986) which quantified bird mortality, including collisions, at a 10 MW pilot SRSG pilot facility (Solar One) near Daggett, California. The Solar One facility consisted of a 79-acre heliostat field and 282-foot solar receiver tower. Staff is not aware of any other scientific study of bird mortality at any other comparable generator.

McCrary et al. documented 70 bird fatalities during the course of a 40-week study, and estimated that approximately 10 to 30 percent of bird carcasses went undocumented because animal scavengers removed the carcasses before they were detected by the researchers. Adjusting for the estimated number of undocumented birds, the total average mortality rate was 1.9 to 2.3 birds per week. The bulk of bird mortality (more than 80 percent) resulted from collisions. The average weekly mortality rate for collisions was 1.5 to 1.8 birds. Most of these mortalities were from collisions with the heliostat mirrors, and one known mortality resulted from collision with the solar receiver tower. The authors partially attributed these collisions to high numbers of birds attracted to the adjacent evaporation ponds and agricultural fields. The applicant has undertaken

monitoring bird mortalities due to solar flux exposure at its six MW SEDC project in Israel (BS 2012x, BS 2012v, BS 2012w), a site that is significantly smaller than the proposed HHSEGS site. To date, no mortalities due to collision or lethal exposure to concentrated solar flux have been reported (Ibid.); however, staff concluded survey methodology was inadequate to detect carcasses presence. The proposed project would be substantially larger than both Solar One, SEDC, or GEMASolar (BrightSource Energy, Inc 2012x). **Biological Resources Table 10** compares physical characteristics of Solar One, GEMASolar, and SEDC to the proposed project**.**

Biological Resources Table 10
Avian Mortality Hazard: Comparison of SRSG Projects

Project Component	Solar One (San Bernardino Co., CA)	SEDC (Israel)	GEMASolar (Andalusia, Spain)	Hidden Hills SEGS (Inyo Co., CA)
Acreage / MW	79 acres / 10 MW	80 / 6 MW	457 acre/19.9 MW	3,277 acres / 500 MW
Mirrors	1,818 heliostats, each one 430 ft^2); Total = 781,740 ft^2	1,610 heliostats, 75-150 ft^2 each. Total = 120,000 – 240,000 ft^2	2,650 heliostats = to 1,075 ft^2	2 generators x 85,000 heliostats each (170,000 total); 2 mirrors per heliostat; each mirror 8.5 x 12 ft (102 ft^2 each, 205 ft^2 per heliostat); Total = 34.8 million ft^2
Tower(s)	One; 282 ft. tall	One; 256 ft tall	One; 420 ft tall	Two; each one 750 ft tall
Adjacent land use/ habitat	Desert shrubland; adjacent agriculture & evaporation ponds	No agriculture or wetlands; adjacent evaporation ponds; within major migratory flyway	Unknown	Adjacent to desert shrubland, near mesquite thickets in Nevada, and Important Bird Areas
Bird Mortality	70 mortalities documented during 40 weeks of surveys 19 were waterfowl & shorebirds; 51 (incl. all burns) were other species	Applicant commenced bird monitoring at this location in spring 2012. No mortality or injuries reported	No mortality or injuries noted after two days of carcass searches.	

Source: URS 2012a.

McCrary et al. (1986) also inventoried bird carcasses on the Solar One project site and estimated the number of birds in the surrounding approximately 370-acre area, including the solar facility, evaporation ponds, and adjacent agricultural fields. They estimated total bird mortality as 1.9 to 2.2 birds per week (including collisions and

"burns", from exposure to concentrated solar flux); and that collisions account for 1.5 to 1.8 of the weekly mortalities). Based on the total number of birds observed in the area, weekly, mortalities (collisions and burns) accounted for a 0.6 to 0.7 percent weekly mortality rate in the survey area. Much of the bird mortality consisted predominantly of collisions with mirrors, according to McCrary. These collisions were partially attributed to an increased numbers of birds attracted to the adjacent evaporation ponds and agricultural fields (McCrary 1986). However, it is important to note that the Solar 1 facility was completely graded, with heavy industry development adjacent to the facility. The proposed project enlists use of a low impact design, with the majority of habitat remaining intact onsite, albeit mowed.

The applicant has indicated that heliostat mirrors at the proposed project would be shorter than those at the Solar One site, and that this design difference would reduce collision hazard for birds. However staff has been unable to find documentation of relative collision hazards of taller or shorter mirrors. Staff believes that collision hazard is more likely to be a function of the total area of mirror surface than the height of the individual mirrors, and how birds appear to interact with reflective surfaces. The HHSEGS project would have 37 times more surface area of mirrors. Based on those factors, the Solar One collision mortality rates extrapolate linearly as 56 to 67 (rounded) bird mortalities per week at the larger HHSEGGS project site. The low value (56 birds per week) is based on the estimate for Solar One collision mortalities (1.5 birds per week) multiplied by 37 (mirror surface ratio). The higher value (67 birds per week) is based on the higher estimate for Solar One collision mortalities (1.8 per week) multiplied by 37(the mirror surface ratio). Annually, this results in a range of mortalities from 2,912 to 3,484 birds. These estimates do not account for morbidity that occurs as a result of collision and exposure to concentrated solar flux.

These extrapolations are intended as projections of the anticipated scale of bird collision mortality, using the best data available. Staff cautions, however, that this is not an estimated or predicted mortality rate. McCrary et al. (1986) noted that "The greater magnitude of these [larger commercial-scale] facilities may produce non-linear increases in the rate of avian mortality when compared to Solar One and extrapolations from this study should be made with caution." Due to the many factors contributing to bird collision risk and bird behavior in a concentrated solar flux zone, staff cannot quantify expected bird mortalities from the project facilities. Nevertheless, staff believes that the risk is significant. See **Appendix BIO1** for a discussion of the nonlinear scaling of effects from concentrating solar power projects.

Lighting also plays a substantial role in collision risk because lights can attract nocturnal migrant songbirds, and major bird kill events have been reported at lighted communications towers (Manville 2001), with most kills from towers higher than 300 to 500 feet (Kerlinger 2004). Radar data from the Mojave Desert indicate that less than 15 percent of birds that migrate at night fly below 984 feet (Felix et al. 2008), therefore more migratory flight is likely to occur over the 750-foot power tower. Disruption of birds' migratory path, such as happens during storm events can cause birds to fly at lower heights, and be at risk of collision with the tower or other project facilities. Many of the avian fatalities at communications towers and other tall structures have been associated with steady-burning, red incandescent L-810 lights, which seem to attract birds (Gehring et al. 2009). Longcore et al. (2008) concluded that use of strobe or flashing lights on

towers resulted in less bird aggregation, and, by extension, lower bird mortality, than use of steady burning lights. Bright night lighting close to the ground at the project site could also attract bats and disturb wildlife that occurs adjacent to the project site (e.g., nesting birds, foraging mammals, and flying insects).

The project's transmission lines are not expected to pose a collision risk to bats. Although many studies have quantified bird strikes with transmission lines, analogous information on bats is very limited (Manville 2001). Collisions with distribution, collector or feeder lines will likely occur to some degree however collision risk is not thought to pose a significant risk to bats in the project area. The most likely collision risk for bats is associated with vehicle or equipment as bats forage near roads or work areas.

Given that most bat species can use echolocation to discriminate objects as small as 0.4 to 0.004 inches in size (Vaughan and Vaughan 1986), and the size of transmission lines are typically equal to or greater than 0.5 inches in diameter, the frequency of strikes with facility structures is expected to be extremely low.

Installation of heliostats could also cause an increase in Polarized Light Pollution (PLP) which occurs from light reflecting off of dark colored anthropogenic structures, and been demonstrated to be generated from even low-reflectance photovoltaic panels (Horvath et al. 2009). According to Horvath et al., PLP caused by anthropogenic structures can alter the ability of wildlife to seek out suitable habitat and elude or detect the presence of predators (Horvath et al. 2010). It has also been documented that for a variety of birds and other species PLP can affect their ability to detect natural polarized light patterns in the sky which can negatively affect navigation ability and ultimately affect dispersal and reproduction (Horvath et al. 2009). Although the proposed heliostats are not expected to result in PLP the effects of large reflective surfaces are poorly understood. Polarizing surfaces are also known to disrupt insect behavior, causing some insects to react as though the surface is water, and depositing eggs on polarizing surfaces ((Horvath et al. 2009)., Horvath et al (2009) determined that minimization of polarizing effects was possible by adding white grids onto solar panels, or otherwise minimizing the solar active area. The extent to which heliostats could serve as an attractant is not known.

There is uncertainty regarding how many birds may be killed by collisions with project features, but bird mortality is predictable. The significance of such mortality, in a CEQA context, is also uncertain, and would vary depending on the species involved, and the number of birds involved.

To minimize this risk of collision and disturbance to wildlife from lights, Condition of Certification **BIO-8** specifies that the lighting atop the towers be flashing strobe lights rather than steady burning lights, and that lighting be shielded, directed downward, and turned off when not needed. The project owner has proposed use of FAA lighting systems on the HHSEGS project, using only red lights at night with the longest permissible interval between flashes and the shortest flash duration permissible, which would further reduce the potential for nocturnal strikes. Staff has incorporated these measures into proposed Condition of Certification **VIS-3**, which directs the use, placement, and minimization of all lighting. Condition of Certification **BIO-15**, which requires development of an Avian, Bat, and Golden Eagle Protection Plan, would

require the project owner to monitor, record, and report dead or injured birds found within the project footprint. The plan would also require the implementation of remedial actions including the placement of aerial markers, ribbons, or other devices to reduce bird mortality. Monitoring of operational impacts for seasonal factors, and species of birds affected, and types of injuries or mortalities has also been requested by the USFWS, is considered crucial in understanding operational impacts, bird behavior and responses to stresses, and identifying and implementing measures to avoid, minimize, or mitigate impacts. However, staff believes residual impacts to avian species will exist after implementation of the conditions of certification.

Staff also recommends Condition of Certification **BIO-15** (Avian, Bat, and Golden Eagle Protection Plan) to monitor bird mortality due to glare. Staff concludes that the Avian and Bat Protection Plan and mortality monitoring as recommended in Condition of Certification **BIO-15** would effectively determine rates of bird and bat mortality from collisions with structures. It may not be feasible to accurately determine the rate of latent mortality, when mortality occurs at a time and place removed from the project site. There is no feasible means of minimizing or avoiding this impact.

Solar Energy Flux

Implementation of the proposed project would have the potential to expose birds to potentially dangerous levels of solar energy. Solar energy from the field will strike the bird as it is reflected from the heliostat field to the solar receiver. Solar energy would be expected to strike the bird in the heliostat field, and the intensity of the exposure will vary, based on a number of factors including the angle of the bird (see **Appendix BIO1 and Appendix BIO2, Figures 1 -7**).

Thresholds for solar flux exposure have been established for humans, and range from 1.42kW/m^2 (24CFR, Section 51.204 Appendix II) to 5kW/m^2 (49CFR Part 193). No published threshold for avian exposure has previously been identified. Exposure to solar flux has the potential to result in direct and indirect effects to birds by damaging their eyes, including the loss of sight; burning or singeing feathers; compromising the molecular structure of feathers (i.e., non-visible damage); and secondary, non-visible physiological changes including elevated body temperatures or thermal stress. In some circumstances exposure to solar energy flux will result in the death of the bird either immediately or within a short period of time following exposure. The potential for injury depends on a variety of factors including the size and type of bird; length of exposure; and the level of solar energy flux (see **Appendix BIO1**). **Biological Resources Table 11** provides an example of the effects of solar energy flux on various organic materials including applicant's preliminary, unpublished anecdotal information on bird carcasses.

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Biological Resources Table 11
Effects of Thermal Radiation*

Radiant Heat Flux (kW/m^2)	Observed Effect
0.67	Summer sunshine in UK [a]
1	Maximum for indefinite skin exposure
6.4	Pain after 8 second skin exposure[b]
10.4	Pain after 3 second exposure[a]

12.5	Volatiles from wood may be ignited by pilot after prolonged exposure
16	Blistering of skin after 5 seconds[b]
29	Wood ignites spontaneously after prolonged exposure[a]
50	Singed or burned feathers; tissue discoloration and drying of a bird carcass after 20-30 seconds (BS 2012v)
52	Fibreboard ignites spontaneously in 5 seconds[a]

[a]D. I. Lawson (1954) [b]S.H. Tan (1967)
The data quoted for human exposure are essentially in agreement with information given by Purser (1995) and Mudan and Croce (1995)
Table source: Drysdale 1998, An Introduction to Fire Dynamics, 2nd Ed., by Dougal Drysdale, Publ: John Wiley and Sons, 1998, Table 2.8, P. 61

McCrary et al. (1986) found that 13 of the bird carcasses (19 percent) at the Solar One facility had been burned, reporting that the "heavily singed flight and contour feathers indicated that the birds burned to death," see Appendix BIO2, Figure 7. The authors interpreted these mortalities as the result of birds flying through that facility's standby points, though they did not observe the incidents, and the mortalities also may have been caused by flying within elevated flux levels surrounding the SRSG during normal operation. Risk of burning was evidently higher for aerial foragers (swifts and swallows) because of their feeding behavior. The McCrary study was based on systematic searches of the 32 hectare (79 acre) Solar One site but not beyond the site boundaries. Thus, if any birds were injured but were able to fly beyond the site's boundaries (about 1,200 ft from the receiver tower), they would not have been found by the field biologists and could have been scavenged before being observed. For this reason, staff believes that actual mortality from burning may have been higher than reported. It is also possible that birds considered collision victims had suffered damage to flight feathers such that birds were unable to fly, or had experienced damage to the eyes and became disoriented, resulting in collision with the heliostats. However, the authors did not perform microscopic examination of feather structure or eyes that would make this determination possible.

The HHSEGS's reflective surface area would be 37 times greater than Solar One's. Mortality ascribed to solar flux exposure at the Solar One site ranged from 0.3 to 0.4 birds per week. Based on those factors, the Solar One radiant energy flux mortality rate extrapolates linearly as 11 to 15 bird mortalities per week at the larger HHSEGS project site, or 572 to 780 bird mortalities per year. This extrapolation is intended as a rough projection of the anticipated scale of radiant energy flux mortality, but that it may be inaccurate for a variety of reasons. Even with site mortality monitoring it will be very difficult to discern the full impact of solar flux on birds. A detailed discussion of non-linear scaling effects has been included in **Appendix BIO1**. Due to the many factors contributing to bird collision risk, staff cannot quantify expected bird mortalities from radiant energy flux. Nevertheless, staff believes that the risk is significant. Interestingly, the authors concluded that power tower projects should be located away from water sources and rare, threatened, or endangered species (Ibid).

Elevated levels of solar flux would occur within some airspace over the solar field. This field would expose a variety of birds, bats, and insects to potentially damaging levels of solar energy. The applicant has stated that the HHSEGS would begin to operate at the moment the sun appears over the horizon; there is limited potential for bats to be active at that time. Birds that fly at lower elevations over the heliostat field may, intentionally or unintentionally, fly below zones of concentrated solar flux, and therefore not suffer damage from exposure to high levels of solar energy (see **Appendix BIO1**).

There is no information available to staff on the safe levels of solar energy flux that bats or insects may tolerate; however, because of body size and the absence of feathers, these species would be subject to adverse effects from lower intensities of solar energy flux than most birds. The risk to bats from the exposure of concentrated levels of solar energy is likely to be low. Bats are crepuscular, that is, primarily active during dawn and dusk, and at night when the facility would not be fully operational. Therefore this risk is not expected to be significant.

Staff has evaluated the formulation of a risk assessment model for the HHSEGS project, and the possibility of adapting existing risk models commonly used for the wind industry to power tower technology. Staff and the resource agencies have agreed that there is insufficient background data on expected bird use at the site to perform a risk assessment, and that a "retooled" wind project model is likewise not yet available to create a risk assessment model for this technology. Therefore, further quantification of mortalities is not currently possible. **Appendix BIO1** provides a "Characterization of Risk" and "Analysis of Uncertainty for the HHSEGS project and provides describes staffs best estimates for evaluating risks associated with this technology.

As described above staff believes that exposures to elevated levels of solar energy would be likely to kill living birds. In addition, staff believes that shorter exposures would be likely to cause other tissue or feather damage that could impair flight or vision or cause physiological effects and ultimately cause or contribute to mortality from other causes (e.g., reduce ability to forage, escape from predators, or thermoregulate). Staff also believes that longer exposures to lower energy flux levels are likely to cause feather damage or physiological effects. The following discussion is intended to illustrate the role of feathers to birds, and the types of behavioral or physiological functions that may be impaired or destroyed following exposure to concentrated solar flux in excess of safe thresholds, estimated to be no more than one minute's exposure at 4kW/m^2.

Damage to Plumage and Flight Feathers

A birds' plumage is well adapted to its environment, and serves a variety of roles, such as: flight, thermoregulation, protection from impact, defense, incubating eggs and young, tactile hunting, seasonal displays such as breeding plumage in male birds, and camouflage from predators (Raptor Research Foundation, 2012). When exposed to elevated levels of solar radiation; it is the plumage that is expected to show the first signs of damage. Eye exposure is also expected be a sensitive endpoint, and is discussed further below in the section entitled Irradiance.

Surface feathers, or contour feathers, cover and streamline the remainder of the body and also contribute to aerodynamics. Insulating feathers are found beneath the contour

feathers. Damage to insulating feathers may affect the bird's thermoregulation (body temperature control). A bird's plumage is critical to insulating the bird from the environment, and is influenced by color and structure of the plumage (Wolf and Walsberg 2000).

Bird feathers grow from lines, or tracts, pterylae (Raptor Research Foundation 2012) with bare patches of skin in between, called apteria (Ibid.) There are several types of feathers, including fluffy down insulating feathers (which are used in the manufacture of pillows); semi-plumes, which shape and insulate the bird, bristles, usually around the face and used in feeding; filoplumes, used to feel and sense vibrations, and contour feathers, which add shape to a bird. A diagram of a feather is depicted in Appendix BIO2, Figure 6. Feathers are comprised of a central shaft, or rachis, and barbs come off the rachis at an approximately 45 degree angle (45°). Between barbs are two sets of barbules, microscopic filaments that connect each barb (Doctors Foster and Smith 2012, Muller and Patone 1998). Barbules have even smaller microstructures, called barbicels, which hooks the barbules together. These barbules act like a zipper, connecting the barbs and making them airtight and able to withstand air resistance during flight (Ibid., see also Muller and Patone 1998). This microstructure of a feather, consisting of barbules and barbicels, comprises the majority of the feather, and is not visible to the naked eye. These components, so critical to flight, are used in establishing a safe avian exposure criteria (see **Appendix BIO1**)

Flight feathers may be one of the most important feathers at risk from exposure to high levels of solar energy. The long relatively rigid feathers of the wings and tail (flight feathers) are the bird's aerodynamic flight surfaces. These feathers provide lift and are adapted to the body style of the bird, that is, raptors have long wings and long pointed flight feathers that allow for catching air current and generating great speed, while other birds have wing lengths and flight feather construction that allow for various flight patterns and behaviors. The feathers used for flight include primary, secondary, and tertiary feathers which are located along the arm of the bird, while the large tail feathers are called retrices. Feathers are "instrumental in flying [and] they play a critical role in temperature regulation" (Sibley 2002), and are considered the most valuable asset a bird has (Raptor Research Foundation 2012).

Feathers damaged by concentrated solar flux would only be replaced during a molt. Birds have no physiological means to replace damaged feathers other than seasonal molting. Molting generally occurs during or after the breeding season (Raptor Research Foundation 2012), and birds are known to time molting to optimize fitness such as after migration, or in concert with breeding. During a molt, the bird replaces all of the feathers over a period of four to 16 weeks. Typically the molt is staggered to allow the bird to fly and maintain thermal protection. Depending on the stage of molt, the existing plumage would provide varying degrees of protection from solar energy. A bird in the middle of molt, that may have areas of exposed skin, would be expected to have an increased risk from exposure to elevated levels of solar energy flux and may experience immediate tissue damage to tissue; having no thermal protection from plumage.

Birds replace lost feathers slowly and even minimal damage to flight feathers can significantly affect flight performance. Large birds, such as eagles and vultures may take up to two years to molt (Raptor Research Foundation 2012); although a few

species will molt all flight feathers at once (Ibid.). When a feather is actively growing, blood is supplied to the shaft of the feather. When fully grown and formed the vessels that supply blood to the feather constrict and the feather is considered dead tissue, without feeling, similar to human hair. A feather broken while in the blood feather stage remains damaged until molt (Chubb 2003). Birds exposed to elevated levels of solar energy flux while in the blood feather stage may be subject to increased risk of feather damage. Additionally, it is unknown if a feather heated by flux could conduct heat through the feather shaft and into the follicle or skin of a bird.

Molting requires additional energy to create the feather components and synthesize them (Murphy 1999). A bird that has experienced damage from elevated levels of solar energy flux may have diminished abilities to meet existing energy requirements. Damaged plumage may require the use of additional energy to fly, forage, and perform normal behaviors lowering the survivability of the bird. Hawks and eagles have been demonstrated to manage the nutritional cost of molting by shedding just two feathers on each wing at a time, and typically having around 24 flight feathers total to be molted (Chubb 2003). Feathers produced during periods of poor nutrition can be faulty, showing ridges and other abnormalities (German Assn. for the Prot. Of Common Swifts 2012), therefore, one or more molts may be necessary to repair the damage, and a bird would be energetically challenged to do so if damaged feathers reduced the birds success at foraging.

Exposure to elevated levels of solar flux would be expected to damage feathers such that insulating and flight capacities are lost, impaired or even destroyed. Birds exposed to damaging levels of solar energy flux either during or after a recent molt may also have an increased the risk of mortality or decreased fitness. In a desert environment, staff expects that a bird exposed to high temperatures and with limited access to water would have low survivability, either succumbing to heat, or extreme cold during cold desert nights, or from being more susceptible to predation. Birds with exposed skin are considered “greatly disadvantaged” (Chubb 2003). As with most species, older and younger individuals would be considered more susceptible to injury or mortality from elevated levels of solar flux. For example, juvenile birds have feathers that are much softer, and are not as adept at maintaining feathers as adults (The Modern Apprentice 2012); and may be more susceptible to injury or mortality than older birds.

Flight Performance

Fight performance is critical to foraging, evading predators, conducting seasonal migration and breeding displays, and performing other life history characteristics. In pet birds, incorrect feeding or caging can cause damage and weakness in feathers such that swifts cannot thermoregulate or fly (German Assn. for the Prot. of Common Swifts 2012). Seemingly minor damage to flight feathers may affect a bird’s flight speed or its ability to maneuver; more significant damage to flight feathers would prevent flight altogether. Length of flight feathers, and asymmetry in flight feathers were noted to reduce take-off speed in birds, when impaired by damage, or during molt (Swaddle et al 1996). In rehabilitating wild birds, the condition of plumage is critical to determining if the bird can be released. If plumage conditions allow the bird to fly, thermoregulate, and waterproof themselves, the survival rate is much greater (Wildlife Rehabber 2012). Additionally, damage to flight feathers may impact a birds’ capability to migrate. Passerines with impaired flight feathers have been demonstrated to avoid long-distance

flights (Hedenstrom 2003). Birds prevented from seasonal migrations due to the inability to effectively fly may experience mortality from the lack of food or exposure. Birds damaged by exposure to elevated solar energy flux would likely have limited abilities to complete these actives, and may suffer mortality at a later time or after leaving the site (i.e. off the project site). See **Appendix BIO1** for further discussion of flight mechanics.

Flight performance is also important in raising young. Adult birds make numerous trips back and forth from foraging grounds to the nest, carrying food items to young. A bird attempting to feed young with damaged flight feathers would have impaired flight capabilities that reduce the bird's ability to forage or hunt. Raptors in particular carry large prey to young, and have feathers adapted to these heavy loads. Bald eagles are capable of carrying up to half of their weight (Nye 2005), and damaged flight feathers would be detrimental to successful fledging of chicks.

Flight speeds and patterns will affect the length of time a bird is exposed to solar flux while moving across the project site. Flight speeds are reported to be typically within 10 20 to 50 miles per hour (mph) (USGS 1998), and vary dramatically on the upper end of the range. Appendix BIO1 provides estimates of the time required to traverse the solar field at various flight speeds, and also provides data for select flight paths and concentrated solar flux dose at the Solar 1 site. For reference purposes, horned larks and ravens are known to occur on the project site, and fly from 22 to 28 miles per hour, (mph) (USGS 2006), whereas mourning doves, which could also occur onsite, are faster flying, around 35 mph. Even faster are the swifts, whose speeds may possibly exceed 180 mph (Cooke 1933). It is unclear how flight speed may affect the likelihood of exposure to elevated levels of solar flux. Flight patterns would also affect the dose of solar flux a bird receives. Depending on species and behavior, birds exhibit various flight patterns such as continuous flapping, as well as non-continuous flapping such as soaring or gliding, flap-bounding and flap-gliding. Furthermore, flap speed varies depending upon energetics, weather conditions and speed needed, with swallows having a very low flap speed for birds of comparable size (Park et al 2001).

While it is unknown what the behavioral response of a bird will be from exposure to elevated levels of solar energy flux, passage through an area of high energy intensity could result in injury to the birds. Bird behavior will likely act in conjunction with flight speed to influence the probability of the exposure risk. Birds that fly at low elevations below elevated levels of solar energy flux are not expected to experience an exposure risk. However, aerial foraging birds, such as swifts and swallows, have been documented to be more likely to experience exposure to this risk (McCrary 1986).

The type and color of the plumage will also influence the potential risk to the bird. Plumage will absorb various amounts of solar radiation, depending on many factors. Plumage color, position of bird, density and structure of feathers, and flight speed, will all affect a birds' tolerance to this heat (Walshburg 1992). Other factors such as behavioral response to elevated flux levels, age of the bird, ambient temperature and humidity level will also affect how exposure to elevated solar energy levels will impact a bird. Birds will not be able to see the solar energy flux over the heliostat field, and therefore would not be expected to avoid the airspace where solar energy is concentrated. Birds may also become confused or disoriented and depending on

behavioral response, such as flying lower, higher, or making evasive maneuvers will affect duration of exposure.

It is unknown what protection plumage will afford the different species of birds that may move into solar fields and experience elevated levels of solar energy flux. At low levels and short durations the birds may suffer little permanent damage and be able to survive post exposure. However, at exposure to high levels of solar energy flux even short durations may be lethal even if the bird is able to fly out of the flux field. For a large powerful bird, such as golden eagle, lethal damage to plumage, skin, or eyes from exposure to high levels of solar energy flux may occur, yet the bird may be able to fly away from the site. Documenting incidences of latent mortality that occur off the project site is likely not feasible nor is it possible to accurately predict what percentage of birds would be subject to this effect.

Irradiance

When the project is operating, the heliostats will reflect the sun's rays onto the SRSG, which occupy the top 130 feet of each solar power tower. During these times, the boilers absorb approximately 95 percent of the light that reaches them. Light that is not absorbed will be visible reflecting off of the surfaces of the solar boilers.

The perceived brightness of objects is measured in terms of retinal irradiance, which is a measure of the intensity of the light reaching the retina. Retinal irradiance also has the potential to cause adverse impacts. The avian eye is comparatively larger than the human eye (Brooke et al 1999), and raptors have even larger size eyes than non-predatory birds of the same weight (*Ibid*). Birds eyes are typically fixed in the socket and unable to turn (Project Beak 2012), although some species such as raptors have limited ability to turn their eyes (White et al 2007) (O'Rourke et al 2007), and have very wide fields of view (O'Rourke et al 2007). Some birds may be unable to look away or avoid exposure, given their physiological attributes (Dr. Gregg Irvin, personal communication). This lack of response would be considered similar to a "deer in the headlights". In humans, the sensation of pain is not linked to retinal damage, nor does it seem to be linked in animal species (*Ibid*).

It has been suggested that the presence of specially-adapted oils in the cones of avian eyes may provide some protection against solar irradiance (Vorobyev 2003). Staff has no data on how much, if any, protection is gained by the presence of these oils. However, it is assumed that wildlife have evolved and adapted protective physiological traits specific to their environment, and would not have innate protections against irradiance of the magnitude created by the project.

Staff has no further data regarding the impacts of irradiance exposure on wildlife. It should be noted that the possibility exists for wildlife to experience damage, yet still be able to fly off the site. For the purposes of evaluating significance thresholds, staff believes irradiance has the potential to cause injury or lethality to avian species that fly within an un-quantified area of the solar field. Estimates of species most susceptible, or numbers of individuals exposed to damage from irradiance is not currently available. Injury or death from exposure to irradiance would be in conflict with LORS. It should be noted that the monitoring and mitigation protocol outlined in Condition of Certification

BIO-15 would not detect eye damage, as necropsy of a live or freshly killed specimen would be needed to quantify damages. Staff has accounted for the lack of data by incorporating a safety margin (see Appendix BIO1) for flux exposure on feathers, and therefore will rely on damage to keratin (feathers) as the lowest endpoint of toxicity.

Applicant's Data

Staff has reviewed all information provided by the applicant with respect to solar flux. The applicant initiated a pilot study commissioned by the applicant at the SEDC site in Israel in April, 2012 (CH2 2012pp). The SEDC site uses similar technology, albeit is a much smaller project, with a 75-meter power tower. After 41 days of monitoring, only 3 bird carcasses were found at the SEDC site, with no signs of singeing or effects of collisions noted on the carcass. However, it is possible that flight capability was impaired by flux exposure, but not detected during examination of the carcasses.

Further information regarding the study was provided on November 1, 2012 (CH2 2012pp) and during a workshop held December 5, 2012, including information regarding study design at the site, and presenting the results of spring 2012 survey data. The study includes carcass searches within the heliostat field, as well as observation of bird behavior in the airspace over the project site. During 41 days of surveys a total of 62 species have been observed at the project site, with the majority of the birds flying above 100m. Fall surveys of the SEDC site will be performed from August 15 to October 15, 2012 (CH2 2012pp); no results were available to staff at time of publication of this analysis.
The applicant also provided results of the preliminary investigation on the effects of concentrated solar energy on bird carcasses to staff during a workshop on August 28, 2012, and December 5, 2012 (BS 2012uBS 2012v, BS 2012w, BW2012x). Carcasses of three species (chickens, doves, and quail) were exposed to various energy flux level for periods of 10 to 30 seconds. Burned or singed feathers and discolored or dried muscle tissue were observed in the carcasses exposed for 20 to 30 seconds to flux levels above 50 kW/m^2. These effects were not observed in carcasses exposed to lower flux levels for the same intervals. No data on longer exposures were available.

The levels of feather and tissue damage reported for these exposures at 50 kW/m^2 or above would be likely to kill living birds. In addition, shorter exposures at these energy flux levels would be likely to cause other tissue or feather damage that could impair flight or vision or cause physiological effects and ultimately cause or contribute to mortality from other causes (e.g., reduce ability to forage, escape from predators, or thermoregulate). Longer exposures to solar flux levels below 50 kW/m^2 are likely to cause feather damage or physiological effects. Staff has reviewed these studies, disagrees with conclusions presented, and notes that applicant's results are in stark contrast with other published literature. For example, a whole house is known to ignite after 15 to 20 minute exposure to flux density of 31.53 kW/m^2 (24CFR, Section 51.204, Appendix II); it seems unreasonable to believe that a bird might withstand even higher flux densities for any amount of time.

Conclusions and Discussion of Mitigation

Based on staff's understanding of solar energy flux intensity and exposure times, staff believes that birds flying for through energy flux in excess of safe thresholds will likely

suffer significant damage to flight feathers, eyes, or skin so that they will be unable to survive longer than a few days. In some cases, where they fly through higher flux levels, these birds will fall to the ground with evidence of severe burning as reported by McCreary et al. (1986). Staff believes that many birds may continue flying for a few seconds or minutes, perhaps long enough to escape the hazard, but will be unable to fly effectively, find food, or escape predators and will die a short time after the exposure.

Staff also believes that birds exposed to concentrated solar flux will be at risk of suffering (1) feather damage and consequent flight impediment, or (2) hyperthermia, hypothermia, or other damaging physiological or anatomical effects. These effects of exposure are influenced by both the dose level and exposure time. These effects are considered significant and immitigable.

The project applicant has offered no mitigation for impacts stemming from exposure to solar flux, and has stated that the size and configuration of the project itself serves to minimize effects. Staff disagrees with this position; yet no feasible onsite mitigation and minimization measures to avoid the impact have been identified. Implementation of Condition of Certification **BIO-15 (**Avian, Bat, and Golden Eagle Protection Plan) will be required to monitor and potentially reduce the onsite loss of some birds and golden eagles. Opportunities for offsite mitigation may also be possible by enhancing, creating, or restoring offsite habitat demonstrated to be of value to the avian species occurring on the HHSEGS site. Other offsite mitigation may be available through a partnership between the project owner and the USFWS JointVenture Program (discussed further below). However, just as it is difficult to discern the full actual impact of the project on avian species, it is also difficult to identify feasible mitigation that is matched proportionally to such an impact.

In developing Condition of Certification **BIO-15** with respect to golden eagles, staff has considered the USFWS Draft Environmental Assessment for the West Butte Wind Project golden eagle take permit (2011c). The USFWS concludes (in its Draft) that the applicant's conservation measures would meet USFWS's purpose and need. The relevant conservation measure is 11 power pole upgrades for each eagle mortality. However the take of golden eagle is not permitable under state law, and such take cannot be "fully mitigated" under state law. Thus, even with mitigation for potential golden eagle take, the impact to golden eagles would be viewed as significant.

Staff has also considered the USFWS's recommended survey protocol for bird mortality at the Rice Solar Energy project (Rice project). The Rice project is a 150 MW concentrating solar power project, similar to the HHSEGS project in creating a concentrated solar flux field over the heliostats. The Rice Project (09-AFC-10) was certified by the Energy Commission in 2010, and pursuant to conditions of certification, a monitoring plan was developed for the Rice Project (Nicolai et al 2010).

Implementation of **BIO-15** (Avian, Bat, and Golden Eagle Protection Plan) would require the project owner to monitor, record, and report bird deaths and injuries from project construction and operation. Monitoring the project's operational impacts for seasonal factors, the species of birds affected, and the types of injuries or mortalities that occur have also been requested by the USFWS. This type of monitoring is considered crucial in documenting bird behavior, noting responses to stress, quantifying impacts, and

subsequently identifying and implementing any available measures to avoid, minimize, or mitigate these impacts. If take occurs, it will be reported to the US Fish and Wildlife Service (USFWS) for further action. Additionally, Condition of Certification **BIO-15** has been developed to meet USFWS requirements for addressing the ESA, MBTA, and BGEPA. Feasible mitigation to reduce impacts below the level of significance are not currently known.

Condition **BIO-15** requires development of Avian, Bat, and Golden Eagle Protection Plans. These plans require development of project monitoring methodology and implementation of compensatory mitigation, should monitoring reveal significant impacts to avian species. This mitigation shall be implemented as needed based on levels of take revealed by monitoring, and would detail all appropriate minimization and compensatory actions, as determined in consultation with USFWS, CDFG, and the Energy Commission. These actions would vary from restoration of avian habitat that supports the species impacted by the project, power line retrofits or other means of minimizing take and enhancing habitat, and will allow for flexibility in measures imposed, based on effectiveness monitoring. These avian protection plans will also incorporate a means of accounting for individuals that may suffer damage from irradiance exposure, yet still be capable of flying off the site. These animals would not be detected during onsite carcass searches, yet would be adversely impacted by the project.

While data collection is important, and could potentially inform new mitigation or adaptive management strategies, feasible mitigation to reduce impacts to avian species from exposure to elevated levels of solar energy flux or irradiance to below the level of significance does not exist. This is because mitigation cannot avoid bird mortality, nor can it adequately replace birds in the local population that are killed by solar flux exposure. Further, if golden eagles are adversely affected, impacts to this species would be considered unmitigable because golden eagle is a fully protected state species. While habitat restoration actions may benefit by some measure the species impacted by improving survivability and reproduction of the species, staff is unaware of any means of directly correlating such restoration measures to the impact of solar flux on various bird, bat, and insect species. Staff concludes significant residual effects could exist after implementation of **BIO-15**.

Conservation Opportunities

Condition of Certification **BIO-15** would, among other things, require the development and implementation of conservation opportunities. Staff has accordingly conferred with various agencies to determine where these conservation opportunities may exist. While the final determination of specific conservation actions would be made during development of the Avian, Bat, and Golden Eagle Protection Plans, and are not limited to those opportunities presented here, the following are viable examples of conservation actions that may be taken by the project owner.

The USFWS Joint Venture is a collaborative, regional partnership of government agencies, non-profit organizations, corporations, tribes, and individuals that conserves habitat for priority bird species, other wildlife, and people. Joint Ventures bring these diverse partners together under the guidance of national and international bird

conservation plans to design and implement landscape-scale conservation efforts. Joint Ventures have been widely accepted as the model for collaborative conservation in the 21st century. They use state of the art science to ensure that a diversity of habitats is available to sustain migratory bird populations for the benefit of those species, other wildlife, and the public. JointVenture actions include: biological planning, conservation design, and prioritization; project development and implementation; monitoring, evaluation, and research; communications, education, and outreach; and funding support for projects and activities.

Within California, several JointVentures exist: the Central Valley, Intermountain, and Sonoran. Based on personal conversations with USFWS and the Sonoran JointVenture Coordinator, means of compensation benefitting desert avian species are in place (Robert Mesta, personal communication), and further, the Sonoran JointVenture program also has the capability of designing conservation plans responsive to certain bird species or specific geographic locales. It is possible that conservation measures, as determined in the Avian, Bat, and Golden Eagle Protection Plans may entail cooperative effort with a JointVenture Program.

Staff has also conferred with the BLM (Chris Otahal, personal communication) regarding conservation opportunities at the Amargosa River Natural Area, which is comprised of three ACECs: the Upper Amargosa Mesquite Bosque Unit, Central Amargosa Unit, which includes the previous Amargosa Canyon and Grimshaw Lake Natural Areas plus additional lands in China Ranch Wash and the Tecopa area, and the Lower Carson Slough Unit. Within these ACECs restoration and enhancement of the Amargosa River and adjacent environs are ongoing, including tasks such as tamarisk removal and control of brown-headed cowbirds (*Molothrus ater*), a bird known to parasitize the nests of songbirds. The BLM has indicated that if conservation actions are deemed necessary through project operations monitoring, the possibility exists for the project owner to participate in these conservation opportunities through various means such as funding or supply of personnel.

Electrocution

Egrets, herons, raptors, and other large aerial perching birds, including those accorded state and/or federal protection, are susceptible to transmission line electrocution if they simultaneously contact two energized phase conductors or an energized conductor and grounded hardware. The design characteristics of transmission towers/poles are a major factor in raptor electrocutions. Electrocution occurs when a perching bird simultaneously contacts two energized phase conductors or an energized conductor and grounded hardware. This happens most frequently when a bird attempts to perch on a transmission tower/pole with insufficient clearance between these elements. Electrocution can occur when horizontal separation is less than the wrist-to-wrist (flesh-to-flesh) distance of a bird's wingspan or where vertical separation is less than a bird's length from head-to-foot. Electrocution can also occur when birds perched side-by-side span the distance between these elements (APLIC 2006).

The majority of bird electrocutions are caused by lines that are energized at voltage levels between 1-kV and 60-kV, and "the likelihood of electrocutions occurring at voltages greater than 60-kV is low" because phase-to-phase and phase-to-ground

clearances for lines greater than 60-kV are typically sufficient to prevent bird electrocution (APLIC 2006). The proposed transmission lines on the project site are currently under review and the applicant has proposed burying transmissions lines on the project site. Therefore, the project will not afford new perching opportunities from these facilities; however, substation structures do provide perching opportunities for birds. To reduce potential effects of the project the applicant has indicated that construction and operations crews will use BMPs, and that transmission facilities will be designed to be raptor-safe in accordance with the Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006 (APLIC 2006). This includes placing perch deterrents on small structures to reduce the potential for birds to perch on the poles. Condition of Certification **BIO-8** requires above-ground transmission lines and all electrical components to be designed, installed, and maintained in accordance with APLIC guidelines to reduce the likelihood of large bird electrocutions and collisions. With the Implementation of proposed Condition of Certification **BIO-8**, the project transmission lines would not pose a significant electrocution threat to birds.

Impacts to Special-Status Wildlife

Habitat in the project area has the potential to support a variety of special-status wildlife. Some of the sensitive species observed in the project area include desert tortoise, burrowing owl, Le Conte's thrasher, golden eagle, American badger, and Nelson's bighorn sheep. **Biological Resource Table 4** lists the special-status wildlife species that have the potential to occur in the project area. Impacts to special-status or listed species would occur in the same way as described for common wildlife and could be caused by a variety of direct and indirect factors. Impacts to special-status species are described below.

Special-Status Reptiles

Desert Tortoise

The desert tortoise is listed as threatened under CESA, and the Mojave population (i.e., all animals located west of the Colorado River) is listed as threatened under the federal ESA. The proposed project would be required to obtain both state (Incidental Take Permit via Section 2081 of Fish and Game Code) and federal permits (USFWS Biological Opinion via Section 7 of the ESA). As part of its authority granted by the Warren-Alquist Act, the Energy Commission has in-lieu permitting authority for local and state agencies; therefore the state Incidental Take Permit (2081) for desert tortoise would subsumed in the Commission Final Decision.

Protocol-level surveys were conducted between March 13, 2011, and May 18, 2011 (HHSEGS 2011a). Desert tortoise and their sign were detected on the project site and in adjacent habitat to the east and south. Two live desert tortoises, the remains of a skeleton and shell, 58 burrows, 12 desert tortoise scats, and six sets of desert tortoise tracks were detected on the project site (See Figure 5.2 -7 Desert Tortoise and Sign in the AFC). Six live desert tortoise, 15 burrows, one desert tortoise scat, and three sets of tracks were detected within 150 meters of the project site. Surveys within the broader "zone of influence" (ZOI), which extends 1,600 meters from the project boundary, detected seven live tortoise, 21 burrows, and 5 desert tortoise scats. **Biological Resources Table 12** provides a summary of the applicant's data representing desert tortoise observations, burrows, and their sign within the project area, the 150 meter

buffer, and the ZOI transects (HHSEGS 2011a). **Biological Resources Figure 5** identifies burrows detected by the applicant and staff during surveys of the project site conducted in August 2012.

Biological Resources Table 12
2011 Desert Tortoise Survey Results

Location	Tortoise	Carcass	Burrows	Scat	Tracks
Project Site	2	1	58	12	5
150 M Buffer*	6	0	15	1	4
Zone of Influence**	7	0	21	5	0
Total Sign	**15**	**1**	**94**	**18**	**9**

**Denotes sign identified within 150 meters of the project boundary*
*** Zone of Influence surveys were conducted in suitable tortoise habitat along all sides of the main project site at 200 meters, 400 meters, 600 meters, 1200 meters, and 1600 meters from the survey area perimeter. No ZOI transects were conducted south of the site due to the presence of private residences.*

Although only a small number of desert tortoises were detected on the project site it is likely that the project area supports a larger number of tortoises than were observed by the surveyors. Desert tortoises are frequently unavailable to be sampled by field crews because they make extensive use of underground shelters (Nussear 2004). Similarly, desert tortoises spend much of the year in burrows even during the active season (Woodbury and Hardy 1948; Marlow 1979; Nagy and Medica 1986; Bulova 1994), and only the proportion of the tortoise population that is above ground is usually sampled (Nussear 2004). Even when desert tortoise are active and above ground during the surveys only a subset of these animals are usually detected. This can lead to a violation of a critical assumption of the line distance sampling technique, namely, that all animals on the line are found (Anderson et al. 2001; Buckland et al. 2001).

In order to account for observer bias, weather conditions, and desert tortoise behavior the USFWS developed a predictive model (USFWS 2010) for estimating the expected range of desert tortoise that may present based on the limited ability to detect animals during the surveys. The USFWS 2010 survey protocol takes into account the probability that tortoises would be present above ground based on the previous winter's rainfall and the fact that not all tortoises within the survey area are seen by surveyors. The model then provides a mathematical formula that is used to estimate the number of adult and subadult tortoises that are actually present. Statistical techniques can provide further estimates of minimum and maximum numbers of tortoises expected, within a 95 percent confidence interval. In addition, most juvenile tortoises and tortoise eggs are not detected during field surveys.

The applicant has indicated that although most tortoises were found off the proposed project site, the abundance of burrows, recent scat, and tracks on site, and the close proximity (within 150 meters) of desert tortoise and their sign indicate an active population is using the site (HHSEGS 2011a, Appendix 5.2F). Based on the USFWS predictive formulas completed by the applicant between 6 and 33 adult and subadult desert tortoises are expected to occur on the project site (USFWS 2010a). In addition to adult and subadult desert tortoises, the proposed project site is expected to support a population of juvenile tortoises that are not considered in the USFWS formula.

Juvenile tortoises are extremely difficult to detect because of their small size and their cryptic nature. In many instances these species are overlooked during surveys. However, estimates of juvenile tortoise populations can be extrapolated using information based on a four-year study of tortoise population ecology conducted by Turner et al. (1987). This study determined that juveniles accounted for approximately 31.1 to 51.1 percent of the overall tortoise population. Using this range and the estimate of between six and 33 adult and subadult desert tortoises (i.e., lower and upper 95 percent confidence value), the project site may support between three to 34 juvenile tortoises (i.e., a total population range between nine and 67 adults, subadults, and juveniles).

The project site may also support areas containing the eggs of desert tortoise. The number of tortoise eggs that could be present on the project site was estimated based on the assumption of a 1:1 sex ratio and that all females present would lay eggs (clutch) in a given year. Applying the 1:1 sex ratio to the lower and upper 95 percent confidence values (i.e., five out of the nine adult desert tortoises and 17 out of the 33 adult desert tortoises) the project site could theoretically support between five and 17 reproductive females. Using the average clutches per reproductive female in a given year (i.e., 1.6, see Turner et al. 1984), multiplied by the average number of eggs found in a clutch (i.e., 5.8; see USFWS 1994b); approximately 46 to 158 eggs would be expected on the site in a given year. However, fewer eggs are likely to be onsite at any given time because it is likely that not all females are of reproductive age or elected to produce eggs during any given year. The estimated number of desert tortoise, their range class, and the number of eggs that have the potential to occur on the project site are presented in **Biological Resources Table 13.**

Biological Resources Table 13
Estimated Number of Desert Tortoise on the Project Site and Within the 150 meter Buffer (95 percent confidence values)

Adult and Sub-adults*		**Juvenile Estimates****		**Eggs*****	**Total Adult/Sub-adult and Juvenile**	
Lower	Upper	Lower	Upper	(Min-Max)	Lower	Upper
6	33	3	34	46-158	**9**	**67**

*Value based on formula recommended by the USFWS. Numbers reflect the 95 percent confidence interval.
** Values based on the equations of Turner et al 1987. Equation assumes that juveniles account for approximately 31.1 to 51.1 percent of the overall tortoise population. If P = Percentage of juveniles in population, A = Number of adults, and J = Number of juveniles then P = J / (J + A). Therefore J = PA/ (1 – P).
*** Assumes a 1:1 sex ratio and that all females present would clutch in a given year. Assumes average clutches per reproductive female in a given year (i.e., 1.6, see Turner et al. 1984), multiplied by the average number of eggs found in a clutch (i.e., 5.8; see Service 1994).

Impacts to Desert Tortoise

Construction of the proposed project would result in direct, indirect, and operational effects to desert tortoise and their habitat. These effects are similar to those described for common wildlife and would occur during the initial stages of mobilization, construction, and from operation and maintenance of the proposed facility. In addition, the implementation of the proposed project would require the translocation of all desert tortoises that occur in the development footprint prior to construction. The translocation of desert tortoise from the project site has the potential to adversely affect desert

tortoises that may occur on the project site and at designated recipient areas (See translocation effects below).

Direct Impacts to Desert Tortoise

During construction of the proposed project desert tortoises could be harmed during clearing, grading, and trenching activities or may become entrapped within open trenches and pipes. Construction activities could also result in direct mortality, injury, or harassment of individuals and eggs from encounters with vehicles or heavy equipment. Desert tortoises are known to shelter under parked vehicles and be killed, injured, or harassed when the vehicle is moved. Other direct effects could include individual tortoises or eggs being entombed in their burrows, collection or vandalism, disruption of tortoise behavior during construction and disturbance due to noise or vibrations from heavy equipment. Human disturbance, lighting and noise may disrupt desert tortoise in adjacent lands. Desert tortoise may also be injured or suffer mortality from encounters with workers' or visitors' pets. Windblown dust can also adversely affect desert tortoise by degrading habitat and decreasing the value of available forage. Desert tortoises may also be attracted to the construction area by the application of water to control dust, placing them at higher risk of injury or mortality by vehicle traffic.

Construction of the proposed project would occur over a period of 29 months and access the site through Tecopa Road. Section 5.12.4.2 (Summary of Construction Phase Impacts) of the AFC indicate that during the peak construction month, the project is projected to add 2,744 daily trips, with 907 trips occurring during the morning peak hour and 907 trips occurring during the afternoon peak hour. Use of paved roads and the small dirt access roads could result in mortality of desert tortoises by vehicle strikes. The potential for increased traffic-related tortoise mortality is greatest along paved roads where vehicle frequency and speed is greatest. Desert tortoises on dirt roads may also be affected depending on vehicle frequency and speed. Data indicate that desert tortoise numbers decline as vehicle use increases (Bury et al. 1977) and that tortoise sign increases with increased distance from roads (Nicholson 1978; Karl 1989; von Seckendorf & Marlow 1997, 2002).

Construction activities that result in fires can also directly affect desert tortoise and their habitat. Because of the abundance of annual grasses and weeds in the region wildfires that result from welding, vehicles carelessly parked on vegetation, smoking, or other ignition sources pose a potential direct impact to desert tortoise and can quickly spread to off-site areas. Direct effects of fire on desert tortoise include mortality by incineration, elevating body temperature, poisoning by smoke, and asphyxiation (Whelan 1995). Small individuals such as hatchlings are more at risk from lethal heating than large ones because they have a higher surface to volume ratio that allows heat to penetrate their vital organs relatively quickly (Brooks and Esque 2002).

Indirect Impacts to Desert Tortoise

Indirect effects to desert tortoises could include soil compaction, fugitive dust, the introduction of non-native and invasive plant species, and increased human presence along access roads. Indirect effects may also include habitat fragmentation, the disruption of existing home ranges, and barriers to dispersal. Increased human presence from new access roads or interest in the facility could lead to increased road

kill, illegal collecting and the spread of disease due to abandonment of captive tortoises infected with upper respiratory tract disease.

Indirect effects to desert tortoise may also occur from wildfires. Desert tortoises that escape direct mortality from wildfires may still be affected by fire-induced habitat alteration. Alterations to habitat can result in mortality, decreased fecundity, increased predation, starvation, and dehydration; all resulting in reduced viability of this species (USFWS 2011a). Reduction in plant cover also reduces available shelter as perennial plants, especially woody shrubs, provide protection for desert tortoises from mortality due to predators and overheating from the sun (Woodbury and Hardy 1948; Burge 1978; Mushinsky and Gibson 1991). Although single fires may not produce long-term reduction in the cover of perennial plants or biomass of native annual plants (O'Leary and Minnich 1981), recurrent fire can convert native desert scrub to alien annual grasslands (Brown and Minnich 1986; Duck et al. 1997; Esque et al 2003). Indirect effects can also increase the risk of predation by predators attracted to the area by increased human activity, water or food subsidies. Clearing and grading activities would result in the exposure of large numbers of fossorial species such as small rodents and reptiles. Many of these species are killed or injured during these activities and attract ravens and other opportunistic predators.

Operational Impacts to Desert Tortoise

Operational impacts to desert tortoise include both direct and indirect effects including those described above. Typically, these effects are similar in type but smaller in magnitude when compared to construction related effects. These effects may include the risk of mortality from vehicle traffic, crushing of burrows by routine maintenance activities on access roads or if any desert tortoises remain in the facility area post construction, vegetation management activities, and washing of the heliostats. Other operational effects include fires, habitat degradation, and the spread of invasive plant species. Increased road traffic on Tecopa Road either from facility staff or sightseers increases the risk of road kill to both tortoises and common wildlife. This not only results in the loss of desert tortoise but increases the risk for subsidized predators such as ravens and coyotes.

Construction and operation of the project has the potential to increase raven and coyote presence in the project area. Ravens depend on human encroachment to expand into areas where they were previously absent or in low abundance. Ravens habituate to human activities and are subsidized by the food and water, as well as roosting and nesting resources that are introduced or augmented by human encroachment. Ravens were observed by the applicant and staff on the project site and are likely to increase during construction of the project.

The proximity to the community of Charleston View may provide subsidies to known predators of desert tortoise. For example, common raven populations in some areas of the Mojave Desert increased 1,500 percent from 1968 to 1988 in response to expanding human use of the desert (Boarman 2002). Since ravens were scarce in this area prior to 1940, the current level of raven predation on juvenile desert tortoises is considered to be an unnatural occurrence (BLM 1990; USFWS 2008a). In addition to ravens, feral dogs have emerged as major predators of the tortoise. Dogs may range several miles

into the desert and have been found digging up and killing desert tortoises (USFWS 2011; Evans 2001).

Ravens may also use the perimeter fence as potential perch sites and new transmission line structures as nest and perch sites increasing the potential for loss of tortoises from raven predation. Several raven subsidies occur in the region including the city of Pahrump, Nevada, a trash dumpster placed along the road in Charleston View, and a small pond that occurs at a local firearms training institute located north east of the project. Small mammal, fox, coyote, rabbit, lizard, snake, and tortoise road kill along Tecopa Springs Road also provides an additional attractant and subsidy for opportunistic predators/scavengers such as ravens. In addition, bird collisions with facility structures or transmission lines may also attract ravens. As the project area is already subject to elevated raven predation pressure and any loss of juvenile tortoise due to the further addition of raven subsidies could have a long-term effect on the tortoise population by reducing the recruitment of juvenile tortoises into the adult life stages (Boarman 2003). The effects of reduced recruitment may not be apparent for years because tortoises do not typically reach sexual maturity until approximately 15 to 20 years of age, and are therefore considered indirect impacts of project operation.

Conclusions and Discussion of Mitigation for Direct, Indirect and Operational Impacts to Desert Tortoise

Implementation of the proposed project would result in significant direct, indirect, and operational impacts to desert tortoise. Section 5.2.9.2.1 (Mitigation Measure 2 – Desert Tortoise) of the AFC identified a series of actions that would be employed during construction to minimize project effects to this species. These actions include but are not limited to worker training; the installation of exclusion fencing to prevent desert tortoises from entering construction areas; conducting pre-construction clearance sweeps; translocating desert tortoises; construction monitoring; trash collection; and providing compensatory mitigation for lost habitat. The applicant has also proposed to implement dust control measures; inspect beneath vehicles; restrict construction traffic to designated routes; and require reduced vehicle speed limits to minimize the risk of collision with vehicles or equipment. These actions were reviewed and incorporated into staffs recommended Conditions of Certification **BIO-1** through **BIO-13**, which apply to the protection of desert tortoise and other biological resources.

The most effective mechanism for reducing impacts to desert tortoise is to avoid or minimize on-site disturbance. However, because of the distribution of this species on the project site it will not be possible to avoid all occupied habitat. Desert tortoise are cryptic species that are often overlooked during surveys, and can be difficult detect unless weather conditions are favorable. The primary strategy to reducing direct impacts from construction related effects is educating workers as to the natural history of desert tortoise through Condition of Certification **BIO-6** (Worker Environmental Awareness Program); **BIO-7 (**Biological Resources Mitigation and Monitoring Plan) identifying sensitive species locations and permit requirements; **BIO-8** (Impact Avoidance and Minimization Measures); conducting pre-construction surveys and relocating desert tortoise to pre-selected off-site locations required by **BIO-9** (Desert Tortoise Clearance Surveys and Exclusion Fencing and **BIO-10** (Desert Tortoise Translocation Plan). **BIO-10** would require that the applicant prepare and implement a

desert tortoise translocation plan to move the tortoises from the project site prior to ground disturbance. Direct impacts would also be reduced through Condition of Certification **BIO-12** (Desert Tortoise Compensatory Mitigation), which requires the acquisition of compensatory mitigation lands to off-set habitat loss (Impacts to Desert Tortoise Habitat are discussed further below).

Even with the implementation of the Desert Tortoise Translocation Plan it is likely that some juvenile tortoises and eggs would be overlooked and subject to mortality from project activities within the enclosed fence line both during construction and operation of the facility. Likewise, the ongoing translocation experience associated with the Ivanpah Solar Energy Project has illuminated the need to revise the translocation strategy to increase the number of clearance surveys in order to detect tortoises. While impacts to desert tortoise would be minimized through the implementation of proposed Conditions of Certification **BIO-8** (Impact Avoidance and Minimization Measures)**, BIO-9** (Desert Tortoise Clearance Surveys and Exclusion Fencing), and **BIO-10** (Desert Tortoise Translocation Plan) some onsite mortality would likely occur because of the cryptic nature of juvenile tortoises and from recent hatchlings not detected during the pre-construction clearance surveys. It is also likely that desert tortoise will continue to be found within the project fence line during the multi-year development of the project. Similarly, maintaining the integrity of the tortoise fence after storms and in locations where burrowing mammals such as coyote, badger and kit fox have breached the fence line will be an ongoing challenge. In addition, conditions of certification **BIO-9** (Desert Tortoise Clearance Surveys and Exclusion Fencing) and **BIO-10** (Desert Tortoise Translocation Plan) have inherent risks and could themselves result in direct and indirect effects to tortoises on the proposed project, translocation, and control sites. These could include direct effects such as mortality, injury, or harassment of desert tortoises due to equipment operation, fence installation activities, removal of tortoise burrows, and tortoise translocation. Indirect effects could include but are not limited to intraspecific competition for burrows or forage, increased stress, and the spread of disease. These impacts are described in more detail below.

Indirect effects to desert tortoise would also be reduced through the implementation of the conditions identified for direct effects. Implementation of the worker environmental awareness training (Condition of Certification **BIO-6**) would reduce the potential for wildfires to occur. Condition of Certification **BIO-8** would minimize the risks of increased traffic fatalities. These measures include confining vehicular traffic to the project site and existing routes of travel, prohibiting cross country vehicle and equipment use outside designated work areas, and imposing reduced speed limits on the dirt access roads. Condition of Certification **BIO-8** will also prohibit the use of the existing desert trail network to access the site and require vehicles to access the project via Tecopa Road and Highway 160. Potential impacts from the spread of invasive plant species would be reduced to less than significant levels through the implementation of conditions of certification **BIO-18** (Weed Management Plan). Condition of Certification **BIO-23** (Ground Water-Dependent Vegetation Monitoring Plan) would prevent significant adverse impacts to the mesquite dune scrub and Stump Spring ACEC, which are also used by desert tortoise (Poff pers. comm. 2012, HHSEGS 2011a). Implementation of these measures would reduce impacts of the proposed project to less-than-significant levels under CEQA.

The AFC did not identify specific mitigation to reduce the impacts of increased raven presence at the project site. However, measures proposed by the applicant including the removal of trash, management of standing water, and the removal of road kill would reduce raven subsidies. However, because of the responsibility to fully mitigate impacts to desert tortoise staff has proposed Conditions of Certification **BIO-8** (Impact Avoidance and Minimization Measures) and **BIO-13** (Raven Management Control Plan and Fee). These conditions would minimize the project's potential to cause increased predation on desert tortoise by ravens and other species in the project area by requiring a variety of impact avoidance and minimization measures to collect road kill; control trash and minimize other human activities that tend to increase raven activity; and implement on-site raven management and control. The project owner would also be required to provide a one-time per-acre contribution to support the USFWS Regional Raven Management Program.

Regional Approach to Raven Control

The USFWS, in cooperation with CDFG and BLM, has developed a comprehensive regional raven management and monitoring program in the California Desert Conservation Area to address the regional, significant cumulative threat that increased numbers of common ravens pose to desert tortoise recovery efforts (USFWS 2010b). The Regional Raven Management Program will implement recommendations in the USFWS E*nvironmental Assessment to Implement a Desert Tortoise Recovery Plan Task: Reduce Common Raven Predation on the Desert Tortoise* (USFWS 2008). To mitigate the projects contribution to cumulative and indirect impacts on desert tortoise from raven predation, staff proposes that the applicant contribute toward implementation of the Regional Raven Management Program (USFWS 2010b), as described in Condition of Certification **BIO-13**. To mitigate for the regional effects of ravens on desert tortoise, the applicant shall provide a onetime fee in the amount of $105.00 per acre and a two percent fund management fee to the REAT Account held by NFWF for 3,197 acres of desert tortoise habitat disturbed by the project. This payment of $342,399 would support the regional raven management plan activities focused within the Mojave Desert Recovery. The fees contributed by the applicant would fund staff to implement raven removal actions, provide education and outreach efforts, and survey and monitor the activities identified in the federal Environmental Assessment (USFWS 2008b).

Staff has concluded that that implementation of these actions would be an effective means of reducing the project's cumulative contributions to desert tortoise predation from increased raven numbers. Implementation of these conditions would reduce direct, indirect and operational impacts to desert tortoise to less-than-significant levels under CEQA and would also satisfy the CESA requirements to fully mitigate impacts to desert tortoise under Fish and Game Code Section 2081.

Translocation

As discussed above, desert tortoises are a listed species under both the State and federal ESA. Projects like HHSEGS that result in "take" of desert tortoise require a authorization from the USFWS. This authorization may be provided in the form of an "incidental take statement" in compliance with Section 7 of the ESA. For many large scale projects the USFWS requires that all living desert tortoises are removed from the development site and placed in areas where the tortoise have a possibility to survive.

This relocation is called “translocation” when desert tortoises are move more than a certain distance from their current habitat (i.e., typically greater than 500 meters/1642 feet). For the HHSEGS project it is likely that translocation will be required and the USFWS will require a “translocation plan” as part of the Biological Opinion that accompanies its permit for incidental take.

Large scale land acquisition to support military training, residential and commercial development, and the construction of industrial level solar infrastructure projects has necessitated the use of translocation as a tool to minimize direct losses to desert tortoise and other sensitive wildlife. Construction of the proposed project would require the translocation or removal of all desert tortoises, including adults, subadults, and any juveniles that are found on the site during clearance surveys. An important consideration in assessing potential impacts from the translocation effort is establishing the proposed translocation sites. Translocation and control sites should occur on lands that can be managed for the protection of this species. The translocation of animals to privately held lands is not recommended by USFWS and CDFG, given the threat of future development and other inherent risks to desert tortoise associated with private land.

Most of the desert tortoise sign that occurs on the HHSEGS project is located near the eastern border of the project site; however, desert tortoise sign was observed in scattered locations across large portions of the site. Animals that are identified in the eastern area will likely be translocated to lands located immediately east of the proposed project site. These lands consist of suitable habitat that may include portions of the animals existing home range. The lands in this area are managed by the BLM and primarily occur within the State of Nevada. In order to comply with CDFG legal requirements all desert tortoises translocated to this area will be placed on lands located adjacent to the project that occur in California. Although the land in California is limited to a narrow strip of habitat; the land is contiguous with suitable habitat that occurs in Nevada. Animals found near the western border of the project site or in areas greater than 500 meters from a proposed translocation site will be held and tested prior to release in conformance with the proposed Translocation Plan.

The distance of the translocation site from the project site also affects the methods used during the implementation of the plan. Current USFWS standards require disease testing and quarantine for any tortoise translocated more than 500 meters (1642 feet). This requirement is intended to limit the potential exposure risk to healthy tortoises adjacent the project site. However, for each desert tortoises translocated to a long distance sites, two other tortoises must be handled, disease tested, and radio tagged. Therefore, a total of three tortoises are handled for each translocation event. Desert tortoises at the recipient site and control site are diseased tested and radio tagged in order to ensure that healthy animals are not being introduced into a diseased population and to track the animals post-release. In addition disease testing and radio tagging allows the agencies to track the mortality of translocated versus host or control populations; provides long term monitoring of the populations; and provides a mechanism for evaluating whether mortality occurs uniformly across the three groups. These requirements may not be enacted in the event that only short distance translocation occurs and if the number of desert tortoises is determined to be low (i.e., usually less than five animals).

For some areas the USFWS will limit the maximum number of desert tortoises that may be relocated to a particular area to minimize potential effects to the host population from resource competition. In order to assess this impact, additional information is required of the applicant, specifically the density of desert tortoises inhabiting proposed translocation sites.

Translocation activities require the implementation of a series of actions. Some of the proposed activities include but are not limited to:

- The identification of the proposed translocation and control sites;
- The evaluation of the habitat quality on the translocation and control sites;
- A determination of existing tortoise density and an assessment of the sites ability to accommodate additional tortoises above baseline conditions;
- Pre-construction fencing and clearance surveys of the project site;
- The construction of holding pens for quarantined translocated tortoises prior to their release into host populations;
- Pre-construction surveys of the proposed translocation sites;
- The placement of tracking units (GPS) on tortoises from the project site, translocation site, and control site;
- Disease testing for long distance translocated tortoises, host, and control sites;
- Long term monitoring and reporting of control and translocated and host populations; and
- The implementation of remedial actions should excessive predation or mortality be observed.

Translocation of desert tortoise has inherent risks that must be considered when implementing this activity. Capturing, handling, and relocating desert tortoises could result in harassment, injury, or mortality of desert tortoises. Impacts of translocation may include elevated stress hormone levels, changes in behavior and social structure dynamics, genetic mixing, increased movement (caused by antagonistic behavior with other tortoises, avoidance of predators or anthropogenic influence, homing, or seeking out of preferred habitat), spread of disease, and increased predation. Handling, holding, and transport protocols may also compound with abiotic factors to affect the outcome for translocated individuals (Bertolero et al. 2007; Field et al. 2007; Rittenhouse et al. 2007; Teixeira et al. 2007), particularly during extreme temperatures, or if they void their bladders. Averill-Murray (2001) determined that tortoises that voided their bladders during handling had significantly lower overall survival rates (0.81-0.88) than those that did not void (0.96). Desert tortoises that are improperly handled by biologists without the use of appropriate protective measures may be exposed to pathogens that spread among tortoises in both resident and translocated animals. The introduction of diseased tortoises to a recipient site or holding pen may also result in the spread of upper respiratory tract disease (URTD). The USFWS consider URTD to be one of the most serious infectious disease affecting desert tortoises.

Translocation may be a useful tool in the conservation of some species, yet well designed studies are necessary to properly evaluate its efficacy (Field et al 2007). As of 2012 there are a number of ongoing translocation actions that are currently underway. Most of these translocation events are related to military land expansion and solar energy development. Definitions of success are variable and determining ultimate success can require lengthy studies (Fischer and Lindenmayer 2000, Seigel and Dodd 2002). For the HHSEGS project translocation should be considered a mechanism to salvage existing animals and place them in an area where they have the potential to survive post construction.

Success rates of herpetofauna translocations range from 14 percent to 42 percent, suggesting that improved efforts are essential for the future recovery of many reptiles and amphibians (Dodd and Seigel 1991; Germano and Bishop 2009). Existing studies also suggest that animals move away from the translocation site and move through the landscape at a higher rate than control animals (Sullivan et al. 2004; Bertolero et al. 2007; Field et al. 2007). More specifically, a review of 91 herpetofauna translocation projects reported the primary causes of translocation failure were homing response by translocated individuals and poor habitat in translocated areas, followed by human collection, predation, food and nutrient limitation, and disease (Germano and Bishop 2009). The risks and uncertainties of translocation to desert tortoises are well recognized in the desert tortoise scientific community. The Desert Tortoise Recovery Office (DTRO) Science Advisory Committee (SAC) has made the following observation regarding desert tortoise translocations (DTRO 2009, p. 2):

> *As such, consensus (if not unanimity) exists among the SAC and other meeting participants that translocation is fraught with long-term uncertainties, notwithstanding recent research showing short-term successes, and should not be considered lightly as a management option. When considered, translocation should be part of a strategic population augmentation program, targeted toward depleted Populations in areas containing "good" habitat. The SAC recognizes that quantitative measures of habitat quality relative to desert tortoise demographics or population status currently do not exist, and a specific measure of "depleted" (e.g., ratio of dead to live tortoises in surveys of the potential translocation area) was not identified. Augmentations may also be useful to increase less depleted populations if the goal is to obtain a better demographic structure for long-term population persistence. Therefore, any translocations should be accompanied by specific monitoring or research to study the effectiveness or success of the translocation relative to changes in land use, management, or environmental condition.*

However, many translocations of desert tortoises have been limited in scope and applicability; shortcomings have included small sample size, loss of tortoises by death, poaching, transmitter failure, limited sampling period, inadequate information on resident tortoises; variation in release techniques or timing of releases, and use of captive or penned tortoises (Walde et al. 2011). In a study conducted over that last four years at Fort Irwin the USGS observed highly variable mortality rates ranging from 34 percent in 2009 to 1.5 percent in 2011(Drake et al. 2011). Tortoise mortality rate for 2011 continued to decrease from previous years despite an increase in the number of

tortoises being monitored (*ibid.*). **Biological Resource 14** provides a summary of the data as taken from 2011 USGS study at Fort Irwin California.

Biological Resource Table 14
Desert tortoise mortality from 2008-2011 at the Ft. Irwin Study Site.*

Study Year	Number Dead	Number Monitored	Percent Mortality
2008	39	121	32.2
2009	31	90	34.4
2010	11	82	13.4
2011	8	525	1.5

*Drake et al 2011.

This study also suggested that the majority of desert tortoise mortality could be attributed indirectly to predation. In times of drought when predators (e.g. coyotes, kit foxes, and bobcats) have fewer mammalian prey items available, they will increase take of less preferred prey including desert tortoises (Woodbury and Hardy 1948, Berry 1974). During droughts, coyotes apparently killed most of the tortoises in one study at the Desert Tortoise Natural Area (Peterson 1994) and 21 to 28 percent of the marked wild population in a study near Ridgecrest, California were killed by canids. Longshore et al. (2003) found that periods of drought may directly influence tortoise survivorship leading to regional population declines. Turner et al. (1984) also reported unpublished materials from K.H. Berry indicating that a site in the west Mojave had less than five percent mortality during five previous years (estimated from carcass remains), followed by a year when she observed 27 percent mortality among 48 marked tortoises over 12.5 km^2. Esque et al. (2010) found mortality rates at sites spanning the Mojave Desert ranged from zero to 43.5 percent, where two of the sites had no mortality observed and seven sites had some mortality in at least one of three years reported here.

Recent mortality data compiled from the ISEGS Monthly Compliance Report - July 2012 identified that of approximately 504 animals tracked (i.e., hatchlings, resident, control, and translocated animals) 32 were deceased and 21 have been identified as missing. The breakdown of mortalities included four hatchlings (born within the holding pens), six control animals, six resident animals, eight animals identified for translocation but held in pens, and seven animals that were subject to short distance translocation efforts. Excluding hatchlings and missing animals' mortality rates (i.e., 28/ 447 animals) for all desert tortoise including resident, control, and translocatee's is approximately six percent at this time. However, this is preliminary data and the long term effects of translocation for this population are not yet known.

While recent data suggests that translocation may be an effective tool for minimizing impacts to desert tortoise in some instances; the implementation of any translocation activity must be completed in a thorough and well-coordinated manner. To provide guidance for these actions the USFWS prepared specific draft guidelines for clearance and translocation of desert tortoises from the project sites. This included the *Translocation of Desert Tortoises (Mojave Population) From Project Sites: Plan Development Guidance* (USFWS 2010b). This document provides guidance including the timing of relocation/translocation, disease testing requirements, and other actions intended to minimize impacts to desert tortoise.

The applicant provided a Preliminary Draft Desert Tortoise Translocation Plan in Data Response, Set 1B in December 2011. The plan provides a general outline only and the applicant has indicated a revised plan is forthcoming. However, the complete plan will be required by the USFWS, CDFG, and Energy Commission prior to implementing any tortoise clearance activities. The plan will be required to identify the proposed translocation and control areas, identify the number of tortoises that can be translocated into these areas, and provide a detailed methodology to describe the proposed translocation procedures, disease testing, and long term monitoring.

Biological Resources Table 15 (Desert Tortoise Density Estimates and Impact Summary) estimates of the numbers of tortoises that could be translocated from the project site; numbers of tortoises that would be handled at the translocation and control sites; and numbers of undetected juveniles and eggs that may occur at the project site. These estimates were derived through surveys and mathematical formulations. The number of desert tortoises that may actually occur on the project site is expected to fall somewhere between the upper and lower statistical 95 percent confidence level identified in the USFWS formula. Nonetheless, for the purposes of this analysis, the FSA presents the largest probability estimates of desert tortoise that has the potential to occur on the project site.

Biological Resources Table 15
Desert Tortoise Density Estimates and Impact Summary

	Estimated Number of Tortoises Subject to Direct Project Effects						
Project Feature	**Adult and Sub-adults***		**Juvenile Estimates****		**Eggs*****	**Total Adult/Sub-adult and Juvenile********	
	Lower	Upper	Lower	Upper	(Min-Max)	Lower	Upper
Project Site	6	33	3	34	46-158	9	67
Translocation Area²	6	33	3	34	N/A	9	67
Control Area³	6	33	3	34	N/A	9	67
Subtotal	18	99	9	102	N/A	27	201

*Value based on formula recommended by the USFWS. Table assumes all tortoise are detected and translocated.
** Values based on the equations of Turner et al 1987. Equation assumes that juveniles account for approximately 31.1 to 51.1 percent of the overall tortoise population. If P = Percentage of juveniles in population, A = Number of adults, and J = Number of juveniles then P = J / (J + A). Therefore J = PA/ (1 – P). For translocation purposes it is highly likely that most of the juvenile tortoise will not be detected during the clearance surveys. However they are included here for documentation purposes.
*** Assumes a 1:1 sex ratio and that all females present would clutch in a given year. Assumes average clutches per reproductive female in a given year (i.e., 1.6, see Turner et al. 1984), multiplied by the average number of eggs found in a clutch (i.e., 5.8; see Service 1994).
****Table assumes all tortoises are detected and translocated. The actual number of tortoises that may be subject to translocation is expected to be a subset of this value based on the assumption that only 15 percent of juvenile desert tortoise are likely to be detected.

Comments on the PSA provided by the applicant suggested the number of desert tortoises estimated in the PSA is too high, and recommended a reduced estimate. This information was reviewed and considered by staff. However, the PSA estimates are derived from the applicant's AFC (Appendix 5.2 F, Desert Tortoise Survey Report). The derived numbers are based on the USFWS predictive model and include desert tortoises that were found within 150 meters of the proposed project site. Staff utilized these numbers as a basis for extrapolating the expected levels of adult, sub-adult, and juvenile desert tortoises and their eggs based on the calculations of Turner et al (1985). The PSA used applicant data that between six and 33 adult and subadult desert

tortoises may occur on the project site and within a 150 meter buffer. The AFC assessment correctly suggested that desert tortoise found within 150 meters of the project boundary may include portions of the project site as part of their home range. Staff has used these assumptions and the USFWS model to calculate the number of desert tortoise affected by the project. Applicant in its comments proposes to exclude from the estimate animals immediately adjacent to the site. Staff and CDFG believe that this approach would severely underestimate project impacts, as the project is removing part of the home range of these desert tortoises, and the level of disturbance from construction may force temporary abandonment of the remaining portion.

As described in **Biological Resources Table 15** (Desert Tortoise Density Estimates and Impact Summary) approximately six to 33 adult tortoises (lower and upper USFWS 95 percent confidence level), three to 34 juvenile tortoises (based on 31.1 to 51.1 percent of the total population identified by Turner), and 46 and 158 eggs are expected to occur on the proposed project site. The actual number of animals that may be subject to translocation is expected to be a subset of this value. It is estimated that only 15 percent of juvenile tortoises (0.15 multiplied by the number of juveniles) on the site would be located during clearance surveys.

As described above, there are inherent risks to any action that requires the handling, disease testing, and translocation of desert tortoise. For the proposed project these risks could occur in the translocated, host, and the control population. Although desert tortoises will not be translocated into the control population some mortality may occur from handling or from the placement of GPS tracking devices. For example, mortality at control populations is expected to be approximately five percent based on a review of scientific studies of tortoise mortalities associated with routine handling (Moore pers. comm. 2010).

For this project translocation mortality rates are assumed to range up to 45 percent. This value represents the high end of documented translocation mortality for desert tortoise at this time. Using the five percent mortality rate for the control population (adult and juvenile tortoises multiplied by 0.05) and the 45 percent mortality rate for the translocated and host populations (adults and juveniles multiplied by 0.45) this would result in the potential loss of between eight and 36 tortoises from translocation mortality. In addition, given the likelihood that all of the eggs will be lost and assuming approximately 85 percent of the juveniles will be overlooked, it is reasonable to estimate that between three and 29 juvenile desert tortoises (i.e., 85 percent of 3-34), and all of the 46 to 158 eggs would be lost.

In total, translocation could result in the estimated loss of between 46 to 158 eggs and between 11 and 65 desert tortoise if mortality rates are 45 percent for the translocated animals. If mortality rates are lower there would be a corresponding reduction in desert tortoise deaths from translocation activities.

Condition of Certification **BIO-10** requires development of a Desert Tortoise Translocation Plan in consultation with CDFG and USFWS. The Desert Tortoise Translocation Plan will include the identification and prioritization of potentially suitable locations for translocation; desert tortoise handling and transport considerations (including temperature); animal health considerations; a description of translocation

scheduling, site preparation, and management; and specification of monitoring and reporting activities for evaluating success of translocation. With implementation of proposed Condition of Certification **BIO-10**, adverse impacts associated with desert tortoise translocation would be minimized.

Direct Impacts to Desert Tortoise Habitat

The project would result in "take" of desert tortoise as that term is defined under both State and federal law. Under the CESA, impacts for take of listed species must be "fully mitigated," such that the project does not result in the net loss of the species. CDFG, were it issuing the take permit, would require "compensatory mitigation" to meet the requirement that the project be "fully mitigated." Since the Energy Commission is issuing a permit that subsumes the CDFG "take" permit, staff has consulted with CDFG to determine the compensatory mitigation appropriate for the project.

Implementation of the proposed project would result in the direct loss of approximately 3,197 acres of occupied desert tortoise habitat. These impacts are significant and require compensatory mitigation. This includes approximately 1,580.5 acres of Mojave Desert scrub and 1,616.5 acres of shadscale scrub. The project area also includes 77 acres of disturbed lands including a fallow orchard (HHSEGS 2011a, Figure 5.2-3). In addition, the site includes a grid of unpaved roads; disturbed ruderal habitat, and a large bermed area primarily devoid of native vegetation. The loss of this habitat would reduce access to foraging, denning, and dispersal areas. Compensatory mitigation is not requested for the 77 acres of disturbed habitat on the project site.

The U.S. Geological Surveys (USGS) has developed a model which appraises the habitat value of various regions inhabited by the desert tortoise. The Desert Tortoise Habitat Model (Nussear et al. 2009) ranks tortoise habitat based on sixteen environmental data layers including soils, landscape, climate, and biotic factors that were merged with desert tortoise presence data region wide. This model provides an output of the statistical probability of habitat potential that can be used to map potential areas of desert tortoise habitat (*ibid.*). The habitat quality is given a numeric value ranging from zero to one. Areas within the designated mapping unit of one square kilometer given a rank of zero are not considered suitable habitat for desert tortoise; areas given the value of 1.0 represent high quality habitat for this species. Model values for the proposed project site range from of a high of 1.0 in the southeastern tip of the project site to 0.7; with the majority of the site ranked as 0.8 or 0.9. In other words, the model suggests that the majority of the project site either is, or potentially could be, excellent tortoise habitat.

Desert tortoise and their sign are concentrated within the northeastern third of the project site. This location abuts the California Nevada State line and is contiguous with open desert. Desert tortoise sign also occurs to a limited degree on most of the project; this included several burrows and a single scat. Desert tortoise or their sign were not detected on the southwestern corner of the site which consists of an approximately 640-acre parcel. Habitat on the project site consists of three primary vegetation community types. This includes Mojave Desert scrub, shadscale scrub, and disturbed communities that consist of disturbed areas and a fallow orchard. In addition, a network of unpaved roads excavated for a proposed residential subdivision, particularly in the western two-thirds of the site.

The highest concentration of desert tortoise or their sign was associated with the creosote bush scrub communities that dominate the eastern portion of the site. Creosote bush scrub in this area is largely unaffected and is considered to be of moderate-to-high quality (in terms of structure and species diversity). In addition, a total of 11 special-status plant species were documented in the eastern portion of the project site (HHSEGS 2011a) which suggests the site retains native habitat functions. **Biological Resources Figure 4** provides photos of representative habitat in the project area. The presence of tortoise in this area may be associated with a variety of factors including the more intact creosote bush scrub communities that occur in this area, soil composition, increased grass and herb layers, and proximity to adjacent natural lands supporting similar vegetation types. Although burrow density and sign was concentrated in this area; burrows were present to some degree in most of the project area. Although portions of the site have been degraded by roads, the majority of habitat is largely undisturbed in the eastern portion of the project site. Similarly, while noxious weeds and other invasive non-native plants were mapped across the entire project site (as were special-status plants); the eastern portion of the site is much less affected by non-native species.

Desert tortoise sign was also detected in vegetation supporting shadscale scrub. Shadscale or saltbush scrub dominates the western half of the project which is common on the finer textured and more saline or alkaline soils that occur between playas and the gravelly alluvial fans. Although desert tortoise are found in shadscale communities across their range desert tortoise density and sign was lower in areas dominated by this community. Habitat quality in the western portion is highly variable, ranging from densely weedy, highly degraded habitat of low native diversity to areas dominated by shadscale scrubs of moderate-to-high native species diversity. Some areas appear to have an agricultural history and most of this community type supports a moderate-to-high component of non-native annual weeds. However, although portions of this community type have been degraded two special-status plant species, Pahrump Valley buckwheat and Goodding's phacelia, were documented in scattered locations in the western and eastern portions of the project site.

Many invasive non-native species are adapted to and promoted by soil disturbance (Lathrop & Archibald 1980). Once introduced, they can out-compete native species because of minimal water requirements, high germination potential and high seed production (Beatley 1996). Weeds can outcompete native annuals where nitrogen deposition (near highways such as Tecopa Road) and precipitation rates are higher, leading to higher risk of wildfire (Allen et al. 2010), and can become locally dominant, representing a serious threat to native desert ecosystems (Abella et al. 2008). Lower desert tortoise densities on the southern and western portion of the project site may also be associated with the proximity to Tecopa Road and the residential communities that occur in this area. Dogs may range several miles into the desert and have been found digging up and killing desert tortoises (USFWS 2011, Evans 2001).

Although the USGS tortoise map identifies most of the project area as high quality desert tortoise habitat, portions of the project site are degraded and likely provide a reduced forage base for desert tortoise. As with any model of this nature, the regional scores reflect a hypothesized habitat potential given the range of environmental conditions where tortoise occurrence was documented (Nussear et al. 2009). As such,

the model may underrate some areas and overrate others compared to their actual habitat potential (*Ibid.*)

Nussear et al. (2009) also states that the map of desert tortoise potential habitat does not account either for anthropogenic effects, such as urban development, habitat destruction, or fragmentation, or for natural disturbances, such as fire, which might have compromised habitat potential. While portions of the site are mapped as good quality habitat some of these areas do not appear to routinely support desert tortoise or their sign. In addition, only limited desert tortoise or their sign was detected within most of the vegetation characterized as shadscale scrub. While the presence of desert tortoise is not strictly limited to vegetative structure alone, the degraded habitat, presence of weeds and proximity to residential properties likely limits the use of this area by this species.

Impacts to Critical Habitat

There is no federally designated critical habitat for desert tortoise within the proposed development footprint and no direct or indirect impacts to critical habitat are expected to occur from the project. The nearest designated critical habitat for this species is located approximately 20 miles south of the project site within the Shadow Valley Unit (USFWS 2011a). Until the proposed translocation areas have been provided by the applicant it is unknown whether any critical habitat units would be subject to effects from translocation activities.

Habitat Loss and Compensatory Mitigation

Compensatory mitigation for desert tortoise typically involves balancing the acreage of habitat loss with acquisition of lands that would be permanently protected and enhanced to support healthy populations of desert tortoise. The compensation comes about by removing threats to desert tortoise and by improving the carrying capacity of the acquired property so that more desert tortoises will survive and reproduce on these lands.

For the acquisition of mitigation lands to truly compensate for the habitat loss and to make up for the numbers of desert tortoise that would otherwise have been supported by that habitat, the acquisition must be accompanied by: (1) permanent protection and management of the lands for desert tortoise, and (2) enhancement actions. The permanent protection is essential because it would allow the lands to be managed in a way that excludes multiple threats and incompatible uses (grazing, off-highway vehicle use, roads and trails, utility corridors, military operations, construction, mining, grazing by livestock and burros, invasive species, fire, and environmental contaminants). Without this protection and management the desert tortoise populations on the acquired lands would be subject to the same threats that led to its population declines and threatened status. This level of protection would be necessary to meet the mitigation requirements for loss of desert tortoise habitat under CEQA and CESA. An equally important component of mitigation is the implementation of enhancement actions to improve desert tortoise survival and reproduction. These actions might include habitat restoration, invasive plant control, road closures or road fencing, reducing livestock and burro grazing, reduce the risk of wildfires, and by controlling ravens and other predators. Without permanent protection and enhancement actions on lands acquired for

mitigation, the project's impacts would result in a net loss of desert tortoises and their habitat.

To fully mitigate the loss of desert tortoise habitat under CESA, the CDFG usually requires a mitigation ratio greater than 1:1 for compensation lands (i.e., acquisition of more than one acre of compensation lands for every acre lost), and typically uses a 3:1 ratio or higher for good quality habitat such as that found in portions (i.e., northeastern portions) of the project site. The higher ratio reflects value of the existing habitat and the limits to increases in carrying capacity that can be achieved on the acquired lands, even with implementation of all possible protection and enhancement measures. Depending on the quality of habitat that is lost and the habitat conditions of the land that is acquired, it is difficult to sufficiently increase the carrying capacity of the acquisition lands to completely offset habitat loss without relying on additional acreage to increase the numbers of desert tortoise that can be supported on the mitigation lands.

The applicant proposed a 1:1 ratio to mitigate permanent impacts to desert tortoise habitat in the AFC. The PSA recommended adopting the applicant's proposed 1:1 ratio for (1,616.5 acres) of the project site that supports shadscale scrub communities because some of these areas were more disturbed, are proximal to other disturbed areas, and have less evidence of use by desert tortoise. However, based on an analysis of site conditions and the expected use of the site by desert tortoise the PSA suggested that for areas supporting creosote bush scrub (1,580.5 acres) a 3:1 ratio was appropriate. The highest desert tortoise densities and most suitable habitat were observed in the north and eastern portions of the project site; in areas primarily supporting creosote bush scrub. These areas support relatively intact vegetation and provide more complex topography and soil development.

Applicant comments on the PSA state that the habitat quality on the site is relatively low value compared to many areas of the desert and that the PSA mitigation was excessive and not warranted for this site. The applicant identified a number of factors that reduce the habitat value at the site, including but not limited to the presence of silty soil types, the surficial geology, the relatively flat topography, existing vegetation patterns, and the presence of weeds. In addition, the applicant stated that the number of desert tortoises estimated by staff in the PSA is too high and provided an alternative estimate. In summary, the applicant suggests that the site has a low value to desert tortoise and recommends that mitigation ratios should range from between 0.5:1 to 1.5:1 for the proposed project site.

In response to applicant's comments, staff conducted supplemental field investigations to further evaluate the site. These investigations were conducted by a wildlife biologist and botanist and included two biologists from the CDFG. The site visit confirmed staff's (and CDFG's) earlier estimate of habitat value, an appraisal consistent with other factors previously considered. Despite the presence of weeds which are acknowledged as locally abundant in some areas, most of the lands present on the project site are relatively intact and are characterized by areas supporting biotic soil crusts, native shrub cover, and a diverse assemblage of annual plant life. Most of the heavily disturbed areas are located along the roads that form a grid pattern across much of the site; however, lands within the existing road system continue to support large areas of native vegetation. For example, Section 5.2.6.3.1 of the AFC indicates that for creosote bush

scrub communities “the understory consists of a large variety of mainly annual forbs, a few species of native grasses, and a few species of non-native grasses”. Staff confirmed this during biological surveys of the project site and a review of the annual plant species detected during botanical surveys conducted by the applicant. In addition, based on a review of information provided in the AFC approximately 131 native annuals and shrubs occur on the project site. This includes approximately ten plants considered rare by the California Department of Fish and Game and California Native Plant Society. Similarly, approximately 63 species of birds, 18 reptiles, and nine mammals were detected or expected to occur on the project site. Notwithstanding the presence of invasive weeds, and some heavily disturbed areas the presence and distribution of native plants and animals indicates the site supports a fairly diverse assemblage of wildlife which are not associated with more heavily disturbed areas.

Staff’s conclusion regarding appropriate mitigation ratios are based on a wide range of biotic and abiotic factors. These included but were not limited to the existing vegetation communities; annual plant composition; percentage and distribution of weeds; presence of soil crusts; level of site disturbance; soil composition; proximity to adjacent lands supporting desert tortoise populations; and proximity to developed lands. Staff also took into consideration the number and distribution of desert tortoise on the project site; the landscape level scale of the project; the projects location; the sites’ importance for connectivity and regional movement and gene flow; and the cumulative effects of other projects. The mixed compensation ratio reflects the variability of site habitat quality.

Desert Tortoise Mitigation Requirements

To satisfy CDFG’s full mitigation standard the proposed mitigation must meet criteria described in Title 14 CCR, Sections 783.4(a) and (b). These criteria include requirements that the proposed mitigation would be capable of successful implementation, and that adequate funding is provided to implement the required mitigation measures and to monitor compliance effectiveness of the measures. As described above, the CDFG has recommended the following mitigation strategies that fulfill the state’s full mitigation standard for desert tortoise. CDFG would require a 3:1 ratio (1,616.5 acres) for areas supporting creosote bush scrub and a 1:1 (1,580.5 acres) ratio for areas of the project site that supports shadscale scrub communities. In total this would require the acquisition of 6,358 acres of compensatory mitigation for desert tortoise. This results in several conditions of certification: **BIO-12** (Desert Tortoise Compensatory Mitigation) requires acquisition, protection and enhancement of desert tortoise habitat, in combination with the requirements for a Designated Biologist and Designated Monitor (**BIO-1** through **BIO-5**), worker training (**BIO-6**), mitigation monitoring (**BIO-7**), general avoidance and minimization measures (**BIO-8**), clearance surveys and fencing (**BIO-9**), relocation/translocation plan (**BIO-10**), and **BIO-13** (Raven Management). These conditions of certification, if adopted by the Commission, would fully mitigate project impacts to desert tortoise. Acquisition of appropriate mitigation lands as described in **BIO-12** would secure lands that would promote protection of high quality desert tortoise habitat and facilitate biological connectivity in the region.

Potential indirect impacts to desert tortoise habitat from the spread of invasive plant species would be reduced to less than significant levels through the implementation of Conditions of Certification **BIO-18** (Weed Management Plan), and **-**(Ground Water-Dependent Vegetation Monitoring Plan would minimize and potentially avoid impacts to

locally important groundwater-dependent vegetation used by desert tortoise. Implementation of these measures would reduce these indirect impacts of the proposed project to less-than-significant levels under CEQA.

Calculation of Financial Security for Desert Tortoise Compensatory Mitigation

CDFG, were it the permitting agency, would require the applicant to provide financial assurances to guarantee that an adequate level of funding is available to implement all impact avoidance, minimization, and compensation measures described in the desert tortoise conditions of certification that are not carried out before project impacts occur. CDFG's approach has been adopted by the Commission in previous siting cases. The required financial assurances are generally provided in the form of an irrevocable letter of credit, an escrow account, a pledged savings account, or another form of financial security prior to initiating ground-disturbing project activities. The proposed conditions of certification typically specify the dollar amount of the security, and include a provision for adjusting that financial security amount when parcel-specific information is available. This financial security amount is calculated by multiplying the acreage of the impact area by the total per-acre costs, a figure which represents the sum of the costs required for: (1) land acquisition, (2) initial habitat improvements, and (3) a fund to support long-term management of the acquired lands. The latter cost for the long-term management fund is typically the largest component of the mitigation fee. Interest from the fund provides enough income to cover annual stewardship costs on the acquired lands and includes a buffer to offset inflation.

The amount for the fund is established by a Property Analysis Record (PAR), a computerized database methodology developed by the Center for Natural Lands Management (<www.cnlm.org/cms>) which calculates the costs of land management activities for a particular parcel. These activities include preparation of a desert tortoise management plan tailored for each parcel of mitigation land to assess habitat status, identify desired conditions, and develop plans to achieve conditions that would best support desert tortoise. Once the management plan is prepared and approved by the appropriate resource agencies, implementation of enhancement actions such as fencing, road closure, invasive plant control, habitat restoration, and monitoring can begin. The goal of these activities is to increase the carrying capacity of the acquired lands for desert tortoise and increase their population numbers by enhancing survivorship and reproduction.

Funding for the initial habitat improvements supports those actions needed immediately upon acquisition of the property to secure it and remove hazards. These activities might include fencing or debris clean-up, or other urgent remedial action identified prior to acquisition. When the management plan is completed for the acquired parcel, activities such as these are thereafter funded from the interest produced by the long-term management fund described above.

Condition of Certification **BIO-12**, Desert Tortoise Compensatory Mitigation, specifies financial security for acquisition of 6,358 acres and provides an estimate of associated costs. These costs include an acquisition fee of $1,000 per acre, initial habitat improvement costs at $250 per acre, long-term management fund is estimated at $1,450 per acre, and other administrative and acquisition costs (see **Biological**

Resources Table 16). The estimated composite mitigation cost for establishing the financial security would be $3,506 per acre. This security amount may change with updated appraisals and when a Property Analysis Record is prepared for the parcels selected for acquisition. It is important to note that these are estimates based on current costs; the requirement is defined in terms of acres, not dollars per acre, and actual costs may vary.

The applicant may elect to purchase and permanently protect compensation lands itself; to fund the acquisition and initial improvement of compensation lands through National Fish and Wildlife Foundation (NFWF) by depositing funds for that purpose into NFWF's Renewable Energy Action Team (REAT) Account; or to fund the acquisition of compensation lands through a third party other than NFWF, as outlined in **BIO-12**. REAT options are described below. Further, **BIO-12** would require that the project owner provide financial assurances to guarantee an adequate level of funding to implement the compensation measures described above. Because there are several suitable options available to the applicant to satisfy the compensation requirement, and because mitigation requirements must satisfy the requirements of both state and federal Endangered Species acts, the calculation of the security amount includes estimates of all transaction and management fees described above. These calculations are presented in **Biological Resources Table 16**.

Biological Resources Table 16
Desert Tortoise Compensation Cost Estimate[1]

	Task	**Cost**
1.	Land Acquisition	$1000 per acre[2]
2.	Level 1 Environmental Site Assessment	$3000 per parcel[4]
3.	Appraisal	$5000 per parcel[4]
4.	Initial site work - clean-up, enhancement , restoration	$250 per acre[4]
5.	Closing and Escrow Costs – 1 transaction includes landowner to 3rd party and 3rd party to agency	$5000 per transaction
6.	Biological survey for determining mitigation value of land (habitat based with species specific augmentation)	$5000 per parcel
7.	3rd party administrative costs - includes staff time to work with agencies and landowners; develop management plan; oversee land transaction; organizational reporting and due diligence; review of acquisition documents; assembling acres to acquire….	10% of land acquisition cost (#1)
8.	Agency costs to review and determine accepting land donation - includes 2 physical inspections ; review and approval of the Level 1 ESA assessment; review of all title documents; drafting deed and deed restrictions; issue escrow instructions; mapping the parcels….	15% of land acquisition costs (#1) × 1.17 (17% of the 15% for overhead)
	SUBTOTAL - Acquisition & Initial Site Work	**$12,560,229.00**

9.	Long-term Management and Maintenance (LTMM) Fund - includes land management; enforcement and defense of easement or title [short and long term]; monitoring….	$1450 per acre[5]
	SUBTOTAL - Acquisition, Initial Site Work, & LTMM	**$9,219,100.00**
	SECURITY SUBTOTAL -	**$21,779,329.00**
	NFWF Fees	
10.	Establish the project specific account	$12,000.00
11.	Pre-proposal Modified RFP or RFP processing[9]	$30,000
12.	NFWF management fee for acquisition & initial site work	3% of SUBTOTAL
13.	NFWF Management fee for LTMM Fund	1% of LTMM Fund
	TOTAL for deposit in REAT-NFWF Project Specific Account	**$22,290,326.87**

1. All costs are best estimates as of summer 2010. Actual costs will be determined at the time of the transactions and may change the funding needed to implement the required mitigation obligation. Note: regardless of the estimates, the developer is responsible for providing adequate funding to implement the required mitigation.
2. For the purposes of determining costs, a parcel is defined at 40 acres, recognizing that some will be larger and some will be smaller, but that 40 acres provides a good estimate for the number of transactions anticipated (based on input from CDD).
3. Generalized estimate taking into consideration a likely jump in land costs due to demand, and an 18-24 month window to acquire the land after agency decisions are made. If the agencies, developer, or 3rd party has better information on land costs in the specific area where project-specific mitigation lands are likely to be purchased, that data overrides this general estimate. Note: regardless of the estimates, the developer is responsible for providing adequate funding to implement the required mitigation.
4. Based on information from CDFG.
5. Two transactions at $2500 each: landowner to 3rd party; 3rd party to agency. The transactions will likely be separated in time.
6. Includes staff time to work with agencies and landowners; develop management plan; oversee land transaction; organizational reporting and due diligence; review of acquisition documents; assembling acres to acquire.
7. Includes agency costs to accept the land into the public management system and costs associated with tracking/managing the costs associated with the donation acceptance, including 2 physical inspections; review and approval of the Level 1 ESA assessment; review of all title documents; drafting deed and deed restrictions; issue escrow instructions; and parcel mapping .
8. Estimate for purposes of calculating general costs. The actual long term management costs will be determined using a Property Assessment Report (PAR) tailored to the specific acquisition. Includes land management; enforcement and defense of easement or title [short and long term]; monitoring.
9. Each renewable energy project will be a separate sub-account within the REAT-NFWF account, regardless of the number of required mitigation actions per project.
10. If determined necessary by the REAT agencies if multiple 3rd parties have expressed interest; for transparency and objective selection of 3rd party to carryout acquisition.

The compensatory mitigation described in Condition of Certification **BIO-12**, in addition to other conditions of certification that reduce impacts to desert tortoise, would meet CESA's full mitigation standard and would mitigate CEQA impacts to desert tortoise to less-than-significant levels. CDFG is currently reviewing this calculation of financial security costs (acquisition costs, initial habitat improvement, and long-term management endowment). However, the calculations for security are consistent with past CDFG guidance on Energy Commission projects that included an Incidental Take Permit, and staff believes believe that CDFG would find this approach acceptable.

"In Perpetuity" Protection for Acquired Mitigation Lands

The Energy Commission and CDFG do not accept land acquisition as adequate mitigation for impacts to endangered species unless the lands can be maintained and protected in perpetuity for the benefit of those species. CDFG or an appropriate land conservation organization would be required to own, protect, and manage the mitigation lands to ensure permanent protection.

Location of Acquired Mitigation Lands

Coordination with CDFG is ongoing in conjunction with Nevada BLM and the USFWS to define an appropriate geographic boundary for compensatory acquisitions. Consideration has been given to the preferences of the County of Inyo, which has expressed concerns regarding the siting of mitigation lands. With less than three percent of the county in private holdings, the county requests that private lands not be used for mitigation purposes. While biological factors suggest that the proposed mitigation land should be as close to the project site as possible, ideally in the Pahrump Valley, a broader region, such as the NEMO planning area, or eastern Mojave Recovery Unit could also be beneficial to the species. The State Lands Commission is another entity with substantial land available for sale and use as compensatory mitigation. Revenue from the sale of "school lands" held across California is intended to benefit the State Teachers' retirement fund (Barker, 2011).Together the Departments of General Services, Corrections and Rehabilitation, Transportation (Caltrans), Water Resources, Fish and Game, the University of California, and the State Lands Commission adopted a memorandum of understanding between the Energy Commission to facilitate the development of renewable energy projects on state buildings, properties, and rights-of-way.

Summary – Impacts and Mitigation for Desert Tortoise

The impact analysis and translocation requirements for desert tortoise have been based on the applicant's survey data, USFWS probability calculations for determining desert tortoise number on a project site, and available published literature. Based on this data the project site supports approximately six to 33 adult tortoises, three to 34 juvenile tortoises, and 46 to 158 eggs.

Based on the existing data the applicant will be required to translocate between an estimated low of six desert tortoises (six adults and subadults, and no juveniles) to an estimated high of 38 desert tortoises (33 adults and subadults, and five juveniles). If all of these tortoise are translocated to areas greater than 500 meters from the project site, an estimated 18 (six adults + no juveniles multiplied by three) to 114 tortoises (33 adults + five juveniles multiplied by three) would require handling, radio tagging, and long term monitoring.

Total mortality estimates for the proposed project range from a low of eight desert tortoises and approximately 46 eggs to a high or 65 desert tortoise and approximately 158 eggs. These figures represent estimates only and reflect a conservative approach to quantifying project impacts to desert tortoise. Should lower numbers of desert tortoise be detected on the project site the associated impacts to this species would be correspondingly lower as well. However, should the number of tortoises detected on the project site during the translocation events exceed the 38 identified for translocation, the

applicant would be required to cease the translocation efforts and coordinate with the CPM, USFWS, and CDFG to determine if translocation efforts should be stopped to consider if new mitigation measures or translocation sites are needed.

Conditions of Certification **BIO-1** through **BIO-9** describe measures that would avoid and minimize direct impacts to sensitive biological resources, including desert tortoise. Conditions of Certification **BIO-10** and **BIO-12** would require additional measures specific to desert tortoise, including installation of tortoise exclusion fencing; pre-construction clearance surveys; monitoring; verification that all desert tortoise impact avoidance, minimization, and compensation measures to replace lost habitat are implemented; translocation of tortoises from the project area; and acquisition of compensation lands. Condition of Certification **BIO-13** would require the preparation and implementation of a Raven Monitoring, Management, and Control Plan which would minimize impacts to desert tortoise resulting from increases in raven populations.

Staff concludes that implementation of these conditions would reduce impacts to desert tortoise to less-than-significant levels under CEQA and would also satisfy the CESA requirements to fully mitigate impacts to desert tortoise under Fish and Game Code Section 2081.

Mojave Fringe-Toed Lizard and Gila Monster

Mojave fringe-toes lizard habitat has been mapped along portions of the California Nevada border (DRECP 2011). However, this species has not been detected on the project site during multiple surveys and the preferred habitat for this species (i.e., sand ramps, partially stabilized dunes, and sand fields) is not present on or adjacent to the project site. While it is likely that populations of this species exist in the region they are likely restricted to locations in and near areas supporting large areas of friable sands. Direct and indirect impacts to this species are not expected to occur.

Gila monsters were not observed during biological surveys conducted by the applicant. This species is often associated with rocky outcrops, sandy soils and desert riparian areas which are largely absent from the project site. Based on the current distribution of this species and preferred habitat associations impacts to Gila monster are not expected to occur.

Impacts – Special-Status Mammals

American Badger and Desert Kit Fox

American badger burrows and desert kit fox complexes were found on the project site. In addition, the project site supports suitable foraging and denning habitat for these species. The desert kit fox is designated as a furbearer and, under Title 14 Section 460 of the California Code of Regulations, “may not be taken at any time.” The California Fish and Game Code defines “take” as to “hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill” (§ 1-89.1). The CDFG does not issue Incidental Take Permits or Memoranda of Understanding to permit the capture or handling of desert kit fox. American badger is considered a species of special concern, which affords this species special consideration and protection under CEQA.

Direct Impacts to American Badger and Desert Kit Fox

Direct impacts to American badger and desert kit fox include mechanical crushing of individuals or burrows by vehicles and construction equipment, noise, dust, and loss of habitat. Construction activities could also result in the disturbance of badger maternity dens during the pup-rearing season (15 February to 1 July). Because of the large size of the project, numerous badgers or kit foxes may be affected. For example, depending on prey densities, home ranges of badgers can vary from 338 to 1,549 acres (Zeiner et al. 1990). Their distribution in a landscape coincides with the availability of prey, burrowing sites, and mates, with males ranging wider than females during the breeding and summer months (Minta 1983). While home ranges are expected to be larger and badger densities lower in more arid regions, construction of the project could result in the loss of as many as nine home ranges if home ranges are small (3,277 acres divided by a 338-acre home range) to as few as two home ranges if home ranges are large (3,277 acres divided by a 1,549-acre home range). Based on the number of pocket gopher burrows and small rodent burrows observed by staff, prey densities appear high on the project site, primarily along disturbed access roads. While badgers near the perimeter of the project may be able to effectively disperse to other areas, the placement of the tortoise exclusion fence is expected to trap badgers in the project footprint.

Estimates of kit fox home range size vary widely, and population densities fluctuate drastically depending on the availability of food, predation pressures, and rainfall (Zoellick and Smith 1992; White and Garrott 1999; Arjo et al. 2003). In addition, many kit fox home ranges overlap considerably, often by 20 percent or more (Zoellick and Smith 1992). Therefore, it is difficult to estimate the actual number of desert kit fox that currently occupy the project site. However, the applicant identified numerous active kit fox complexes on the project site during surveys conducted in 2011. Desert kit fox could be trapped within the site by the exclusion fence, as described above for badgers. Construction activities could also result in disturbance or harassment to these species on lands adjacent to the proposed project.

Indirect Impacts to American Badger and Desert Kit Fox

Indirect impacts to badgers and kit foxes include alteration of soils, such as compaction that could preclude burrowing, alteration in prey base, and the spread of invasive plants. Forcing kit foxes into adjacent habitat may also increase the risk and spread of diseases. Operational impacts include risk of mortality by vehicle strikes on access roads by maintenance personnel, the spread of invasive plants, and disturbance due to increased human presence.

Forcing animals out of active territories can result in increased stress which can lead to disease and possibly death. Forcing diseased animals to adjacent territories can threaten the local populations. Several of the recent kit fox deaths (preliminary estimates of eight deaths) have been caused by canine distemper, a disease that had not been documented in desert kit fox until construction of the Genesis project.

Habitat Loss for American Badger and Desert Kit Fox

Implementation of the proposed project would result in the direct loss of approximately 3,277 acres of habitat for American badger and desert kit fox. Staff considers these

impacts to be significant and require compensatory mitigation. The loss of this habitat would reduce access to foraging, denning, and dispersal areas.

Conclusions and Discussion of Mitigation for American Badger and Desert Kit Fox

Prior to construction of the project the applicant would be required to evict all American badger and kit fox from the project site. This is often accomplished through passive mechanisms, designed to discourage animals from remaining onsite. During this "passive relocation," or hazing, dens of these species are typically blocked, and fitted with one-way doors. Once the animals have abandoned the burrow the den is excavated to ensure no animals remain then collapsed to prevent re-occupation of the den. Displaced animals are then forced to disperse to adjacent habitat. On the project site, construction of the project would occur in phases. Depending on the fencing plan animals would be required to disperse up to a mile in any given direction to find habitat outside the fenced area. Displaced animals would attempt to locate suitable new burrows in territory not already occupied by residents of the species. Passive relocation on a large site has proven problematic and may lead to increased predation risk, overcrowding of remaining suitable habitat, competition for food, mates, and territory in adjacent lands. Currently private lands surround the project to the south and west which extends at least 1,600 meters beyond the boundaries of the project site. Publically-held land is located east of the project.

Staff considers eviction of resident kit fox or badgers into adjacent private lands unsuitable for kit fox and badgers, as the land cannot be managed for the benefit of the species. For kit fox, access to safe burrows reduces predation by eagles and coyotes and provides thermal refugia. Staff is concerned that unless supplemental burrows can be provided on adjacent lands, forcing kit fox from the project area will likely result in mortality. To minimize this risk staff recommends that the applicant attempt to evict animals onto adjacent public lands that are afforded some protection by the BLM.

Staff is also concerned regarding the viability of displacing the animals. Typically, procedures used to evict kit fox from the site include passive hazing or grading the site such that safe, vegetated "escape corridors" to undisturbed land are maintained. While effective to a degree on smaller sites, the use of the method on large solar sites has proven challenging. Additional scrutiny of kit fox impacts has resulted from the deaths of kit fox on or adjacent to the Genesis Solar Energy Project. Staff is aware of difficulties in fully evicting kit fox from active solar projects where construction is underway. Rather than establish new permanent offsite territories, some kit fox attempt to remain onsite, digging new burrows overnight, or possibly moving briefly offsite, only to return to the following day. This results in increased stress to kit fox, as the animals are forced to repeatedly search out and/or create new dens, avoid humans and equipment, and find prey. Successful eviction is also important because kit fox may not be disturbed during the pupping season (February 15 through May 31), and must be protected with construction buffers during this time.

Potential direct and indirect impacts to American badgers and desert kit fox are significant, and considering the landscape level scale of the project, some level of mortality is expected even with staff's proposed conditions of certification. The implementation of Condition of Certification **BIO-8** (Impact Avoidance and Minimization

Measures) and Condition of Certification **BIO-14** (American Badger and Kit Fox Management Plan) would reduce impacts to American badgers and desert kit fox. These conditions require the project owner to perform preconstruction surveys for badger and kit fox dens in the project area, including areas within 250 feet of all project facilities, utility corridors, and access roads prior to ground disturbance. If these species are present, the applicant will flag and avoid occupied badger and kit fox dens during ground-disturbing activities and establish a buffer to avoid loss of natal dens. The applicant would also be required to map all kit fox dens and badger dens and document the type of the burrow/den (i.e., natal, single den, complex). Condition of Certification **BIO-14** would also require the applicant, in consultation with CDFG, to prepare a management plan for kit fox and American badger. Staff expects implementation of an adaptive management approach emphasizing flexibility in passive relocation methods, ground-disturbance schedule, placement of escape dens on facility property, and treatment of possible disease outbreak.

Condition of Certification **BIO-12** (Desert Tortoise Compensatory Mitigation) would mitigate habitat loss for these species. **BIO-22** (Compensatory Mitigation for State Waters), **BIO-18** (Weed Management Plan), and **BIO-23** (Groundwater-dependent Vegetation Monitoring Plan), would further reduce direct and indirect impacts of the project to less than significant levels under CEQA.

Nelson's Bighorn Sheep

The Nelson's bighorn sheep is a BLM sensitive species and is classified as fully protected by the State of California. Nelson's Bighorn sheep are known from the local mountain ranges and the applicant detected the horn of a bighorn sheep on the project site. At a staff workshop conducted in Bishop, California, residents from the Charleston View and other local communities stated that a herd of sheep had been sighted on the project site in May of 2012. The CDFG confirmed that herds of this species are present in the Nopah Range to the west, the Kingston Range to the south (CNDDB 2012), and that they occupy, or have occupied in the past, the north portions of the Nopah Range.

Direct Impacts to Nelsons Bighorn Sheep

Direct effects to bighorn sheep could include disturbance from construction activities, noise, and lighting. Construction of the facility may also pose a partial barrier to movement for this species.

Indirect Impacts to Nelsons Bighorn Sheep

Indirect impacts include the degradation of habitat in the region from invasive weeds, human disturbance, and lighting. Additional indirect effects include avoidance of areas near manmade structures, increased traffic on desert roads by the public, and risk of wildfires. Degradation of seeps or springs from groundwater pumping may also occur. Loss of surface water sources within existing and historic bighorn sheep ranges may diminish the viability of existing populations or the potential for successful reintroduction or natural colonization where this species is absent. The influence to bighorn sheep from the loss of any particular water source will depend on the number of water sources available to bighorn sheep in the region (Wehausen 2005). Water sources can be lost to bighorn sheep due to various causes, including domestic and feral stock use, vandalism, or natural disasters.

Operational impacts include the degradation of habitat in adjacent areas due to increased human presence associated with use of new facility, noise, nighttime maintenance activities and mirror washing. Public interest in the new facility may also result in increased road traffic along roads in the region.

Habitat Loss for Nelsons Bighorn Sheep

Implementation of the proposed project would result in the direct loss of approximately 3,277 acres of habitat that likely supports only periodic use for foraging and movement. Staff considers the loss of habitat from the proposed project to be adverse but less than significant.

Conclusions and Discussion of Mitigation for Nelsons Bighorn Sheep

The Society for Conservation of Bighorn Sheep has recommended a minimum buffer of one mile from the upper edge of any solar development to the base of rugged terrain to protect spring foraging habitat. The proposed project is located several miles from the base of either the Nopah or Spring mountains. However, in years of high rainfall, animals may move further out from rugged terrain to take advantage of available forage resources and, thereby, temporarily occupy new habitat that has the potential to facilitate gene flow, and enhance reproductive success (Bleich pers comm. 2012).

While sheep will range far from mountainous areas, especially during intermountain movement, the implementation of the proposed project is not expected to result in the loss of annual spring forage for this species or act as a barrier to movement. Because of the distance to known herds the project is also not expected to result in direct impacts from noise, dust, or human activity unless sheep are undergoing seasonal movement at the time of construction. The most likely risk to bighorn sheep would be increased road traffic during spring lambing or during periods of intermountain movement. Sheep have been known to acclimate to human habitual noise and human presence to a certain degree, whereas being exposed to sudden noises or human presence elicited a stronger startle response (Papouchis et al 2001).

Ensuring availability of intermountain areas used for movement by bighorn sheep is fundamental to colonization of vacant habitat and to metapopulation processes, in general. Colonization allows the species to maintain adequate metapopulations to thrive. Colonization by ewes is the slow link in this process, but has recently been documented in several Mojave Desert ranges in California (Bleich et al. 1996; Torres et al. 1996). Consequently, intermountain areas of the desert floor that bighorn traverse between mountain ranges are as important to the long term viability of populations as are the mountain ranges themselves (Schwartz et al. 1986; Bleich et al. 1990b, 1996). CDFG has informed staff that the project site likely has some import in facilitating movement by bighorn sheep between the Nopah Range and other, nearby, mountain ranges.

Several intervenors and members of the public have commented that the site is or may be more frequently used by bighorn sheep. However, staff notes that significant portions of Pahrump Valley remain undeveloped and the project would not preclude intermountain movement. Although intermountain movement may periodically occur consultations with experts in bighorn sheep ecology (Dr. Wehausen, personal

communication) have stated that the Pahrump Valley may be too wide for bighorn sheep to cross and the movement of bighorn sheep between mountain ranges does not depend upon inter-valley movements in this area. Rather, these movements are expected to occur across rugged mountain habitat. In addition, the project site does not provide the rugged terrain more suitable for bighorn sheep, and is located over three miles from the preferred escape habitat for this species (i.e., slopes greater than 15 percent, see **Biological Resource Figure 7, Bighorn Sheep Habitat**). Because sheep are only expected to visit the site infrequently and the project will not preclude movement significant impacts to foraging habitat or movement corridors are not expected to result from implementation of the proposed project.

Implementation of the following conditions would minimize potential impacts, if any, to this species. These include Conditions of Certification **BIO-5** (Designated Biologist and Biological Monitor Authority) in which the Designated Biologist and Biological Monitor can halt any activities that would be an adverse impact to biological resources including bighorn sheep; **BIO-6** (Worker Environmental Awareness Program); **BIO-7** (Biological Resources Mitigation Implementation and Monitoring Plan); and **BIO-8** (Impact Avoidance and Minimization Measures). Implementation of these measures would reduce impacts on bighorn sheep to less-than-significant levels under CEQA.

Compensatory mitigation for the loss of land associated with the project is being provided for both desert washes and to reduce impacts to desert tortoise. While not required to reduce potential impacts to bighorn sheep, Condition of Certification **BIO-12** (Desert Tortoise Compensatory Mitigation), **BIO-22** (Compensatory Mitigation for State Waters), and **BIO-18** (Weed Management Plan) may benefit bighorn sheep should these lands occur in areas used by the species either as spring forage or for intermountain movement.

Direct and indirect impacts from groundwater pumping are not expected to occur on water sources located within mountain ranges utilized on a permanent basis by Nelson's bighorn sheep; see the **Soils** section of this FSA for staff's analysis of impacts to groundwater resources. However, project groundwater pumping could potentially impact the seasonal spring pools at Stump Spring ACEC, which provides water from December to July, by lowering the water table in the vicinity of the springs. Cumulative and incremental impacts to mountain block streams in the Clark Mountains have also been identified, including at Manse Springs to the north of the project site. The connection of mountain block streams to the groundwater supply is not known for this region. However, without mitigation, these impacts to water sources could be significant. Condition of Certification **WATER SUPPLY-4** (groundwater monitoring) would require the applicant to stop pumping groundwater if declines in groundwater levels reach the project boundary. **WATER SUPPLY-2** would offset the project's contribution to the Pahrump Valley groundwater basin overdraft.

Potential indirect impacts associated with the degradation of habitat in adjacent lands or by reducing access to surface water at Stump Spring would be reduced to less than significant levels with the implementation of conditions of certification **BIO-23** (Groundwater-dependent Vegetation Monitoring Plan) and **WATER SUPPLY-4** (Groundwater Monitoring).

Special-status Bats

The AFC indicated that there was a low to moderate potential for sensitive bat species to occur in the project area. However, due to proximity of the project site to suitable habitat for foraging and roosting (e.g. Stump Spring ACEC, scattered mesquite thickets along the Stateline, etc.), staff requested that the applicant install an Anabat station. Three special-status bats have been detected onsite, the pallid bat, Yuma myotis, and the Western small-footed myotis. These species have the potential to forage within the project site and adjacent areas and some bat species utilize large areas for foraging. For example, the pallid bat is capable of flying more than 18 miles, although most foraging occurs within about two miles of the diurnal roost (Hermanson and O'Shea 1983). Western mastiff bats have been heard in open desert, at least 15 miles from the nearest possible roosting site (Vaughan1959).

Direct Impacts to Special-status Bats

Direct impacts to bats could include mortality of individuals during construction activities should bats elect to day or night roost in equipment or the power towers. The placement of large open structures may be an attractant to bats which are known to periodically day roost on open structures such as the eves of buildings. Bats could also be directly impacted by the loss of foraging habitat due to construction of permanent structures or other construction activities, and temporary disturbance during construction (noise, air turbulence, dust, and ground vibrations from construction equipment). Bats that forage near the ground, such as the pallid bat, would also be subject to crushing or disturbance by vehicles driving at dusk, dawn, or during the night.

In general, bats are highly mobile and it is unlikely that construction activities would result in mortality of bats in the project area. Although bats forage periodically in the project area, most activities will occur during daylight hours when the potential for bat interactions is limited. The applicant has not proposed specific avoidance measures for bats and staff considers the likelihood of roosting bats to be low. However, because potential roost sites may be constructed on the project area (i.e., power towers, stacks of pallets or constriction materials) and sensitive bats are known to occur at the site, staff considers potential impacts to these species significant absent mitigation. In order to reduce these impacts staff has developed pre-construction monitoring and impact avoidance measures for bats to reduce impacts to potential day roosts. Conditions of certification required to reduce impacts to sensitive bats are described below.

Indirect Impacts to Special-status Bats

Indirect effects include the loss of foraging habitat due to type conversion, night time lighting that exposes bats to predation, and alteration in prey bases. Because crews will work at night to wash mirrors it is likely that bats will be attracted to the night lighting associated with the project area. Bats may also be attracted to project features such as night lighting, mirror washing, and the retention basin (when filled), as these features may attract prey items such as insects. Indirect impacts to the Stump Spring ACEC and associated mesquite thickets in Nevada, as well as to the Amargosa River in California, may also occur (see also the **Water Supply** section for more information).

Habitat Loss for Special-status Bats

Implementation of the proposed project would result in the direct loss of approximately 3,277 acres of habitat for several species of bats. The most likely bat to forage on the ground would be the pallid bat. Other bats may periodically forage over the project site post development or be attracted to night lighting. Staff considers the loss of habitat from the proposed project to be significant absent mitigation. Conditions of certification required to reduce impacts to sensitive bats are described below.

Conclusions and Discussion of Mitigation for Special-status Bats

Implementation of the proposed project has the potential to result in the direct loss of special status bats. The project is not expected to result in the loss of maternity roosts, day roosts, or hibernacula for sensitive bats. These features are not known to occur on the project site, and while bats will utilize large trees for day roosts, the habitat on the project site (primarily Mojave Desert scrub and windrows of dead Arizona cypress trees surrounding the abandoned orchard) is generally exposed and may not be well suited for this behavior. Roosting opportunities for bats are available in habitats offsite, such as the Nopah and Kingston ranges, potentially within buildings in Pahrump Valley, and other habitat that provides rock outcrops, tree hollows, and such sheltered roosts. Bats may also be associated with the large trees that occur immediately south of the site in the community of Charleston View or in the many stored trailers and vehicles that occurs on private lands east of the project site. It is possible that bats may roost within some of the dense mesquite that occurs near the California/Arizona Stateline. Staff recommends the implementation of Condition of Certification **BIO-8.** This condition includes specific language regarding the avoidance of roosting bats or maternity colonies should they occur. Implementation of this condition would reduce project impacts to a level that is less-than-significant.

Potential indirect impacts associated with the degradation of habitat in adjacent lands or by drawdown of the spring-fed surface water at Stump Spring, other smaller seasonal springs, and other areas known to support a variety of foraging bats, would be reduced to less than significant levels with the implementation of Condition of Certification **BIO-23** (Groundwater-dependent Vegetation Monitoring Plan). With the implementation of these conditions of certification, impacts from the project to special-status bats would be considered less-than-significant under CEQA.

Operation of the project may also have the potential to alter the abundance of insect prey for both bats and birds. The presence of insect prey on the project site, and the hazard to bats from collision with and thermal exposure is also poorly understood. Presumably, bats will be able to avoid striking the heliostats and support facility through the use of echolocation. Similarly, while bats are active at dawn and dusk, when the facility is just commencing or ending daily operation, it is likely the solar flux levels will be at sub- lethal levels. Studies by Horvath et al. (2010) have suggested that some solar panels could cause an increase in Polarized Light Pollution (PLP) which occurs from light reflecting off of dark colored anthropogenic structures; the authors also demonstrated that some insects are attracted to photovoltaic solar panels and mistake these structures for the surface of water, depositing eggs on the solar panels. According to Horvath et al. (2009), PLP caused by anthropogenic structures can alter the ability of wildlife to seek out suitable habitat and elude or detect the presence of predators.

Because the heliostats onsite would also be expected to polarize light, they may also serve as an attractant. In general, many species of insects are attracted to light or heat.

Staff recommends the implementation of **BIO-15** (Avian, Bat, and Golden Eagle Protection Plans), to assist with monitoring operational impacts and formulate adaptive management strategies if significant project effects upon bats are demonstrated through project operations monitoring.

Impacts - Special-Status Bird Species

Special-Status Bird Species

The desert scrub communities present on the project site support a broad range of food items for resident and wintering birds, including seeds from annual grasses and forbs, various insects, small mammals, and a variety of small resident birds. Species expected to use the site include golden eagle, burrowing owl, loggerhead shrike, Leconte's thrasher, northern harrier, and prairie falcon. **Biological Resources Table 4** identifies the special-status birds either observed during surveys conducted by the applicant or species that have the potential to occur on or near the project site.

Direct Impacts to Special-status Birds

Direct impacts to special-status nesting birds or raptors would be similar to impacts described above (see subsections entitled Overview of Impacts to Wildlife, and Nesting Birds). This includes the impacts of mortality from solar flux, collision with power tower, heliostats, or other project features, removal or disturbance of vegetation that supports nesting birds, increased noise levels from heavy equipment, increased human presence, and exposure to fugitive dust.

Indirect Impacts to Special-status Birds

Indirect impacts to special-status nesting birds or raptors would be similar to impacts described above (see subsections entitled Overview of Impacts to Wildlife, and Nesting Birds). This includes the loss of habitat due to the colonization of invasive plants and a disruption of breeding or foraging activity due to facility maintenance. The drawdown of surface and subsurface water in adjacent lands such as the mesquite thickets and Stump Spring ACEC could result in significant impacts to bird habitat.

Birds may also become trapped within vertical pipes used to support the heliostats. In addition, noise and lighting effects have been demonstrated to adversely affect behavior, reproduction, and increase the risk of predation. The project's collision hazards and concentrated solar energy hazards have the potential to result in the loss of special-status bird species, and staff concludes that these hazards present a significant and unavoidable impact (see Operational Impacts, above).

Habitat Loss for Special-status Birds

Implementation of the proposed project would result in the direct loss of approximately 3,277 acres of habitat that supports foraging for a variety of resident and migratory birds. As with most common bird's, species that rely on the site for year round cover, foraging and nesting would be subject to more intense effects of the proposed project when compared to species that utilize the project site for foraging alone. Other special-

status species may use the site during winter or migration season, but would not nest on the site. The effects of foraging, migration stopover, and wintering habitat loss for these species would be comparable to other habitat loss effects (see Overview of Wildlife Habitat Impacts, above). All native birds, including special-status species, are protected under the federal Migratory Bird Treaty Act (MBTA) and California Fish and Game Code. The loss of habitat from the proposed project would be significant absent mitigation. Conditions of certification required to reduce impacts to sensitive birds are described below.

Conclusions and Discussion of Mitigation for Special-status Birds

Implementation of the proposed project would result in the direct loss of habitat supporting special-status birds. Declines in verdin, pyrrhuloxia (*Cardinalis sinuatus*), northern flicker, cactus wren, Leconte's thrasher, crissal thrasher, Bendire's thrasher, loggerhead shrike, and greater roadrunner populations have all been correlated to urbanization, though verdin and cactus wrens have also been found to be unaffected by urban development if nest-site alternatives are present in the urban matrix (Corman and Wise-Gervais 2005, Germaine et al. 1998, Emlen 1974). It is expected that construction of the HHSEGS facility will result in the displacement of these and other sensitive birds. Staff considers these effects to be significant absent mitigation.

Direct impacts to sensitive birds can be reduced or offset through implementation of staff's recommended Conditions of Certification **BIO-1** through **BIO-8** (see Common Wildlife, above). Staff also recommends Conditions of Certification **BIO-15** (Avian Bat & Golden Eagle Protection Plan) and **BIO-16** (Pre-construction Nesting Bird Surveys), see discussion of impacts to common birds. Condition of Certification **BIO-16** includes conducting pre-construction nesting surveys, and the establishment of limited disturbance buffers. The condition would require the applicant to implement a nest management plan to ensure the protection of sensitive birds or their nests. Implementation of these conditions of certification would avoid direct impacts to nests, eggs, or young of migratory birds and would reduce the impacts of construction disturbance to nesting birds to less than significant levels under CEQA.

The loss of foraging habitat would be considered significant absent mitigation. Loss of nesting and foraging habitat for these special-status bird species would adversely affect populations of these species within the Pahrump Valley. As discussed in the cumulative impact subsection, the project would be a contributor to the cumulative loss of biological resources, including these special-status bird species. Implementation of Condition of Certification **BIO-12** (Desert Tortoise Compensatory Mitigation) would reduce this habitat loss by the preservation of similar foraging areas. Implementation of this condition of certification would reduce impacts from the loss of habitat to less than significant levels under CEQA.

Indirect impacts to habitat from the drawdown of surface and subsurface water in adjacent lands such as the mesquite thickets and Stump Spring ACEC would be avoided or reduced to less than significant levels with the implementation of conditions of certification, **BIO-23** (Groundwater-dependent Vegetation Monitoring Plan) and **WATER SUPPLY-4** (groundwater monitoring). With the implementation of these conditions impacts to sensitive birds from the proposed project would be considered less-than-significant under CEQA.

Golden Eagle

Golden eagles are known to occur in the region and have been observed foraging over and/or near the project site during bird surveys by staff and the applicant. Surveys conducted by the applicant identified 19 nests in the region, and this species has been observed in proximity to Charleston View. Golden eagles can have extremely large home ranges and would be expected to prey on many of the species that occur on the project site.

Direct Impacts to Golden Eagles

Direct impacts to golden eagles include the loss of foraging habitat and disturbance from construction activities such as clearing and grading. Increased human presence and vehicle traffic could also adversely affect golden eagles. Noise from these activities will likely exclude or greatly reduce foraging in and adjacent to the Proposed Project. Construction noises are anticipated to range from 43 decibels to 74 decibels at 1500 feet from the noise source (piece of construction equipment) (HHSG 2011a, Table 5-7-7). During project operation, direct impacts could occur from exposure to concentrated solar flux.

Indirect Impacts to Golden Eagles

Indirect impacts could include the loss of habitat due to the colonization of invasive plants and a disruption of breeding or foraging activity due to facility maintenance. Weed abatement, mirror washing (which occurs at night), and maintenance activities would likely limit the use of some areas as foraging or nesting habitat. Glare or heat associated with the heliostats may also adversely affect the use of the site by this species. In addition, noise and lighting effects have been demonstrated to adversely affect behavior, reproduction, and increase the risk of predation. Post development, golden eagles could collide with facility structures or be subject to mortality from exposure to solar energy flux (see Operational Impacts, above).

Habitat Loss for Golden Eagles

Golden eagle, are known to forage within the proposed project site. While golden eagles do not nest onsite, the site provides important foraging habitat. Project construction would result in the loss of 3,277 acres of suitable foraging habitat for these species. Staff considers this loss of foraging habitat a significant impact. Conditions of certification required to reduce impacts to sensitive birds is described below.

State and Federal Guidelines Protecting Golden Eagles

The Bald and Golden Eagle Protection Act (BGEPA) prohibits the take of bald and golden eagles without a permit. A federal permit is required for take. Under state law, golden eagles are fully protected and no take is allowed for this species, in contrast with federal law.

On November 10, 2009, the USFWS introduced new rules (74 FR 46835) requiring a permit for all activities that might result in take of golden or bald eagles, including activities that might cause decreased productivity or nest abandonment. This was supported through the preparation of an Environmental Assessment (EA) and Implementation Guidance for take permits were issued under the Bald Eagle and

Golden Eagle Protection Act (USFWS 2010d). The USFWS concluded that all activities that may disturb or incidentally take an eagle or its nest as a result of an otherwise legal activity must be permitted by the USFWS under this act. Under (72 FR 31132) the USFWS defines disturb as any activity interfering with normal breeding, feeding, or sheltering behavior to the degree that it causes or is likely to cause decreased productivity or nest abandonment. Because large-scale solar projects would result in the loss of large amounts of golden eagle foraging habitat, there are concerns regarding the cumulative impacts to golden eagles from the loss of foraging habitat.

Given the nature of the potential impacts and loss of foraging habitat, coupled with potential injury or mortality from concentrated solar flux (see Operational Impacts, above), the USFWS has recommended that the project applicant apply for a federal Eagle Act Permit, and has also indicated that two-to three years of eagle survey data are necessary to apply for the permit. The project owner is not required to apply for a permit, and an Eagle Act Permit is not being considered as part of this analysis.

Conclusions and Discussion of Mitigation for Golden Eagles

The proposed project site does not provide nesting habitat for golden eagles; however, scrub communities present on the project site provide suitable foraging habitat for this species. Golden eagles are extremely susceptible to disturbance during the breeding season and have been documented to abandon nests when disturbed. However, the nearest nest is located over four miles to the west of the project site, Figure 8, Golden Eagles at Hidden Hills Project Site. Similarly, all of the 19 nests located within 10 miles of the project site were unoccupied in 2011. While it is possible that these nests may become occupied at any time the distance from the project site greatly reduces the potential of the proposed project to result in direct effects to golden eagles or their nests from construction or operation activities.

Golden eagles are expected to actively forage on and near the proposed project site. This includes year round residents and seasonal migrants. The development of the 3,277-acre project site would result in substantial loss of foraging habitat for this species. Accelerated commercial and urban development was attributed to golden eagle nesting declines along the Colorado Front Range (Boeker 1974). Post development, staff considers it likely that golden eagles will be effectively excluded from foraging on the project site. While it is possible that this species may forage near the border of the site; the large numbers of structures within the heliostat field, coupled with glare would likely preclude foraging within the solar field. If foraging did occur within the heliostat field, it could lead to collision, electrocution, or lethal exposure to solar flux (see Operational Impacts, above).

The USFWS considers that foraging habitat loss may be interpreted as take under the BGEPA if it causes territory abandonment or reduced productivity. Staff believes that these effects, would be difficult at best to attribute to any given land use. However, staff concludes that the loss of foraging habitat would be significant under CEQA and require compensatory mitigation. Staff does not consider the habitat loss to constitute take under state or federal LORS.

The USFWS has also raised concerns regarding potential collision threats associated with solar and renewable technologies. To address potential collision concerns (see

Operational Impacts, above) staff has proposed Condition of Certification **BIO-15** (Avian, Bat, and Golden Eagle Protection Plan). This requires a monitoring and reporting program that would document and report potential collision mortality from the proposed solar fields. The plan would specify the project owner's anticipated take of golden eagles and provide specific measures proposed to compensate for that take (e.g., retrofitting of existing off-site electrical distribution lines to reduce electrocution risk, or removal of existing disturbance in nesting habitat, or the control of ravens). The Plan would also specify the project owner's proposed measures to remediate any further take of eagles that may exceed the estimated.

Staff concludes that even with the implementation of the proposed Conditions of Certification it is possible that golden eagles will be subject to mortality. Staff considers these impacts to be significant and unavoidable. Staff notes that any take of bald or golden eagles even if mitigated as required under CEQA, would violate the state Fish and Game Code due to the species' status a fully protected species. Staff believes that if golden eagle became a covered species under the Desert Renewable Energy Habitat Conservation Plan (in preparation) or another plan meeting state requirements as a Natural Community Conservation Plan, such take could be authorized under state law.

To offset other project related effects and the loss of foraging habitat staff recommends the implementation of conditions of certification **BIO-1** through **BIO-9**, **BIO-15**, and **BIO-12**, which include worker training, implementation of Best Management Practices, pre-construction surveys, biological monitoring, the avian protection plan, and acquisition and preservation of compensatory mitigation lands. Conditions of Certification **BIO-22** (Compensatory Mitigation for State Waters), **BIO-18** (Weed Management Plan), **BIO-23** (Groundwater-dependent Vegetation Monitoring Plan), and **WATER SUPPLY-4** would reduce direct loss of golden eagle habitat.

Burrowing Owl

The burrowing owl is a CDFG Species of Special Concern. Construction and operation of the project would result in impacts to burrowing owls and their habitat. Burrowing owl sign (feathers, whitewash, and/or pellets) was detected at on the project site during protocol surveys for desert tortoise conducted from March 13, 2011 to May 18, 2011 (HHSEGS 2011a). The AFC (HHSEGS 2011a, Table 5.2-7) notes that incidental sightings of burrowing owls were observed in 2010 and the spring of 2011. Supplemental information provided by the applicant including a Draft Burrowing Owl Mitigation and Monitoring Plan, suggests that there is no conclusive evidence that burrowing owl nesting occurred on the site during 2011 and that burrowing owls likely use the project site, but burrows on the western portion of the project site are temporary and short-term due to the fine silt and clay soils and impacts that rain events have on it (CH2 2012y). Further the applicant contends that winter surveys, conducted by the applicant January 30, 2012 and February 2, 2012 to a previously reported burrow, was found to be collapsed and no burrowing owl sign was observed at the burrow. No burrowing owls or fresh sign was found at any of the nine previously identified burrowing owl burrows within the project site or the 150 meter buffer. Furthermore, visual surveys of the project area and buffer, conducted by the applicant, did not detect any burrowing owl sign.

The applicant may be correct in concluding that use of the site by burrowing owl is limited; however there is no reliable data to draw this conclusion. A review of Table 2 (Sensitive Species and Sign Locations) of Appendix 5.2 F(Desert Tortoise Survey Report) indicate that of the eight potential burrowing owl burrows detected, two contained pellets, white wash and feathers. However, there is no indication that focused burrow surveys consistent with burrowing owl monitoring guidelines were implemented. These surveys, which consist of repeated burrow surveys, are required to assess if owls are physically present and breeding at a given location. A single breeding season survey alone is not effective to determine if burrowing owls are breeding at a location. However, staff recognizes that the applicant did not conduct these surveys based on direction from the CDFG once burrowing owls were detected.

Direct Impacts to Burrowing Owls

Direct impacts to burrowing owls would be similar to those described for nesting birds. This includes the crushing of burrows, removal or disturbance of vegetation, increased noise levels from heavy equipment and the, increased human presence, and exposure to fugitive dust. Because burrowing owls are cavity dwellers that are primarily active during crepuscular periods (i.e., dawn and dusk) or at night, birds flushed from burrows during the day are exposed to elevated predation risk from various raptors. Burrowing owls also exhibit site fidelity and owls displaced during construction or from passive relocation activities increase the risk of mortality for this species if they lack access to adequate burrows.

Indirect Impacts to Burrowing Owls

Indirect impacts would be similar to those described for nesting birds and could include the loss of habitat due to the colonization of noxious weeds, plant community shifts associated with the maintenance, long term human presence associated with the 29 month construction schedule, mowing of existing vegetation and the degradation of foraging habitat. Operational impacts include increased human presence from maintenance personnel that would flush or otherwise disturb burrowing owls, invasive plant control activities, weeding, and vehicular use of access roads. Burrowing owls may also be at risk from collision or electrocution with facility structures and exposure to solar flux (see Operational Impacts, above).

Habitat Loss for Burrowing Owls

Project construction would result in the loss of 3,277 acres of suitable foraging habitat for burrowing owls. Staff considers this loss of foraging habitat a significant impact. Conditions of certification required to reduce impacts to burrowing owls are described below.

Conclusions and Discussion of Mitigation for Burrowing Owls

Burrowing owls are rare in the undisturbed desert areas of the eastern and southeastern portion of California (Small 1994). By the 1940s', burrowing owls had become scarce in many portions of the desert southwest as a result of shooting and elimination of ground squirrel burrows (Grinnell and Miller 1944). Limited data suggest that they are decreasing in some areas, but may be stable or increasing in others (Klute et al. 2003). Surveys in California in 1986-91 found population decreases of 23-52% in

the number of breeding groups and 12-27% in the number of breeding pairs of owls (DeSante et al. 1997). In addition, in a 2003 report by the U.S. Fish and Wildlife Service, breeding burrowing owls were thought to be largely extirpated during the last 10-15 years from multiple areas in California, including Napa, Marin, San Francisco, Santa Cruz, and Ventura counties, coastal San Luis Obispo county and the Coachella Valley (http://burrowingowlconservation.org/PR12-09-2010.html).

Notwithstanding the current conservation designation assigned to this species by the CDFG and BLM habitat for burrowing owls continues to be lost through development. A ranking of the most important threats to the species included loss of habitat, reduced burrow availability due to rodent control, and pesticides (James and Espie 1997).

If burrowing owls are present within or adjacent to a construction zone, disturbance could destroy occupied burrows or cause the owls to abandon burrows. Construction during the breeding season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to nest abandonment. The loss of occupied burrowing owl habitat (habitat known to have been occupied by owls during the nesting season within the past three years) or reductions in the number of this rare species, either directly or indirectly through nest abandonment or reproductive suppression, would constitute a significant impact absent mitigation. Furthermore, burrowing owls and their nests are protected under both federal and State laws and regulations, including the Migratory Bird Treaty Act and California Fish and Game Code Section 3503.5.

The applicant has proposed mitigation based on the current guidelines recommended by the CDFG Staff Report on Burrowing Owl Mitigation (CDFG, 1995) and the revised 2012 CDFG Staff Report on Burrowing Owl Mitigation (CDFG 2012). Staff has included these recommendations into proposed Condition of Certification **BIO-17** (Burrowing Owl Impact Avoidance and Minimization Measures). Staff is considering the recently published 2012 revision to those guidelines (CDFG 2012) to provide the most relevant guidance addressing impacts and mitigation development to this species.

To avoid potential impacts to burrowing owls that might be nesting or residing within burrows in the project impact area, the proposed conditions of certification include the completion of pre-construction surveys of the site using established protocols. If present, the applicant would establish a buffer and avoid active nests during the breeding season. If owls are detected using a burrow outside the breeding season the owls may be passively displaced pending the establishment of artificial burrows and the acquisition of adequate mitigation lands. As described above the strategy for displacing owls depends greatly on how burrowing owls use the site, their number, and the timing of construction activities. Because project construction would occur for up to 29 months and result in the land use conversion of approximately 3,277 acres of habitat; passive relocation may result in the repeated harassment of resident owls should they try to re-establish territories within the projects footprint. While construction of replacement burrows in off-site areas and the acquisition of mitigation lands would reduce impacts to the species, it is likely that owls would attempt to occupy areas close to known territories. This could require multiple passive relocation events for the same owls. Each of these events stresses the bird and exposes the owls to predation, lost breeding opportunities, thermal stress, and potential territorial disputes.

There is much debate among state, federal, local, and private entities over the most practicable and successful relocation/translocation methods for burrowing owl. When only passive relocation is used as an impact avoidance measure, it is generally only effective when burrowing owl nesting territories are directly adjacent to permanently protected lands (i.e., military reservation, airport, wildlife reserve, agricultural reserve with appropriate crop type such as alfalfa). Conversely active translocation of owls involves trapping owls, temporarily holding them in enclosures with supplemental feeding, and releasing at a suitable off-site location with existing or artificial burrows prior to breeding.

While active translocation might be a better solution than passive relocation for evicting owls from a large project site, California Fish and Game Code 3503.3 prohibits the active relocation of burrowing owls. Therefore, staff is can only recommend the implementation of passive relocation techniques. Although passive relocation would be conducted to avoid direct mortality of owls within the proposed project area, previously occupied burrow(s) would be destroyed and foraging habitat would be degraded. Due to the loss of habitat compensatory mitigation is required to reduce these impacts to less than significant levels. The location and amount of compensatory habitat required to mitigate impacts to burrowing owl is often based on the number of impacted owls and assumes that currently occupied habitat will be replaced with nearby occupied habitat.

The applicant has indicated that no more than five owl territories occur on the project site (CH2 2012y). Territories are typically defined as an area used by a species for foraging and reproduction. In addition, at least eight burrows with sign have been discovered onsite. However, given the occasional migratory nature of burrowing owl, staff cannot predict how many burrowing owls or physical burrows might be detected onsite during pre-project surveys. In some circumstances burrows that occur adjacent to project activities are blocked to minimize conflicts with breeding birds. Staff would consider the closure of burrows in adjacent lands to constitute a significant impact that requires compensatory mitigation.

In order to reduce impacts to burrowing owls from the loss of burrows and foraging habitat the acquisition of off-site habitat for burrowing owl should take into consideration the foraging distance and average home range of breeding and non-breeding owls. Diurnal home range for owls can be 150 feet on both sides of burrow. Nocturnal home range is much larger, one square mile per owl pair, and several owls can overlap in that one square mile. The mean home range for 11 male burrowing owls in 1998 and 22 males in 1999 was 177 hectares (437 acres) and 189 hectares (467 acres), respectively, at Naval Air Station in Lemoore, California which is located south of Fresno (*ibid.*). Male burrowing owls often move greater than 1,000 meters when foraging in the breeding season and home ranges often overlap (*ibid.*). Due to the wide variation of home range size used by burrowing owls and lack of known occurrences of burrowing owls surrounding the project site, staff believes that owls identified during surveys would be impacted by project development. Suitable, off-site (preferably occupied) burrowing owl habitat would need to be acquired to offset the loss of these habitat resources on the project site. Acknowledging that owl territories can overlap staff is considering the site to support between two to four burrowing owls and at least two territories.

For the purposes of establishing compensatory mitigation requirements staff is assuming that each territory encompasses approximately 300 acres. The use of the 300 acre territory size takes into consideration the wide variation of territory size and that some territories likely overlap. Provided that adequate conditions exist on the proposed desert tortoise mitigation lands staff believes the mitigation lands for burrowing owls may be nested within the lands acquired for desert tortoise.

Implementation of Conditions of Certification **BIO-1** through **BIO-8, BIO-12** (Desert Tortoise Compensatory Mitigation), and **BIO-17,** which outlines survey requirements, eviction guidelines, and compensatory requirements; the project's impacts to burrowing owls would be mitigated to less-than-significant under CEQA.

Impacts to Wildlife Movement Corridors

Recent studies indicate that habitat fragmentation and isolation of natural areas ultimately results in the loss of native species within those communities (Soulé et al. 1988). Populations of animals that are isolated from other populations are higher risk of extirpation both from sources such as drought, disease, or wildlife. In the Mojave Desert large areas have been subject to habitat fragmentation from residential development, agricultural practices, military land uses (including Fort Irwin, Marine Corps Logistic Base Yermo, and Twentynine Palms); and off highway vehicle use. On a local scale, the city of Pahrump is one of the fastest growing cities in Nevada. The amount and distribution of suitable habitat is an essential element to consider for the management of wildlife. For example, some species require, and are often limited to, unique vegetation or terrain features for breeding or foraging such as bighorn sheep and desert tortoise.

Direct impacts of the project include the placement of physical structures such as the solar arrays, buildings, or other facilities that block or impede wildlife movement. Ground-disturbing activity, including heliostat and power tower installation and construction, grading of new access roads, and use or improvement of existing access roads would also be expected to interfere with terrestrial wildlife movement during construction. Construction could also affect wildlife in adjacent habitats by interfering with movement patterns or causing animals to temporarily avoid areas adjacent to the construction zone. More mobile species such as birds and larger mammals would be evicted from the project site and prevented access by perimeter fencing. Because construction would occur for up to 29 months it is likely that wildlife use of the area would be adversely affected.

Indirect impacts include human disturbance, shade, altered vertical structure (i.e., heliostat arrays) that reduce the sites' openness (a key element associated with use of an area by some species), the proliferation and spread of invasive weeds, and potential for increased predation risk from the addition of perch sites.

Operational impacts include night time lighting that increases predation risk, and collisions with vehicles (see Operational Impacts, above).

Wildlife corridors provide a variety of functions and can include habitat linkages between natural areas; provide greenbelts and refuge systems; and divert wildlife across permanent physical barriers to dispersal such as highways and dams by roadway underpasses and ramps (Haas 2000, Simberloff et al. 1992). Generally, the accepted

definition describes a wildlife corridor as a linear habitat, embedded in a dissimilar matrix that connects two or more larger blocks of habitat (Beier and Noss 1998). Noss (1987) also suggests several potential advantages to corridors, including increased species richness and diversity, decreased probability of extinction, maintenance of genetic variation, a greater mix of habitat and successional stages, and alternative refugia from large disturbances.

Even within relatively open expanses of the Mojave Desert many species move through the landscape utilizing various physical and biotic features. Some species including Nelson's bighorn are strongly associated with steep mountainous regions and tend to move between these features quickly often utilizing local water sources where available. Likewise, many birds and some mammals seasonally utilize patches of microphyll woodlands, mesquite thickets, and riparian areas during summer and winter migratory passages. An important consideration of any wildlife corridor analysis is evaluating what target species occur in the project area and determining how these species use and move through the landscape affected by the proposed project. For example, desert tortoise while capable of long distance dispersal, are essentially corridor dwellers that complete their entire life history cycle within a relatively small area. In many instances home ranges for desert tortoise may run between 200 and 640 acres. Nelson's bighorn sheep are wide ranging species that may use portions of the project site only for episodic foraging and during periods of intermountain movement. Species may also use an area as true movement or dispersal corridor, on a seasonal basis, where the time spent within a given block of land is limited.

The HHSEGS project would be located in the Pahrump Valley, a broad alluvial plain, located between the Nopah Range, Kingston Range, and the Clark Mountains. Although this area remains largely undeveloped the valley is confined by the steep mountain ranges which affect the dispersal and distribution of some species in the region. Ongoing development in the region including the city of Pahrump, local airfields, and rural residents has led to various forms of habitat fragmentation in the region. Although the project is adjacent to Tecopa Road and bordered by rural residences to the south, the entire project site to provide habitat used by resident and dispersing animals. Habitat suitability and permeability (i.e., ease of movement for the species in the defined habitat) on the project site appears to be high for east-west movement with no existing barriers to dispersal or movement. North-south movement on the project site is hindered by both Tecopa Road and the community of Charleston View.

Construction of the proposed HHSEGS facility would result in the land use conversion of approximately 3,197 acres of natural lands. This would likely disrupt movement on a local scale and would fragment existing home ranges for many small species including desert tortoise, kit fox, and badger. Based on the vegetation, topography and connectivity to other open areas, these impacts are locally significant but the project would not be expected to result in the genetic isolation of the species in the project area.

The project would also have the potential to restrict some areas used by big horn sheep. Bighorn sheep are known from the region and likely use the project site for periodic intermountain movement. Bighorn sheep are known to move between the Nopah Range, the Spring Mountain Range, and the Kingston and Clark ranges. This

species is known to forage in the bajadas near the foothills of the mountains and may move across the flatlands associated with the project. While not located in a designated wildlife corridor for this species the project area and adjacent desert flatlands would be expected to support this species. Wehausen (2005) and others (Schwartz et al. 1986; Bleich et al. 1990, 1996) consider intermountain areas of the desert floor that bighorn traverse between mountain ranges as important to the long term viability of populations as the mountain ranges themselves. Construction of the project may obstruct or hinder some of this movement. For other wide ranging mammals including coyotes, badgers, bighorn sheep, and desert kit fox the project will also pose an obstacle but will not completely prevent movement.

For other less motile species such as desert tortoise, construction of the project will hinder north-south and east-west movement. To reduce potential operational effects to desert tortoise the project will be constructed with fencing that prohibits tortoises and other non-avian wildlife from entering the site. This fencing will result in permanent barriers to east-west and north-south movement for the entire 3,277 acre site. East-west movement will remain available along the northern boundary of the project. Movement along the southern border of the project may occur however this small area would abut Tecopa Road.

Impacts to wildlife movement from the construction and operation of the project power plant site and transmission line in California would be adverse but not significant. The presence of adjacent large areas of open habitat and adjacent natural lands will not preclude movement in the area, rather, movement would be expected to reroute around the project site. The proposed project's construction impacts to wildlife movement would be less than significant.

Impacts to Special-status Plants

Summary of Impacts to Special-status Plants

Construction and operation of the project would directly and indirectly impact 28 occurrences of 11 special-status plant species located within the project boundary. None of the affected species are state or federally listed Threatened, Endangered, Rare, or Candidate species but nine of the 11 species have a highly restricted range in California. This is depicted in **Biological Resources Figure 9**.

All 11 species have a California Rare Plant Rank (CRPR) of 1B or 2, meaning they are "rare, threatened, or endangered in California". All 11 species have distribution outside California (a CRPR 2 rank) but 2 species are also rare outside California (CRPR 1B). The CRPR rank is assigned by the Rare Plant Status Review groups, representing over 300 botanical experts, and jointly managed by the California Department of Fish and Game (CDFG) and the California Native Plant Society (CNPS).

The difference between a CRPR Rank 1B and 2 is not reflection of the degree of rarity within California, or the risk of extinction within California; it simply distinguishes plants that are rare in California and elsewhere from plants that are rare or endangered in California but more common outside the state.

CDFGs Natural Diversity Database (CNDDB) Element Rank is, however, an *index of extinction risk* within California. Consequently, staff utilizes both measures in its analyses of special-status plant impacts. The CNDDB Element Rank, formerly known as the NatureServe rank, is based on a methodology (Master et al. 2009) used by natural heritage programs and conservation data centers throughout North America, and has been used by CNDDB since the mid-1980s. Species' conservation status is summarized as a series of ranks from "critically imperiled" to "secure and widespread" that are assessed at the state level, and at a global level. All but two of the 11 special-status plant species in the project area have a state extinction index, or "state rank" of "S1" or "S2":

> **S1 = "Critically imperiled** because of extreme rarity (often 6 or fewer occurrences statewide) or because of some factor(s) making it especially vulnerable to extinction from the state/province."
>
> **S2 = "Imperiled** in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the state/province."

Two of the 11 species (Pahrump Valley buckwheat and pink-flowered androstephium) have a CNDDB Element Rank of S3:

> **S3 = "Vulnerable** in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation."

The following is a list of the special-status plant species that occur within the project footprint and would be directly affected by the project. Their CRPR Rank and CNDDB Element rank is also provided:

- **desert wing-fruit** (*Acleisanthes nevadadensis*) (syn=*Selinocarpus nevadensis)*) – CRPR 2; CNDDB S1
- **pink-flowered androstephium** (*Androstephium breviflorum*) – CRPR 2; CNDDB S3
- **Nye milk-vetch** (*Astragalus nyensis*) – CRPR 1B; CNDDB S1
- **Preuss' milk-vetch** (*Astragalus preussii* var*. preusii*) – CRPR 2; CNDDB S1
- **gravel milk-vetch** (*Astragalus sabulonum*) – CRPR 2; CNDDB S2
- **Tidestrom's milk-vetch** (*Astragalus tidestromii*) – CRPR 2; CNDDB S2
- **Wheeler's skeletonweed** (*Chaetadelpha wheeleri*) – CRPR 2; CNDDB S1/S2
- **purple-nerve spring parsley** (*Cymopterus multinervatus*) – CRPR 2; CNDDB S2
- **Torrey's joint-fir** (*Ephedra torreyana*) – CRPR 2; CNDDB S1
- **Pahrump Valley buckwheat** (*Eriogonum bifurcatum*) – CRPR 1B; CNDDB S3
- **Goodding's phacelia** (*Phacelia pulchella* var*. gooddingii*) – CRPR 2; CNDDB S2

Construction and operation of the project would *eliminate a substantial portion* of the California range, or total documented occurrences in California, of four special-status plant species, thus increasing their risk of extinction in California. The proportion of the total documented occurrences, including occurrences found by the applicant over two years of offsite surveys, is shown in parenthesis:

- **gravel milk-vetch** (50% of total documented occurrences in state eliminated);
- **Wheeler's skeletonweed** (25%);
- **Torrey's joint-fir** (45%);
- **Preuss' milk-vetch** (18%).

Condition of Certification **BIO-20** (Special-status Plant Compensatory Mitigation) requires offsite mitigation, in the form of preservation. Three offsite occurrences shall be protected for every S1 ("critically imperiled") species affected and two offsite occurrences protected for every S2 ("imperiled") species affected. Range ranks (e.g., an S1S2 rank) shall defer to the more imperiled rank. Condition of Certification **BIO-20** includes the option of mitigating in the form of restoration of offsite populations in immediate threat or risk from off-road vehicles, noxious weeds, herbivores, or other factors. The project can elect to implement the restoration on private lands or fund a participating agency to conduct restoration of at-risk occurrences on public lands. Selection criteria for projects and performance standards are included in **BIO-20** and restoration proposals are subject to review and approval by the Compliance Manager and participating agency.

Avoidance and minimization measures (**BIO-19**) – standard Best Management Practices (BMPs) – are required for protecting the nine special-status plant occurrences located in close proximity to the project boundary from indirect effects during operation or accidental impacts during construction. Potential indirect impacts from the introduction and spread of invasive weeds, and from accidental herbicide drift, will be minimized through Condition of Certification **BIO-18** (Weed Management Plan). The risk of fire, and indirect impacts to plants resulting from fires, will be minimized through fire prevention measures contained in **BIO-8** (General Impact Avoidance & Minimization Measures).

The conservation status, range, local distribution, general and microhabitat preferences of the 11 affected species are discussed in the "Setting" subsection of this Biological Resources section, and in the applicant's botanical survey reports (HHSEGS 2011a, Appendix 5-2G; CH2 2011h; CH2 2012c; Hiss pers. comm.).

California Laws Protecting Native Plants

From the CDFG webpage *California Laws Protecting Native Plants: California Environmental Quality Act* (2012x):

> "CEQA provides protection not only for State-listed or Federally-listed species, but "also for any species that can be shown to meet the criteria for listing (CEQA Guidelines Section 15380)."

CEQA requires a "*mandatory finding of significance*" for special-status species that meet CEQA's definition of "rare" or "endangered," regardless of their formal listing status under the Native Plant Protection Act (NPPA), California Endangered Species Act (CESA) or any other law:

> "When any of the following conditions occur the lead agency shall find that a project may have a significant effect on the environment which will require a Mandatory Finding of Significance...When a project has the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, *reduce the number or restrict the range of an endangered, rare or threatened species*." [emphasis added]
>
> "[CDFG] encourages public agencies to ensure that actions they approve do not significantly impact such species." "As the trustee agency for the wildlife of California, which includes plants, ecological communities and the habitat upon which they depend, [CDFG] advises public agencies during the CEQA process to help ensure that the actions they approve do not significantly impact such resources."

Special-status species defined in CDFGs *Special Plants List* (2012a) and *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* (CDFG 2009), and monitored by CNDDB include:

> ""Taxa which meet the criteria for listing, even if not currently included on any list, as described in Section 15380 of the California Environmental Quality Act (CEQA) Guidelines; these taxa may indicate "None" under listing status, but note that *all CNPS 1 and 2* and some List 3 and 4 (now known as California Rare Plant Ranks 1A, 1B, 2, 3, and 4) plants may fall under Section 15380 of CEQA." [emphasis added]

Spring 2012 Survey Results

This impact assessment includes an analysis of the results of offsite surveys conducted by the applicant in spring and summer of 2012 (CH2 2012oo). Because several of the special-status plant species affected by the project were only recently added to the CNDDB (2012a) and California Native Plant Society *Inventory or Rare and Endangered Plants of California* (CNPS 2012), and because the area is generally under-surveyed, the applicant elected to conduct extensive offsite surveys in Pahrump and surrounding valleys over a two-year period, to determine whether any of the affected species may be more common than previously understood. As expected, many new occurrences were found for a few species, and no new occurrences were detected for others.

Reconnaissance level offsite surveys were conducted in several locations during the spring of 2011 and 2012, with a focus on species most substantially affected by the project in terms of the number of total documented occurrences affected. Estimated population sizes are included (in parentheses) in the summary of new offsite occurrences detected during the 2012 surveys, below. Note that populations of most

desert annuals (such as Pahrump Valley buckwheat) can fluctuate wildly in response to variable annual precipitation, and the timing of storms. In particularly dry years, even perennials can remain dormant and undetectable. New occurrences found in spring 2012 include:

- 2 occurrences of **Preuss' milk-vetch** (est. 20,000 plants)
- 8 occurrences of **Tidestrom's milk-vetch** (252 plants)
- 1 occurrence of **Wheeler's skeletonweed** (1 plant)
- 7 occurrences of **Torrey's joint-fir** (126 plants)
- 20 occurrences of **Pahrump Valley buckwheat** (est. 7.3 million plants)
- 5 occurrences of **desert wing fruit** (10 plants)

The offsite surveys conducted in spring 2011 (a normal rainfall year) yielded many new occurrences for some – but not all – of the affected species. New occurrences were found in Pahrump Valley, Stewart Valley, Chicago Valley, and California Valley. The applicant also documented some new occurrences east of the California-Nevada border that bisects Pahrump Valley, and in the Ash Meadows area of Nevada (the Nevada occurrences are not included in the CNDDB).

Staff requested CNDDB to update the Element Rank upon receipt of the applicant's 2012 survey data to ensure the ranks used in the analysis were current and reflect all new occurrences. Predictably, the Element Rank for Pahrump Valley buckwheat was downgraded to an S3 ("vulnerable" but not "imperiled"). Tidestrom's milk-vetch was also downgraded from an S1 to an S2, and Goodding's phacelia was downgraded from an S1 to an S2 as a result of new occurrences detected in 2011.

In May 2012, a focused survey for Torrey's joint-fir was conducted onsite and in a 250-foot buffer surrounding the project site. The applicant intends to continue surveying for Torrey's joint-fir offsite because it was not added to the CNDDB (2012) and CNPS *Inventory* (2012) until January 2012. Nor is it included in the old or new editions of the flora of California (Hickman 1993; Baldwin et al. 2012); in such a case it is reasonable to conclude that the species may be more common because it would have been overlooked, and not considered, during any rare plant surveys of the region.

Proportion of State Distribution Affected and Other Factors Considered

This assessment employed a combination of qualitative and simple quantitative analyses. Occurrence data from CNDDB and the various herbaria were compared spatially in GIS to prevent duplication and to view current and historical occurrences with landform datasets on aerials and topographic base maps to better understand: 1) species' threats and vulnerabilities relative to probable future development; 2) peripheral status; 3) potential for fragmentation and indirect effects from nearby development and other cumulative concerns, and 4) examination of the ownership of lands containing or adjacent to occurrences to assess potential for mitigation offsite through acquisition or restoration.

Information sources consulted to determine the total number of documented occurrences in California include:

- California Natural Diversity Database (CNDDB 2012)
- California Native Plant Society Online Inventory [v8] (CNPS 2012)
- Consortium of California Herbaria (CCH 2012)
- Calflora (Calflora 2012)
- University of California Riverside herbarium records (UNR 2012)

In all cases, occurrences or collections that were greater than 20 years old (referred to as "historical" occurrences in the CNPS Inventory) were not included in the analysis of total state distribution because the data is unreliable for a variety of reasons -- ambiguous location descriptions, occurrences subsequently eliminated by development or agriculture, etc.

All of the project survey data, to date, has been incorporated into the CNDDB, including the spring 2012 survey results. The number of occurrences described in this analysis and shown in the CNDDB reflects CNDDBs prompt processing of the applicant's new GPS data in order to compare the applicant's survey results to the CNDDB database occurrences by a common metric. An "occurrence" is defined by CNDDB as individuals of a particular species occurring within one-quarter mile of each other that are not separated by significant habitat discontinuities. Consequently, aggregations of rare plant locations depicted in the applicant's special-status plant maps were lumped by CNDDB into a single occurrence if they fell within one-quarter mile of each other. In general, numbers of occurrences are used to evaluate rarity rather than population size because population size data is incomplete for most species, and the populations of desert annuals fluctuate wildly in response to a variable and unpredictable climate.

Staff's analysis of the significance of impacts considered the following additional factors:

- Size and integrity of the local (Pahrump Valley) population;
- Proportion of the local population that would be affected;
- The peripheral status of the local population (whether isolated or in close proximity to other sub-populations);
- Species' patterns of rarity and (where known) dispersal mechanisms;
- Site quality and vigor of the offsite occurrences;
- Consideration of whether the local populations have characteristics that would assign them local or regional significance;
- Potential indirect impacts such as introduction or spread of invasive plants, operation impacts (dust, chemical drift, fire risk, erosion and sedimentation), fragmentation of the local population; and downstream impacts to hydrologic and geomorphic processes that may be necessary to sustain the habitat;
- Integrity and quality of habitat and occurrences onsite;
- Potential cumulative threats to remaining occurrences, and
- Ownership and management threats and opportunities

Direct Impacts to Special-status Plants

Partial site grading and construction, trenching, road construction, vehicle and equipment traffic, and initial vegetation mowing and herbicide spraying are expected to eliminate many of the occurrences within the project footprint. The remainder are expected to be destroyed over time or significantly compromised through a variety of indirect effects, discussed later. Cumulative impacts are discussed in a separate chapter later in the Biological Resources section. Potential direct impacts to special-status plants on the proposed transmission line in Nevada (Hidden Hills Valley Electric Transmission Line (HHVETL) are not included in this analysis.

Construction of the project would eliminate a substantial portion of the total documented occurrences in California of four of the 11 special-status plant species: gravel milk-vetch; Wheeler's skeletonweed; Torrey's joint-fir, and Preuss' milk-vetch. **Biological Resources Table 17**, below, summarizes the direct impacts based on occurrence data that incorporates the results of the spring 2012 surveys and the most current CNDDB version (September 2012). The calculation of the proportion of total statewide occurrences affected by the project is made after subtracting the "historical" occurrences (shown in brackets) not observed in the past 20 years.

Biological Resources Table 17
Proportion of Special-status Plant Species Affected by Project

Common name (*Scientific name*)	**Status Codes[3] CNDDB Element Rank (Global/State)** **CRPR List**	**Total Documented Occurrences in California (including project onsite & offsite occurrences[1])** (historical >20 yrs not included)[2]	**Total Number of Occurrences on Project Site and Affected by the Project**	***Proportion of Total Statewide Distribution Affected by Project[4]***
desert wing fruit (*Acleisanthes nevadensis syn=Selinocarpus nevadensis*)	G5 / **S1** CRPR List 2.3	**13** <1>	**1**	**8%**
Goodding's phacelia (*Phacelia pulchella* var. *gooddingii*)	G4T2T3 /**S2** CRPR List 2.3	**19** <3>	**1**	**6%**
gravel milk-vetch (*Astragalus sabulonum*)	G5 /**S2** CRPR List 2.2	**19** <11>	**4**	**50.0%**
Nye milk-vetch (*Astragalus nyensis*)	G3 /**S1** CRPR List 1B.1	**19** <0>	**1**	**5%**
Pahrump Valley buckwheat (*Eriogoum bifurcatum*)	G2 / **S3** CRPR 1B.2 BLM Sensitive	**40** <1>	**3**	**8%**

Common name (*Scientific name*)	**Status Codes[3] CNDDB Element Rank (Global/State)** **CRPR List**	**Total Documented Occurrences in California (including project onsite & offsite occurrences[1])** (historical >20 yrs not included)[2]	**Total Number of Occurrences on Project Site and Affected by the Project**	***Proportion of Total Statewide Distribution Affected by Project[4]***
pink-flowered androstephium (*Androstephium breviflorum*)	CRPR List 1B.2 G5 /**S2S3** CRPR List 2.2	**93** <8>	**1**	**1%**
Preuss' milk-vetch (*Astragalus preussii* var. *preussii*)	G4T4 /**S1.2** CRPR List 2.3	**22** <0>	**4**	**18%**
purple-nerve spring parsley (*Cymopterus multinervatus*)	G5? /**S2** CRPR List 2.2	**31** <9>	**1**	**4.5%**
Tidestrom's milk-vetch (*Astragalus tidestromii*)	G4G5 /**S2** CRPR List 2.2	**59** <8>	**2**	**4%**
Torrey's Mormon-tea (*Ephedra torreyana*)	G5? / **S1** CRPR List 2.1	**11** <0>	**5**	**45%**
Wheeler's skeletonweed (*Chaetadelpha wheeleri*)	G4 /**S1S2** CRPR List 2.2	**25** <5>	**5**	**25%**

[1] The total number of occurrences includes spring 2012 data and September 2012 version of CNDDB. [2] Herbarium collections >20 ys old and CNDDB occurrences not seen >20 ys not included in this analysis because they are unreliable; location descriptions are often ambiguous, misidentified, or the site has been developed or converted.

[3] Status Codes

CNDDB Element Rank (NatureServe)

Global rank (G-rank) and **State rank (S-rank)** is a reflection of the overall condition of an element throughout its global (or **State)** range. Subspecies are denoted by a T-Rank; multiple rankings indicate a range of values. **State rank (S-rank)** is assigned much the same way as the global rank, except state ranks in California often also contain a threat designation attached to the S-rank. An H-rank indicates that all sites are historic.

G1 or S1 = Critically imperiled; Less than 6 viable element occurrences (EOs) OR less than 1,000 individuals
G2 or S2 = Imperiled; 6-20 EOs OR 1,000-3,000 individuals
G3 or S3 = Rare, uncommon or threatened, but not immediately imperiled; 21-100 EOs OR 3,000-10,000 individuals
G4 or S4 = Not rare and apparently secure, but with cause for long-term concern; this rank is clearly lower than G3 but factors exist to cause some concern; i.e., there is some threat, or somewhat narrow habitat.
G5 or S5 = Demonstrably widespread, abundant, and secure.

California Rare Plant Rank (former California Native Plant Society List)

List 1B = Rare, threatened, or endangered in California and elsewhere
List 2 = Rare, threatened, or endangered in California but more common elsewhere
List 3 = Plants which need more information
List 4 = Limited distribution – a watch list
0.1 = Seriously threatened in California (high degree/immediacy of threat)
0.2 = Fairly threatened in California (moderate degree/immediacy of threat)
0.3 = Not very threatened in California (low degree/immediacy of threats or no current threats known)

Bureau of Land Management

BLM Sensitive = Species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA. BLM Sensitive species also include all Federal Candidate species and Federal Delisted

species which were so designated within the last 5 years and CNPS List 1B plant species that occur on BLM lands. http://www.blm.gov/style/medialib/blm/wo/Information_Resources_Management/policy/blm_manual.Par.43545.File.dat/6840.pdf.
[4] The percentage of the total statewide distribution affected is calculated *after* subtracting historical occurrences (occurrences that have not been observed in over 20 years; shown in brackets in column 3) from the number of total documented occurrences in California.

Indirect Impacts to Special-status Plants

Potential indirect impacts to special-status plants located on or adjacent to the project site include: introduction and spread of invasive plants; alteration of the surface hydrology or geomorphic processes that maintain habitat for rare plants; fragmentation of the local population; increased risk of fire; erosion and sedimentation of disturbed soils; disturbance of the structure and functioning of biological soil crusts; impacts of herbicide spraying and other chemical drift on plants and their pollinators; shading; potential disease from mist during mirror-washing; and fugitive dust during construction and operation, which disrupts photosynthesis and other metabolic processes. Plants and other sessile organisms are particularly vulnerable to the effects of habitat fragmentation. Small fragments of habitat can only support small populations and are more vulnerable to extinction.

Status as Peripheral Populations

California occupies an important biogeographic location and zone of ecological transition on the Pacific coast of North America, and so its floristic diversity includes many widespread taxa on the edge of their range. This includes many of the CRPR Rank 2 plants in the project area, which represent the western limit of those species' ranges—geographically marginal, peripheral populations on the frontiers of their ranges. Peripheral populations can be completely isolated from their core populations, or they can occur in closer proximity to other marginal populations.

Peripheral plant populations are at greater risk of extirpation because they occur on the edge of a species' range. Relative to core populations, peripheral populations tend to be smaller, more isolated, and more genetically and ecologically divergent than central populations, they have more variable densities, and are ecologically distinctive and/or occur in marginal habitats (Leppig & White 2006).

The biological and intrinsic values of these peripheral populations are well documented; maintenance of genetic variation contributes to long-term species survival and preservation of local genetic diversity (Channel and Lomolino 2000). Interestingly, when species undergo catastrophic range contractions, populations on the edge of the range have significantly greater survival than core populations (*Ibid.*). Thus, the maintenance of genetic variation in the form of small, isolated populations contributes to long-term species survival and preservation of local genetic diversity (Leppig & White 2006). The degree of spatial isolation and ecological distinctiveness are the best criteria for assessing a population's conservation significance, especially in the absence of population genetics data (*ibid.*).

CNDDB Element Rank (NatureServe Rank) – an Index of Extinction Risk in California

The case for rarity and extinction risk in California of the affected species is demonstrated, in part, through the California Natural Diversity Database (CNDDB) Element Rank. The rank evaluates several factors of rarity, threats, and population

trend, which are scored and weighted, and include: range & extent; area of occupancy; population size; number of occurrences; number of occurrences or percent area with good viability/ecological integrity; environmental specificity; long- and short-term trend; threats (severity, scope, impact, and timing); intrinsic vulnerability, and other considerations (Master et al. 2009). The CNDDB Element Rank definitions are summarized in the introduction to this analysis, and on page iii-iv of the state's special-status plant list, published by the *California Department of Fish and Game Natural Diversity Database Special Vascular Plants, Bryophytes, and Lichens List* (CNDDB 2012b), also known as the "*Special Plants List*". The rarity of the affected species is demonstrated spatially in **Biological Resources Figure 9,** which also demonstrates the highly restricted range of many of the affected species in California.

CRPR Rank 1 and 2 Plants Widely Recognized as Rare and Endangered In California

CDFG recognizes the California Native Plant Society (CNPS) as an authority on rare, threatened, and endangered plants in California. CDFG works collaboratively with the nationally recognized organization in the management of the Rare Plant Status Review groups that assign the "CRPR rank" (formerly CNPS List). The Rare Plant Status Review groups represent over 300 botanical experts from government, academia, NGOs and the private sector. From CDFG *Special Plants List* (CNDDB 2012x)

> "In March 2010, DFG changed the name of "CNPS List" or "CNPS Ranks" to "California Rare Plant Rank" (or CRPR). This was done to reduce confusion over the fact that CNPS and DFG jointly manage the Rare Plant Status Review groups and that the rank assignments are the product of a collaborative effort and not solely a CNPS assignment. The old name gave the false impression that CNPS solely assigned the ranks and had excessive influence on the regulatory process."

The CNPS website <<http://www.cnps.org/cnps/rareplants/>, a site familiar to botanical consultants and accessible to the general public, provides over 18 pages of details on the Rare Plant Program and Rare Plant Status Review Groups, including: the rare plant status review process; the relationship between CNPS and CDFG in establishing the lists, or ranks; staff and leadership; the Rare Plant Program Committee; contact information; a flow chart of the process; instructions for recommending an addition, list change, deletion, or name change; a description of the regional plant status review groups; a description of the rare plant status review public forum; and sample forms for proposed additions and proposed status changes.

CRPR Rank 1B plants are California endemics, i.e., their entire global distribution is limited to California, or they are also rare outside California. The CRPR Rank 2 is defined in CDFGs *Special Plants List* (CNDDB 2012x):

> "CRPR Rank 2 = **Plants Rare, Threatened, or Endangered in California, but More Common Elsewhere**: Except for being common beyond the boundaries of California, plants with a California Rare Plant Rank of 2 would have been ranked 1B. From the federal perspective, plants common in other states or countries are not eligible for consideration under the provisions of the Endangered Species

Act. Until 1979, a similar policy was followed in California. However, after the passage of the Native Plant Protection Act in 1979, *plants were considered for protection without regard to their distribution outside the state.*"[emphasis added]

Applicant, in its comments, questions CDFG's interpretation that "range" pertains to distribution within the state, and not outside of it. This interpretation of the significance of the California range of a species that also occurs outside California – more specifically the interpretation of the term "range" in "...all or a significant portion of its range...." was upheld in *California Forestry Association v. California Fish and Game Commission* [3], in which the court upheld a trial court's ruling that that the term "range" in the CESA[4] refers to a species' California range only, thereby entitling a species to protection if it is threatened with extinction throughout all, or a significant portion, of its California range (as opposed to its worldwide range).

Indeed, at least five CESA listed plant species are also CRPR Rank 2 species (species that have distribution outside California), and many more CESA-listed wildlife species also have distribution outside California

The language in question in that case, i.e., the term "range" in "...all or a significant portion of its range...." is the same language, verbatim, used in Section 15380 of CEQA to define species that are endangered, rare, or threatened. The California courts have concluded that CEQA and CESA are complimentary statutes whose provisions must be given concurrent effect where possible. For example, in *Mountain Lion Foundation v. Fish and Game Commission*, the California Supreme Court held that California's Courts "are obligated to harmonize the objectives common to both [CEQA and CESA] to the fullest extent the language of the statutes fairly permits."

In *California Forestry Association v. California Fish and Game Commission*[10] the court concludes by noting that species listed under CESA for which the same species are listed under the FESA are justified, because a listing regulation under the CESA ensures that a species remains protected in California if the same species is delisted under the FESA. Further, the decision considered a scenario in which a species is delisted under the FESA because it is flourishing in areas outside of California but is still declining in California. Already having in place a CESA listing of the same species would ensure continued protection of the species in California without having to endure the lengthy wait for a species to move from petition status to listing status[5]. If the species were not already listed under the CESA, it could suffer a dramatic decline in population during the time it takes for the Commission to amend the existing regulations to list the species, undermining the purpose of the CESA."

CDFG's interpretation of the law is thus consistent with the case law, and is reflected in the analysis in this document.

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[3] *California Forestry Association v. California Fish and Game Commission* (2007) 156 Cal.App4th 1535.

[4] *Mountain Lion Foundation v. Fish and Game Commission* (16 Cal.4th at p. 122)

[5] In that case, it took approximately four years for the two coho salmon units at issue to be listed as endangered and threatened under the CESA.

California Native Plant Society is a Recognized Authority

The applicant has questioned whether the CNPS rare plant "Lists" (now CRPR Rank), or the ranking process itself, provides sufficient evidence of the rarity of a species, and in this and other proceedings has questioned whether CNPS can be relied upon as an authority for assessing the rarity of plants in California.

Recognizing that formal listings under federal and state law only account for a fraction of California's native plants that are, as a matter of empirical fact, threatened with extinction, CNPS began publishing an inventory of California's rare and endangered plants, beginning 1974 (CNPS 2001; CNPS 2012). For over 30 years, the CNPS Inventory has served as a forum for regular review of the status of rare plants by a broad body of scientists and field botanists, and as a means of bringing that critical information to the attention of regulatory agencies and the concerned public.

Indeed, as illustrated by resource agencies' recognition of the CNPS Inventory in agency guidelines for rare plant surveys and assessing impacts to rare plants (CDFG 2009; BLM 2009; CNDDB 2012; and others), and in the courts, the CNPS Inventory is considered by CDFG and other agencies as a primary source of information for determining whether non-listed plants meet CEQA's independent definitions of "rare" and "endangered," thus triggering a mandatory finding of significance, environmental review, and the implementation of all feasible mitigation measure to reduce or avoid impacts to such special-status, non-listed plants.

CRPR Rank 1 and 2 Plants Meet CEQA Definition of Rare and Endangered

Applicant in its comments questions whether the plants listed above should be considered rare or endangered. This is presumably because of the legal implications: CEQA Guidelines section 15065 lists certain project impacts that require *mandatory* findings of significance. One such condition is if the project has the potential to substantially degrade the quality of the environment, or *substantially reduce the number or restrict the range of an endangered, rare, or threatened species*. The special-status plant species that would be directly affected by the project are not listed under the California Endangered Species Act, but that does not diminish the significance of their loss. Indeed, there are many plant species without CESA listing whose entire statewide distribution is limited to a small number of occurrences, threatened by one or more factors, and thus their vulnerability to extinction in California is very high. The Commission has acknowledged the rare and endangered status of CRPR Rank 1 and 2 species (formerly termed "CNPS List 1" and "List 2") in its siting decisions, including the Ivanpah Solar Electric Generating System project, Palen Solar Power Project, Blythe Solar Power Project, and Genesis Solar Electric Project.

Plants not CESA-listed must nevertheless be considered "rare" or "endangered" where such plants meet the definitions of these terms in CEQA Guidelines section 15380. Section 15380 provides that a plant or animal species must be treated as "rare" even if not on one of the official lists if "A) although not presently threatened with extinction, the species is existing in such small numbers throughout all or a significant portion of its range that it may become endangered if its environment worsens; or B) the species is likely to become endangered within the foreseeable future throughout all or a significant

portion of its range." Plants on CNPS List 1A, 1B, and 2 meet these criteria, and are thus considered to be "rare" by CDFG.

Case for Rarity

"Rare" and "rarity" are generic, commonly used terms in the scientific literature used to describe scarcity, a statement about the geographic distribution and population sizes of a particular species. The terms "threatened" and "endangered" typically refer to human activities and other processes that are increasing a species' vulnerability to extinction, and the degree of endangerment.

Rarity is based upon pattern of *distribution* and *abundance.* There are three basic kinds of rarity based on these two factors:

1) Restricted in distribution, but locally abundant (e.g., Pahrump Valley buckwheat);

2) More widespread, but never abundant; and

3) Localized and not abundant

The affected species' rarity and endangerment is clearly demonstrated in **Biological Resources Table 17**, and in the spatial representation of these species' highly restricted range in California (**Biological Resources Figure 9**). Combined with the species' CNDDB Element Rank and additional factors considered in this analysis, it is clear that *the affected species exist in such small numbers in California that all or a significant portion of the species' California distribution may become endangered.* **Biological Resources Table 17** underscores the degree of endangerment for four species, represented by the total documented occurrences in California, including the applicant's two years of focused surveys, and in the proportion of those occurrences that would be eliminated by the project. Additional cumulative threats to remaining occurrences in California are discussed in the "Cumulative Impacts" subsection. The case for rarity and concern is also reflected in the CNDDB Element Rank, an index of extinction risk within the state.

Conclusions and Discussion of Special-status Plant Mitigation

As shown in **Biological Resources Table 17**, direct impacts to four of the 11 species are *significant because the project would eliminate a substantial portion of their range in California* and because the affected species *exist in such small numbers in California that all or a significant portion of the species' California distribution may become endangered*:

- **gravel milk-vetch** – CNDDB S2 (50% of total documented occurrences in California eliminated);
- **Wheeler's skeletonweed** – CNDDB S1S2 (25%);
- **Torrey's joint-fir** – CNDDB S1 (45%), and
- **Preuss' milk-vetch** – CNDDB S1 (18%).

For the remaining species, the population or range in California is larger and more stable, the proportion of the total statewide distribution and range affected by the project and/or extinction risk is substantially less, and/or the local population is robust. Two years of offsite surveys were conducted to determine if these species were more common than previously understood, but the direct impacts still affect a substantial portion of their state distribution and thus increase their vulnerability to extinction within the state. This is aggravated by potential indirect threats and cumulative impacts from other past, present and foreseeable future actions within their already highly restricted range in California (see "Cumulative Impacts" subsection). For all four species, the total documented occurrences is less than 20, a threshold at which a species assigned extinction risk increases from "vulnerable" to "imperiled" under the methodology used by CNDDB and Natural Heritage programs around the world to establish extinction risk (Master et al. 2009), and "making it very vulnerable to extirpation from the state/province." Combined with the threats from indirect and cumulative impacts, the extinction risk could increase to "critically imperiled" and "especially vulnerable to extinction in the state" as the total documented occurrences is reduced to approximately 6 viable occurrences or fewer, and/or those occurrences are threatened by one or more factors (Master et al. 2009).

Staff reviewed the ownership and management threats and opportunities for these species to determine if offsite mitigation was feasible. All four species have multiple occurrences on undeveloped private lands and/or occurrences threatened by invasive non-native plants, off-road vehicles, and other factors on private and public lands that could benefit from dedicated restoration efforts to reduce or eliminate the threats.

Avoidance along the eastern boundary could minimize the project's direct impacts to special-status plants. However, staff considered the possibility that because of the position of the project on the California-Nevada border, the constraints to dispersal and limitations in connectivity due to the location of a different habitat type to the east (coppice dunes) and the obstructions of the project to the west, avoidance along a strip on the eastern side of the project (where most occurrences are located) may not be sustainable over the long term and thus may do little to protect the California range of the affected species. Because washes and wind are important seed dispersal pathways (O'Leary pers. comm.), disruption of the natural surface drainage patterns from east to west (into California) by the project, and because the direction of the prevailing winds is from California into Nevada (northwest to southeast), any avoided occurrences along the eastern edge may have limited connectivity, which affects their long-term sustainability or viability, and dispersal pathways into California may be affected over the long term. Staff concluded that mitigation that protects occurrences better situated in California is preferable to avoiding a strip along the eastern boundary with Nevada that may or may not be sustainable.

Condition of Certification **BIO-20** (Special-status Plant Compensatory Mitigation) provides guidelines and performance standards for offsite mitigation through acquisition, with an option for mitigation through restoration of at-risk occurrences. **BIO-20** would require the project owner to place a conservation easement on the mitigation site to ensure protection in perpetuity from future development, and provide stewardship fees necessary for basic protection (e.g., fencing and/or signage if needed). Three offsite occurrences shall be protected for every S1 ("critically imperiled") species affected and

two offsite occurrences protected for every S2 (“imperiled”) species affected. Range ranks (e.g., an S1S2 rank) shall defer to the more imperiled rank. Species that are currently assigned an S1 CNDDB Rank (“critically imperiled”) warrant a higher mitigation ratio in order to protect the species from immediate endangerment.

Under the terms of **BIO-20**, this can be accomplished through acquisition alone or a combination of acquisition and restoration if the restoration can be demonstrated to save an occurrence at moderate to high risk from threats. These may include threats from: noxious weeds or other invasive plants; unauthorized off-road vehicles; alteration of the drainage patterns and/or geomorphic processes essential to maintain the habitat, or herbivores. Because connectivity and maintenance of the ecological processes essential for maintaining the habitat are essential for the long-term sustainability of an occurrence, **BIO-20** requires the mitigation proposal to demonstrate that the acquired or restored occurrence can be protected from the edge effects of adjacent land uses.

The same mitigation strategy, mitigation ratios, and a similar condition of certification was adopted to minimize special-status plant impacts on at least three other Energy Commission-licensed projects (Blythe, Genesis, and Palen projects). As an example of mitigation ratios required by other agencies, in CDFG practice, compensatory mitigation for streams and riparian vegetation is typically mitigated at a minimum mitigation-to-effect ratio of 3:1 for permanent effects and 1:1 for temporary effects (Vyverberg pers. comm.).

There is also potential for impacts to special-status plant occurrences in close proximity to the project boundary during operation. These potential impacts include: the spread of weeds into currently uninfested areas; chemical drift from weed management and dust control; fugitive dust from grading, mowing and road maintenance; increased risk of wildfire from project operation and increased traffic on area roads; and sedimentation of washes offsite from erosion of channels onsite and upstream. Although these indirect project effects are individually minor, they are cumulatively considerable when considered in combination with past, present, and foreseeable future projects in the region (see “Cumulative Impacts” subsection).

Nine occurrences of eight rare species were mapped within a 250-foot buffer surrounding the project. In most cases, the occurrences extend to or near the project boundary. These include: Nye Valley milk-vetch (1 occurrence); Preuss’ milk-vetch (1); pink funnel lily (1); Tidestrom’s milk-vetch (1); Wheeler’s skeletonweed (1); Torrey’s joint-fir (1); Pahrump Valley buckwheat (1), and Goodding’s phacelia (1).

Condition of Certification **BIO-19** includes avoidance and minimization measures for protecting against accidental impacts during construction and indirect impacts following construction. The Best Management Practices (BMPs) described in **BIO-19** are standard BMPs employed on development projects for protecting adjacent oaks, streams, wetlands, etc., and are consistent with avoidance measures described in the Energy Commission’s BMP Manual (CEC 2010). **BIO-19** *does not require the project owner to implement BMPs offsite* avoidance and minimization measures are only required onsite, i.e., at or near the project boundary, to prevent impacts to adjacent sensitive resources. Examples of BMPs include silt-fencing, temporary construction fencing and signage, and guidelines for preventing or minimizing herbicide drift.

Condition of Certification, **BIO-21** (Qualified Botanist) would ensure that specific measures for protecting special-status plants are carried out by a qualified botanist or vegetation ecologist.

Measures for control of fugitive dust, herbicide and other chemical drift, and erosion control measures are incorporated into **BIO-8** (General Impact Avoidance and Minimization Measures). Because washes facilitate the dispersal of special-status plants as well as act as conduits for the spread of some invasive weeds, **BIO-22** (State Waters Compensatory Mitigation and Avoidance & Minimization Measures) and **SOIL-1** contain measures for preventing erosion and sedimentation of washes onsite and downstream. Measures for avoiding and minimizing indirect impacts to offsite occurrences from the spread of invasive weeds are contained in **BIO-18** (Weed Management Plan).

It is reasonable to conclude that one of the four significantly affected species – Torrey's joint-fir – could potentially be more common than currently understood because: 1) it was just added to the CNDDB and CNPS *Inventory* (CNPS 2012) in January 2012; and 2) the species was not known to occur in California before it was discovered on the project site, and it is not included in the state flora (Baldwin et al. 2011). This means, in this unique case, there is a high potential that it may have been overlooked by other surveyors, an opinion shared by at least one other recognized local expert (Silverman pers. comm.). Currently, only one round of surveys has been conducted to assess the size of the species' population in California. **BIO-20** includes a provision that if many new occurrences are found in fall 2012 or spring 2013 that results in a downgrading of the CNDDB Element Rank from an S1 to an S3 ("vulnerable but not under immediate threat of extinction"), and the proportion of the statewide distribution affected by the project is less than 10 percent, the mitigation requirement for that species would be dismissed.

Operation Impacts to Groundwater-Dependent Ecosystems

Local Groundwater-Dependent Ecosystems

Groundwater levels near the proposed project's water supply wells will decline during the project pumping (HHSEGS 2011a, Appendix 5.15D; **Water Supply Figures 19** and **20**). Groundwater pumping could have significant indirect and cumulative impacts to biological resources if it lowers the water table in areas where groundwater-dependent ecosystems occur. Approximately 4,000-acres of mesquite habitats occur within one-half mile and five miles of the project wells (**Biological Resources Figure 1 and 2**; CH2 2011g, Figure DR48-1).

WATER SUPPLY Figure 18 summarizes staff's estimate of the potential drawdown at the distance of the Stump Springs monitoring well and the latent effects on water levels after pumping ends. The range of drawdown estimated at the distance of the Stump Springs monitoring well ranges from no drawdown (based on minimum transmissivity and maximum storativity) to a 19-foot drawdown (minimum transmissivity and storativity); all other aquifer parameter combinations fall between these two limits. These results are considered maximum potential impacts because they ignore the potential (undemonstrated) buffering effects of the state line fault zone, which may – to some degree -- limit the hydraulic connection between project pumping and

groundwater northeast of the fault zone associated with Stump Springs. More often, such faults provide a partial barrier to groundwater flow, but not a complete barrier (Belcher pers. comm.; Comartin 2010).

These estimates of drawdown do not include the cumulative effect of other foreseeable future projects in the vicinity, the most significant of which would come from the BrightSource Energy project ("Sandy Valley Project") located near the opposite side of Stump Spring ACEC that would pump 170 acre feet per year. **WATER SUPPLY Figure 22** also shows that the potential cumulative water level decline at both Stump Springs could be greater than 60 feet. Similarly, this estimate does not consider the potential buffering effects of the fault, i.e., the spread of drawdown from the project wells to Stump Springs could be limited on the northeast of the fault. Staff is concerned about the close proximity of the project wells to sensitive groundwater-dependent ecosystems, which are extensive and occur as close as 600 feet to the project boundary.

Many public and agency comments expressing similar concerns about the impacts of groundwater pumping on dependent habitats and wildlife of the project were received. These include comments from:

- BLM California State Director and Nevada State Director of BLM (BLM 2012a; BLM 2012b; CEC 2011v);
- Inyo County (INYO 2012a; INYO 2012b)
- Nevada Department of Wildlife (NDW 2011a)
- Amargosa Conservancy (ARM 2011a; ARM 2011b; Wright 2011a);
- The Nature Conservancy (TNC2012a);
- Center for Biological Diversity (CBD 2012b);
- Big Pine Paiute Tribe of Owens Valley (PINE 2012a);
- Pahrump Paiute Tribe (PAIU 2012a)

The comments from BLM (BLM 2012a; 2012b), Inyo County (INYO 2012a; 2012b), and The Nature Conservancy (TNC 2012x) contain specific and detailed recommendations for mitigation in the form of long-term monitoring and provisions to stop, reduce, or modify pumping if adverse impacts are detected.

The record of conversation with The Nature Conservancy (CEC 2012g) contains links to presentations made by the BLM California Desert District and USGS. These agencies expressed concern about the potential for cumulative impacts to the Amargosa Wild and Scenic River and other resources of the Lower Amargosa Valley.

There was considerable discussion about the proposed project and other energy projects in the region at the December 12-13, 2011 meeting on the Amargosa Basin, hosted by the Desert Manager's Group (CEC 2012g).

Differences between the applicant's and staff's assessments of this issue center on: 1) the ability of the groundwater-dependent ecosystems to withstand a sustained, project-related decline in the water table; 2) the reliability of limited area well data and the pre-

project pump tests to accurately predict the lateral or vertical extent of the project's effects in a complex hydrogeologic setting; 3) the applicant's assertion that the fault zone represents a complete barrier to groundwater flow and buffer between the project and sensitive resources (rather than a partial barrier), or that its highly unlikely that project pumping would affect resources on the other side of the fault; and 4) the conservation values of the area mesquite washes and mesquite dunes. Many public and agency comments also expressed concern about whether information currently available is adequate to conclude there is no long-term cumulative risk to the Amargosa Wild and Scenic River and other regional groundwater-dependent resources. Some of these differences are addressed below, followed by staff's analysis of significance of potential impacts to groundwater-dependent biological resources. A detailed analysis of the applicant's groundwater assessment and **Water Resources** staff's independent analysis of the applicant's recent pump test data is contained in the **Water Supply** section of the FSA.

Historic Decline of Springs Due to Groundwater Pumping

Many local springs experienced precipitous water table declines and ultimately stopped flowing as a result of groundwater depletion in the middle of the last century (Harrill 1986; Malmberg 1967; Buqo 2004; Comartin 2010). Before extensive agricultural development, the Pahrump Valley playa area (northwest of the project) supported some phreatophytic vegetation, which is largely absent now. Groundwater pumping in the Pahrump Valley for agriculture (predominantly alfalfa and cotton) peaked in 1968 and there was a significant downward trend in static water levels between the years 1953 and 1996, based on an analysis of 651 wells within one mile of a mesquite woodland (Crampton et al. 2006). Groundwater withdrawals accompanying large-scale agricultural development caused some major springs in the area to stop flowing during this period of groundwater withdrawal. Some springs eventually recovered after some the pumping stopped (Moreo et al. 2003). Historically, Manse and Bennetts Springs discharged along the base of the broad alluvial fans at the foot of the Spring Mountains. Groundwater withdrawal in the valley caused these springs to cease flowing in the 1970s. In the late 1990s, after the heavy agricultural pumping stopped, Manse Spring began to flow again. Other springs have not recovered.

Pumping has declined since the heavy agricultural pumping of the last century but with the population expansion that followed, agricultural groundwater uses were replaced by domestic, and the basin is still considered in an overdraft condition (Comartin 2010).

Currently, groundwater at the Stump Spring monitoring well is 28 feet below ground surface (bgs); however, the well is not located at or close to the actively discharging spring, and may not reflect the hydrograph or groundwater levels at the spring. Stump Spring supports three seasonal pools that provide exceptionally valuable open water habitat over a period that extends from approximately December to July (Poff pers. comm. 2012). BLM recently discovered that three additional unnamed seeps within 5 miles of the project boundary have above-ground spring discharge (Poff 2012). Two of these support healthy wetland-riparian vegetation; the third spring appears to have at least minor intermittent flow that was significantly greater historically. The proximity of these water sources to the adjacent mesquite habitats and desert scrubs significantly

increases the value of the habitat for many wildlife species, including some special-status species.

There is inadequate well data in the area to conclude the project will have no effect on the area seeps and springs. However, despite such uncertainty, the documented corresponding decline of the basin's springs during the last century's agricultural pumping is cause for concern.

Significance of the Resources At-risk

The mesquite woodlands and coppice dunes in the southern Nevada region have significant biological importance, providing habitat to many wildlife species in the region, including several species covered under the Clark County Multiple Species Habitat Conservation Plan (MSHCP). The extent and condition of these important resources, however, has been severely impacted by the diverse activities of a growing population (Crampton et al. 2006). In response, the development of a Mesquite-Acacia Conservation Management Strategy (CMS) was adopted in the MSCHP (*ibid.*).

Stump Spring, in addition to its status as an ACEC, is identified as a conservation management priority in the CMS and describes Stump Spring as having "significant wildlife values". Stump Spring also provides a critical seasonal water source in an otherwise extremely arid landscape.

The entire Pahrump Valley "metapatch" (a collection of smaller patches), including the groundwater-dependent mesquite habitats and seeps east of the project and north of the ACEC, is also an identified conservation priority in the CMS, which recommends "coordination with Nye County to protect the woodlands that occur in Nye County". Mesquite habitats were also a proposed conservation priority in the scoping for the Southern Nye County MSHCP (USFWS undated).

In a landscape dominated by desert scrub, the contrastingly dense cover and shade provided by the mesquite serve as important breeding, foraging, and resting places for many avian species (Crampton et al. 2006). They offer protection from weather and predators, and provide refuges where birds may experience more favorable energy budgets. Although mesquite comprise a small percentage of the total vegetation in the desert, they support disproportionately greater densities of birds than surrounding desert habitats. They add structural complexity to the landscape, providing nesting sites and food resources for breeding birds.

Many special-status wildlife species are dependent on or strongly associated with mesquite in the region. These are discussed in detail in the "Setting" subsection of this FSA, and summarized in **Biological Resources Table 5**; (Crampton et al. 2006; NDW 2011a). A decline in the habitat functions and value of the mesquite habitats from groundwater pumping could adversely affect special-status species, including Clark County MSHCP covered species.

The applicant has argued that there is no evidence of the habitat values of the mesquite habitats near the project. The importance of mesquite to wildlife is a matter of empirical fact, an exhaustive review of which is contained in BLMs Mesquite-Acacia Conservation Management Strategy (Crampton et al. 2006), and endorsed in comment letters from

BLM, the Nevada Department of Wildlife, The Nature Conservancy, Amargosa Conservancy, and in conversations with USFWS and CDFG. Staff and CDFG observations of wildlife use of mesquite habitats east of the project are consistent with the habitat values and wildlife associations described in literature. The applicant has provided no evidence for their implausible assertion that the extensive mesquite resources east of the project have no significant value to wildlife.

The applicant has taken issue with a reference to the mesquite as "woodlands" because of a concern that it implies the resources have the habitat values of a tree-dominant community. The Mesquite-Acacia Conservation Management Strategy (Crampton et al. 2006) and BLM use the terms "woodland", "dune scrub" and "bosque" to describe the mesquite-dominant habitats in the project vicinity, which vary from shrubby forms to low trees up to 15 ft with trunks to eight inches diameter or larger. Whatever description is used, it does not diminish their value to wildlife in the Stump Spring area, which BLM describes as "significant"; an opinion reflected in the multi-agency recognition of the area mesquite as a conservation priority. Nevertheless, a detailed and academic discussion of the classification of mesquite, based on consultation with the CDFG Senior Vegetation Ecologist, is provided in the "Setting" section of this FSA to address the applicant's comments.

Tolerance of Mesquite to Declining Groundwater Elevations

In Data Response Set 1A (CH2 2011g), the applicant states that "...mesquite, rooted in shallow groundwater as they are, must be adapted to appreciable inter-annual fluctuations in groundwater level. They would need to survive lowered groundwater conditions, potentially for years when there are a number of drought years in a row—not an infrequent occurrence in the desert. Observation suggests an inter-annual variability in groundwater depth of greater than 6 feet in the vicinity of Corn Creek Springs in the Upper Las Vegas Valley." The applicant also noted that while some area wells declined as much as 40 feet during the second half of the last century, the mesquite persisted. Given this evidence, they speculate that "draw-downs of less than 10 feet must be within the tolerance of the groundwater-dependent vegetation that has survived to the current time."

By contrast, applicant's data response also states that "....while mesquite are adapted to some variability, including declines, in water table elevation, it also seems that historic die back of groundwater-dependent vegetation is likely due to long-term and persistent draw-down of the water table and decline of shallow groundwater influenced by artesian flow" (CH2 2011c). Staff concurs; the potential cumulative effect of the project pumping and other past, present, and future projects, including another BrightSource Energy project near Stump Spring is likely to be significant, particularly when combined with the effect of future droughts. This is particularly worrisome given the overdraft condition of the valley basin and adverse effects already apparent in the mesquite stands near the northern end of the project.

Figure DR49-2, from the same submittal (CH2 2011g), provides a photographic example of the die-back apparent on the stands closest to Pahrump. On the previous page the applicant states "No appreciable die-back of mesquite coppice vegetation was noted on the dunes southeast of the Tecopa Highway (CH2 2011g, Figure DR49-1).

Die-back of groundwater-dependent vegetation was found north and northwest of the Tecopa Highway, both on the dunes closer to the project area (*ibid*.) and in arroyos farther north and east...” Staff confirmed this in several site visits. The applicant argues this could be caused by mistletoe and not attributable to basin drawdown (cite comment letter).

On the subject of mesquite mistletoe competition with its host, the BLM-sponsored Mesquite-Acacia Conservation Management Strategy (CMS) (Crampton et al. 2006), states

> “Hemiparasites are seldom the primary cause of death to their hosts.... The most common damage is death of the branch distal to the infection (Boyce 1961), although this is less likely as distal branch size increases (Reid and Stafford Smith 2000).”

This is consistent with staff’s on-the-ground observations, and both staff and the CMS noted an overall low mistletoe infection rate. Regarding the primary cause of decline of mesquite (Crampton et al. 2006):

> “The primary natural factor influencing leguminous [mesquite] tree survival appears to be water supply...Honey mesquite mortality increases with increasing distance from the water table (Stromberg et al. 1992). Although mesquite roots have been excavated at depths as great as 60 meters (Phillips 1963), this is the exception rather than the rule. In general, it becomes increasingly difficult for mesquite to survive once the water table falls below 15 meters (Judd et al. 1971).”

Groundwater pumping and water level declines are documented to have caused the decline or death of mesquite in many areas of the southwest (Sawyer et al. 2009; Judd et al. 1971; Webb & Leake 2006; Stromberg pers. comm.; Keeler-Wolf pers. comm.). “Similar effects are seen throughout the species range in California and Nevada” (Keeler-Wolf pers. comm. 2010). Keeler-Wolf (*ibid.*) has “observed mesquite and the effects of water drawdown [and noted] observation of dead and dying mesquite in several places in California, Nevada, and elsewhere....up and down the Mojave River from Hinkley to Camp Cady to Cronese Lakes.” Groundwater pumping is a serious threat in many locations and has led to the decline of numerous stands (Sawyer et al. 2009).” Stromberg (pers. comm.), Arizona State University, described documented examples of mesquite that died as a result of groundwater-pumping on the Gila River and Santa Cruz River.

The applicant cites a case study from literature of a mesquite that rooted to a depth of 190 feet, and implied that, based on this single case, that the mesquite roots would chase the decline of the water. Staff consulted a researcher from Arizona State University, and recognized expert in the impacts of groundwater pumping on phreatophytes (Stromberg pers. comm.):

> “The ability of mesquite roots to ‘track’ a declining water table unfortunately is not well studied. As the water table declines, the plant will have to invest more energy into root production and root maintenance and it is likely that its

> aboveground biomass will decrease. In general, there is a relationship between root to shoot ratios and plant water stress. For mesquite, specifically, there is a documented relationship between the degree of water stress a mesquite tree experiences and its above ground biomass (see Martinez and Lopez-Portillo 2003). Also note that increased drought stress can decrease the ability of a mesquite tree to survive other ecological stressors, such as damage by herbivores (see Martinez et al. 2009)."

The County of Inyo Water Department (INYO 2012b) recommended staff establish a typical rooting depth for mesquite on which to base its analysis and mitigation recommendations. Staff conducted an exhaustive literature review of the subject prior to publication of the PSA, and consulted recognized experts (Stromberg pers. comm.; Keeler-Wolf pers. comm.). In fact, there is no way to establish a typical rooting depth for mesquite on which to base critical groundwater management decisions, as, for example, Inyo County has been able to establish for groundwater-dependent meadows in the Owens Valley area.

There are many environmental factors affecting rooting depths: soil porosity and texture, temperature, soil water and oxygen content, and soil chemistry. Soil salinity is also an important factor in these settings. Examples in literature of mesquite rooting to great depths are exceptions (Stromberg pers. comm.). Honey mesquite's taproot commonly reaches depths of 40 feet (12 m) when subsurface water is available (Fisher et al. 1973). The example of a mesquite rooting to over 50 meters (160 ft) was a case study in which the roots of a mesquite followed a mine shaft. In areas where the soil is shallow, or where a distinct calcium carbonate layer is present, the taproot seldom extends more than 3 to 6 feet (1-2 m) (Heitschmidt et al 1988; Ansley et al. 1989; Steinberg 2001). From Stromberg (pers. comm.):

> "There is the one documented case of mesquite (*Prosopis juliflora*) rooting to a depth of 53 meters depth; this appears to be an atypically deep value, and is for a plant in a Sonoran desert upland setting (Phillips, 1963). Roots of [mesquite] generally are strongly dimorphic, with shallow lateral roots near the surface and deep tap roots (Virginia et al., 1976; Bleby et al., 2010). Along incised rivers in southern Arizona and New Mexico, roots of [velvet mesquite] have been observed at cutbanks at depths of at least 8 meters (Cannon, 1911), 9 meters (Zimmerman, 1969), and 12 m (Havard, 1894). Maximum rooting depths for [honey mesquite] include 9 meters and 15 meters for plants growing along an arroyo and playa lake edge, respectively (Silva et al., 1989) and 20 meters in a karst landscape (Bleby et al., 2010)."

The maximum tolerable water table decline is difficult to predict and variable depending on many environmental factors; however, the warning signs of impending changes in ecosystem processes may already be present in the stands most affected by the basin overdraft (i.e., stands closest to Pahrump). As described above, die-off is already occurring in the northernmost mesquite stand and there is a well-documented decline in water tables throughout the valley that parallels the drying of springs. Given the strong above-ground evidence that groundwater levels in the area may have already declined to levels low enough to cause die-back, combined with a documented decline in

groundwater levels, the stands near the northern end of the project may well be at or near the limits of their tolerance.

Staff agrees that mesquite can withstand inter-annual fluctuations in groundwater level. The question is whether the stands can take an additional and sustained lowering of the water table through all seasons (not just the dry season) that extends 30 years or more.

Fault Zones as Hydraulic Barriers

The applicant posits that the position of the project west of the fault zone, "combined with studies conducted by Buqo in 2006 indicate that the hydraulic gradient in the Pahrump Valley Fault Zone [state line fault zone] was found to be lower relative to the overall gradient of the valley. This indicates that the fault zone may act as a hydraulic flow barrier, which could isolate impacts to the greater Pahrump Valley aquifer from onsite pumping. If the groundwater basin in the project area is indeed disconnected from the larger basin, then impacts from site pumping may not extend out to areas of greater groundwater production to the north." The applicant adds "Because the discontinuity cannot be demonstrated, however, this analysis assumes that local drawdown may have regional impacts."

Staff concurs; faults have hydraulic properties that result in decreased cross-fault flow and enhanced flow parallel to the fault by juxtaposing geologic strata of contrasting permeability, resulting in an impediment to groundwater flow (Belcher pers. comm. 2012; Belcher & Sweetkind 2010). However, because this fault juxtaposes carbonate basement rock against carbonate rock, it may present only a partial barrier (*ibid.*). More importantly, no studies have been conducted to confirm the assertion that a barrier is present and protective. A synoptic set of monitoring wells on both sides of the fault would be required to assess the hydraulic connection across the fault (Comartin 2010; Belcher pers. comm.).

Ecological Consequences

When groundwater is maintained within the root zone, management decisions can be made that do not result in loss of cover or adverse impacts to dependent vegetation. However, lowering the local water table from groundwater pumping has been demonstrated to cause die-off and habitat conversions where pumping causes water levels to drop below the effective rooting depth (Manning 2006, 2007, 2009, and others). Stromberg (1996) noted that "groundwater declines equal to or less than one meter have resulted in loss of canopy vigor, declines in radial growth and shoot increment, and tree death" in cottonwood-willow forests. "Velvet mesquite, for example, is a deep-rooted species that grows over a wide range of groundwater depths, but that varies in height, foliage area, leaf size, and xylem [stem] water potential as groundwater declines." Stromberg also describes documented examples of loss of biodiversity, increases in invasive weeds, decreases in cover, and other ecosystem impacts. Other organisms dependent on or associated with these groundwater-dependent plant species would also be affected. The complex below-ground systems of bacteria, algae, and fungi, which provide many valuable ecosystems services (e.g. breakdown of organic matter, nitrogen fixation, carbon storage, and recycling of nutrients are also destroyed or adversely affected when water tables are lowered (Kimsey pers. comm. 2012; Manning 2009).

Impacts to these important biological resources are potentially significant even if the mesquite habitats do not ultimately die as a result of the project. Ultimately, if pumping causes a sustained lowering of the water table below the effective rooting depth of the predominant species, it could set off a cascade of impacts to other shallower-rooted species, as well as dependent wildlife.

Impacts observed in the northernmost mesquite stands presumed (based on documented groundwater declines) to be declining as a result of groundwater drawdown, include a reduction in mesquite cover combined with an increase in cover by weedy annual grasses. As an example, in mesquite stands near an agricultural well in Chuckwalla Valley, staff observed a near complete die-off of the shallower-rooted facultative phreatophyte four-wing saltbush and an increase in cover of Russian thistle in stands, even where the deeper-rooted mesquite was not affected.

Loss of the mesquite associated with the coppice dunes could leave dunes vulnerable to deflation (USACE 2012; Brady pers. comm.) if the plants that anchor or stabilize the dunes die.

Animals, including mammals, reptiles, birds, and invertebrates that require certain plant species or a certain vegetation structure may no longer find suitable food, cover, or nesting habitat if the habitat structure of the mesquite habitats is affected or there are die-offs. For example, ladderback woodpeckers, Lucy's warblers and ash-throated flycatchers can only nest in tree trunks sufficiently large to hold nest cavities, (Crampton et al 2006); drought-induced stunting or loss of the taller mesquite along the washes east of the site and at springs would diminish or eliminate the value of the mesquite for some avian species. Decreases in fruit production can affect many common and special-status species. Local extirpations, if they occur, are compounded if the displaced animal or affected plant species is an important food source for another animal.

Cumulative Concerns

The total dependence of the community of Pahrump on the basin's groundwater resources, and the potential for significant cumulative effects from another solar thermal project near Stump Spring (the BrightSource Energy Sandy Valley project), is another serious concern. A detailed analysis of the potential cumulative groundwater drawdown is provided in the "Water Supply" section of the FSA, and in the "Cumulative Impacts" subsection of this Biological Resources section.

Over 10,000 pumping wells are located in the basin. Groundwater pumping in this already significantly over-appropriated basin has placed these valuable habitats in direct competition for scarce water supplies. Compounding the effects of groundwater pumping, the indirect impacts of salt cedar invasion, fragmentation, and fire from urban and agricultural development have also taken their toll on the ecological health of the basin's mesquite woodlands, mesquite dune scrubs, and area springs. Additional demands on groundwater resources from renewable energy projects and urban expansion may threaten the continued survival of mesquite in much of their range in southern Nevada (Crampton et al. 2006) and California (Sawyer et al. 2009). Water-stressed mesquite may also be a more common scenario under climate change,

accentuated by the higher water demands of a growing population (Crampton et al. 2006).

Discussion of Impacts and Mitigation

Project-related groundwater pumping may impact sensitive and biologically significant groundwater-dependent ecosystems located within the cone of depression identified by staff in their analysis of recent pump test data (see **Water Supply Figures 19** and **20**), including mesquite habitats , seasonal seeps and springs, and an Area of Critical Environmental Concern (ACEC). If project-related groundwater pumping in the vicinity of the groundwater-dependent ecosystems described above causes the water table to decline below the level of effective rooting, the impacts would be significant, and could occur at an ecosystem scale. The potential ecosystem-scale consequences of these impacts are discussed above.

The applicant argues that the project will have no offsite groundwater drawdown, based on the results of its pump test. Water Resources staff has argued the applicant has misinterpreted the pump test results and presents a worst case scenario. Several parties, including BLM California, BLM Nevada, Inyo County Water Department, and The Nature Conservancy agree with staff's conclusion that the applicant has misinterpreted the pump test data. The Inyo County Water Department hydrologist commented on the inadequacy of the necessarily simple hydrologic analytical models used by the applicant and staff

> "...do not provide a single, uniquely correct interpretation of the aquifer system...." and "...extrapolating the results from a test that spanned a few days into an assessment of impacts over the life of the project is inherently uncertain." (INYO 2012b) "Additional testing for a week or month will not eliminate this uncertainty, so the CEC is faced with developing its final staff assessment based on inconclusive data. A high level of hydrogeologic uncertainty is not unique to this project; rather, it is typical when making hydrogeologic predictions...." (*ibid*.)

The Inyo County Water Department supports staff's argument that long-term monitoring and adaptive management are necessary and reasonable:

> "For HHSEGS, because the assessment of impacts is inconclusive, the most viable way for the project to proceed is to require monitoring that will allow tracking of impacts to the groundwater system before they develop during the life of the project, so that mitigation can be implemented if it becomes apparent that groundwater dependent resources will be impacted. This approach is reasonable and feasible for HHSEGS."

Inyo County Water Department proposes -- with consensus from all other interested parties -- that observations of water level change can be used to anticipate adverse impacts and manage pumping to avoid them, and supports staff's recommendation that if a conservative threshold is exceeded, that pumping cease until the project can demonstrate the drawdown is not the result of project-related pumping.
The exceptional ecological values of Stump Spring, and the habitat values of other nearby desert springs and mesquite habitats, are discussed under the Existing

Conditions subsection of this analysis. These resources have been identified as conservation priorities in the BLM document *Mesquite-Acacia Conservation Management Strategy*, and adopted by the Clark County Multiple Species Habitat Conservation Plan (BLM 2012a, Crampton et al. 2006).

Given the ecological significance of the resources at-risk, and evidence that some stands may already be at or near the limits of their tolerance, even seemingly minor drawdowns could have significant impacts. Even if stands persisted, their habitat function and value could be seriously affected. Their ability to support special-status species may be diminished, and in a worse-case scenario there could be local extirpations.

Although there is potential for the state line fault zone to buffer the effects of project pumping, the data is inconclusive, and cannot be demonstrated without hydraulic evidence obtained from wells placed on either side of the fault, and across the fault. Given the cumulative concerns described above, combined with the limited quantity and reliability of the data, and the ecological significance and sensitivity of the resources at risk, a greater factor of safety must be applied. Without the safety net of a long-term (30 year), well-designed and peer-reviewed monitoring plan, protection of the resources cannot be assured. Without monitoring, and a plan for remedial action to restore groundwater levels, the impacts would be significant and immitigable.

Unanimous Support for Long-term Monitoring and Adaptive Measures to Protect Groundwater-dependent Ecosystems

There was unanimous concern among the commenting resource agencies and land managers about the impacts of project-related groundwater pumping to these important resources, support for long-term groundwater monitoring, and for a provision to “stop, reduce, or modify” project pumping if monitoring detects a drawdown in the vicinity of the resources (BLM 2012a; BLM 2012b; INYO 2012a; INYO 2012b; TNC 2012a; ARM 2012b; Custis pers. comm.).

Staff consulted 16 agency hydrologists and biologists and recognized experts in the development of the groundwater-dependent vegetation monitoring conditions. Experts in vegetation ecology, environmental statistics and the development of long-term vegetation monitoring plans, impacts of groundwater pumping on dependent ecosystems were consulted, as well as staff’s own hydrologists and geologists. A complete list is provided under “Personal Communications” following the list of references at the end of this FSA section. Similar conditions were adopted for another Energy Commission-licensed project (Palen Solar Power Project).

Patten, Rouse & Stromberg (2007) suggest that on-site monitoring is critical for detecting impacts, and long-term vegetation data are capable of providing early warning signs of impending changes in ecosystem processes (Patten et al. 2007). Combined with the data on groundwater and climate, sampling of plant communities can provide sensitive metrics for assessing ecological changes over time.

Condition of Certification **BIO-23** provides detailed specifications and performance standards for the development of a peer-reviewed vegetation monitoring plan. The vegetation monitoring plan would be used in conjunction with the groundwater

monitoring plan proposed by **Water Resources** staff in **WATER SUPPLY-4.**To ensure that the selection of adaptive measures was not deferred until a later time, Condition of Certification **BIO-23** outlines the remedial action that would be taken once a project-related adverse effect is detected. If water levels in either of the Power Block 1 or Power Block 2 onsite monitoring wells identify a projected 0.5 foot or greater water level decline at the property boundary due to project pumping during construction or operation, the project owner is required to stop pumping until or unless the project owner can provide evidence that demonstrates, subject to review and approval by the Compliance Manager and interested agencies, that: 1) the pumping can be reduced or modified to maintain groundwater levels above the 0.5 ft. drawdown threshold at the project boundary; or 2) the drawdown trigger was exceeded due to factors other than the project pumping and the project did not contribute to the drawdown; or 3) through vegetation monitoring and soil coring described in **BIO-23** and predictive water level trend analysis **WATER SUPPLY-4**, that a greater groundwater drawdown will not result in significant adverse impacts to the groundwater-dependent vegetation.

Agency and Others' Concern about Sensitivity of Vegetation Triggers and Multi-Parameter Approach for Adaptive Action and Revisions to the Vegetation Monitoring Condition of Certification

BLM, Inyo County, The Nature Conservancy, and Amargosa Conservancy expressed concern in their PSA comments about the sensitivity of the "vegetation triggers" or field indicators prescribed in **BIO-23** to provide adequately early warning of impending ecosystem changes (BLM 2012b; INYO 2012b; TNC 2012a; ARM 2012b). Specifically, there were objections to the ambiguity and/or adequacy of the "20 percent decline in vigor" of the mesquite for triggering adaptive action.

Staff agrees it was not clear that the 20 percent threshold was a measure of individual plant vigor, rather than tree mortality. Characteristic measures of plant vigor, or response to drought stress, include decreases in biomass, crown density, and twig die-back. The 20 percent threshold was developed in consultation with vegetation monitoring specialist Willoughby (pers. comm.) as the "minimum detectable change" in crown density or biomass. Stromberg (pers. comm.) agreed that a 20 percent decline in biomass or crown density is a good threshold, and a decline in vigor from which the mesquite could easily recover, *assuming* immediate action was taken to halt pumping and restore the groundwater levels. It is possible or even likely that groundwater elevations would not recover immediately, and may take as long to recover as it did to drawdown to the threshold level, based on consultation with Water Resources staff, and other hydrogeologists (Custis pers. comm.; INYO 2012b). For this reason, and to address BLM and others concerns about the sensitivity of the trigger, staff conducted a literature review and consulted Stromberg (pers. comm.) and other vegetation ecologists with The Nature Conservancy (Parker pers. comm.) and BLM (Edwards pers. comm.) to determine if more sensitive measures were available that could provide accurate, reliable, and efficient field measures of mesquite drought stress. Regarding the earliest warning signs of drought stress in mesquite, Stromberg (pers. comm.) responded

> "There will be declines in stem water potential, transpiration rate, and amount of carbon fixed (via photosynthesis) in the early stages....Objective techniques for

measuring drought stress include measurements of 1) stem water potential (technically xylem water potential); 2) gas exchange rate; 3) transpiration rate."

Stromberg (pers. comm.) and Edwards (pers. comm.) agree that eco-physiological parameters could be developed for these measurements of drought stress that could be used to develop thresholds for adaptive action after baseline measurements were taken at the site to establish the seasonal variations, and variability between stands, or plots.

Condition of Certification **BIO-23** (Groundwater-dependent Vegetation Monitoring Plan) has been revised to base adaptive action on these more sensitive and earlier warning signs of stress. **BIO-23** requires the development of field-calibrated thresholds from baseline data to establish the range of seasonal and stand variability, and to factor the variability into the thresholds. Although the numeric thresholds are not specified at this time, **BIO-23** provides performance standards for the thresholds. It also provides detailed guidelines for the content of the monitoring plan, and requires approval of the plan by the Compliance Manager in consultation with the BLM Nevada and BLM California state leads for Soil, Water, Air and Riparian Programs, the BLM Southern Nevada District and BLM Barstow District hydrologists and botanists, and the Inyo County Water Department.

Hydrologists and vegetation ecologists representing BLM, The Nature Conservancy, Inyo County Water Department, and Amargosa Conservancy commented on Condition of Certification **BIO-24**, which was originally presented in the PSA, and has since been incorporated into **BIO-23** in this FSA. The above groups expressed concern that under the three-parameter threshold in **BIO-23** and **BIO-24** of the PSA (PSA pp. 4.2-235-242), adaptive action cannot be taken until all three parameters are met ("groundwater drawdown and vegetation decline that cannot be correlated solely to regional drought condition"). BLM and The Nature Conservancy commented that this places an unfairly high burden of proof on the resource that could "result in adverse and irreversible impacts to the vegetation" (BLM 2012b), and a "difficult test that, if it were required to invoked pumping limitations, protracted litigation would almost certainly ensue." (TNC 2012a). These entities recommended a more rigorous and protective threshold that requires pumping be curtailed or stopped if groundwater levels decline more than 0.5 feet at the project boundary. Pumping would not resume unless the project can demonstrate through vegetation monitoring data –based on the more sensitive and field-calibrated measures described above and/or soil coring to establish rooting depths—that the project pumping is not causing an adverse effect on the groundwater-dependent resources. Given that the specific numeric thresholds for the more sensitive (and reliable and objective) measurements of drought stress require field calibration from baseline data, staff agrees with this simpler, single-parameter approach to the threshold, and has revised **BIO-23** and **BIO-24** accordingly, blending the two conditions into one final condition, **BIO-23**. The field measurements of drought-stress would—in combination with corresponding drawdown – be used to establish whether or not pumping could resume, and at what level; however, the requirement to "stop, reduce, or modify pumping" would be triggered solely by the 0.5 foot drawdown at the project boundary.

The County of Inyo Water Department has a long history of requiring long-term groundwater monitoring for pumping project in Owens Valley, and considerable

experience in the development of related groundwater monitoring plans and conditions of approval. Staff accepted many of the Inyo County Water Department's recommended changes to **BIO-23** and **BIO-24,** resulting in one condition, **BIO-23**.

The 0.5-foot Drawdown Trigger Can be Detected with a High Level of Confidence

The applicant has argued that the groundwater monitoring conditions require "...a precision that is not possible...in an area where the water table can vary by several feet annually due to normal variations in seasonal rainfall." Water Resources staff responded to the same comment at the June 14, 2012, public workshop, and in the Water Supply sections of the PSA and FSA. Water Resources staff noted that water levels on the project side of the state line fault are very stable, and concluded that because water levels on the project site are stable (unlike offsite wells in other parts of the basin), the 0.5 foot drawdown threshold can be detected with nearly 100 percent confidence.

Groundwater Monitoring is Not Unprecedented

Applicant's comments argue that groundwater monitoring of the kind proposed by staff (as well as many of the commenting agencies and entities) is unprecedented. But this is incorrect. In fact, a similar condition was imposed on another Energy Commission-licensed project (Palen Solar Power Project). Moreover, it is now common practice to require monitoring, management, and mitigation plans for groundwater impacts; so common that the term "3M plans" is used by practitioners (Harrington pers. comm.; Custis pers. comm.). As an example, the monitoring plan for the Coso Hay Ranch Water Extraction Project in Inyo County requires monthly monitoring at 10 well locations for the life of the 30-year project, identifies triggers at each well, some as low as 0.2 feet, and specifies that pumping must *stop, change, or reduce pumping*:

> "Requiring that observed drawdown values [at intervening monitoring wells],over time be kept below these defined trigger levels would provide an early warning system, allowing for the system operations to *change, to reduce or stop pumping* before maximum acceptable drawdown levels propagated down the valley to Little Lake [emphasis added]."

Inyo County's agreement with the Los Angeles Department of Water and Power has provisions for monitoring, management and control of pumping, mitigation of impacts from pumping for water management and export activities in Owens Valley (Harrington pers. comm.). The primary goals of the agreement are to avoid causing significant decreases in the live cover of groundwater-dependent vegetation, significant changes in vegetation type, groundwater mining and other significant adverse effects. Extensive monitoring began in 1983 to determine the relationship between groundwater pumping and its impact on native vegetation, including the responses of managing pumping to minimize impacts. In contrast, the monitoring for the HHSEGS project requires relatively simple vegetation monitoring that is required only twice annually, at an appropriately small number of plots, and can be conducted by the Designated Biologist (under the supervision or training of a qualified botanist).

The projects described above use considerably more water, but it is the project's *very close proximity* to sensitive and ecologically significant resources that are at the crux of

staff's concern. The 1) close proximity (and thus potential for impacts), combined with: 2) significant cumulative concerns from the proposed Sandy Valley project; 3) limited quantity and reliability of the data; 4) hydrogeologic complexity of the area; and 5) the identification of these resources as conservation priorities justify staff's concern. A conservative approach must be applied that combines long-term groundwater elevation monitoring and monitoring the health of the mesquite, with triggers for adaptive action if impending impacts are detected. This approach has been generally supported by Inyo County (Inyo 2012b) and BLM Nevada and California (BLM 2012a; BLM 2012b), and finds support in many additional scoping comments and PSA comments.

The applicant has argued that the monitoring condition would make the project "un-financeable and un-buildable". However, an almost identical condition was imposed on another Energy Commission-licensed project (Palen Solar Power Project) – a project that was approved for purchase by BrightSource Energy, Inc., in June 2012 (BrightSource Energy, Inc 2012). Note that the remedial action described in **WATER SUPPLY-4** (Groundwater Monitoring) and **BIO-23** allows the project the option of *reducing* water consumption to sustainable levels, for example through water conservation measures. The conditions also provide the project with an option to *modify* pumping, for example, through the installation of new wells located farther from the sensitive resources, or through timing and rotation if monitoring shows that resources adjacent to one of the wells can sustain a greater drawdown than resources affected by the second or third pumping wells (Froend pers. comm.). Staff consulted researchers and manufacturers of waterless mirror-washing technologies, some of which are already available for photovoltaic projects and solar trough projects (Hofman, Baldini, Schik, Hemadrasa, and Mishra pers. comm.).

With the options described above, and examples of other projects requiring a similar conditions that were licensed and built, staff believes the adaptive action described in **WATER SUPPLY-4** and **BIO-23**) is *reasonable and feasible*, an opinion shared by hydrologists representing Inyo County, CDFG, and BLM.

Alternatives to Vegetation Monitoring

Staff considered eliminating the vegetation monitoring component (**BIO-23**) and basing the adaptive action solely on the 0.5 ft. groundwater drawdown threshold at the project boundary (**WATER SUPPLY-4**). Staff concluded that the vegetation monitoring was necessary to determine the drawdown level at which the mesquite begin to exhibit signs of drought stress, a level staff expects to vary from one area to the next due to geologic and hydrogeologic complexity of the area, and variations in the amount of background decline (present or historical groundwater drawdown). If the requirement to "stop, reduce, or modify pumping" is triggered by the 0.5 ft drawdown at the project boundary, the project could not resume pumping unless it can establish evidence of a sustainable level of pumping.

Condition of Certification **BIO-23** includes a provision for using soil coring to establish the maximum effective rooting depths of the groundwater-dependent plant species in the project vicinity (mesquite and four-wing saltbush). Stromberg (pers. comm.) agreed that a soil core would "provide valuable information on the distribution of the root system." The BLM Southern Nevada District hydrologist indicated that a proposal to

collect soil cores on BLM land for establishing thresholds for protecting resources may qualify for a categorical exemption (Poff pers. comm.). The amount of drawdown, relative to the maximum rooting depth, that the plants can sustain before manifesting signs of stress is unknown, however, and would require corresponding measurements of drought stress to establish a safe drawdown threshold.

Mitigation Considered But Rejected

A full range of mitigation options was considered. Mitigation in the form of offsite plantings and transplantation was considered but rejected. This type of mitigation has a long, documented history of failure. A study by CDFG (Fiedler 1991) found that, even under optimum conditions, ex-situ mitigation plantings were not effective in 85 percent of cases studied. Recent studies are even more discouraging. Mitigation with a high potential for failure would not be further considered. Where the hydrology is intact, riparian and wetland plantings have a higher potential for success than upland habitats in an arid region; however, groundwater elevations are declining throughout this basin and plantings may not be self-sustaining over the long-term. Mitigation through offsite restoration is risky for many of the same reasons, and large-scale salt cedar removal projects come with their own set of biological impacts (Shafroth et al. 2010) that must be analyzed and are likely to be significant, largely due to potential impacts to special-status bird species and other nesting birds.

Nor does offsite mitigation replace the complexity of plants and animals, including special-status species that make up the mesquite dune or mesquite woodland ecosystem, or replace the ecological processes essential to maintain these complex systems.

Compensatory mitigation through acquisition and preservation of offsite mesquite habitats was considered but rejected for a number of reasons:

1. Mesquite habitats are rare natural communities (Sawyer et al. 2009; Crampton et al. 2006; NNHP 2010b), and may have additional significance if mesquite clones are of ancient origin; acquisition and preservation would still result in a significant net loss and a residual cumulative effect not alleviated by putting a conservation easement on another stand;

2. Desert springs may be one of the rarest and most endangered habitats. Many have already stopped flowing and those that remain may be threatened by the basin imbalance. Desert springs have exceptional significance and importance to wildlife; they are the only natural source of water for wildlife in the desert, they often support rare and endemic species, and they are disappearing region-wide at an alarming rate due to groundwater pumping;

3. Other mesquite habitats in the basin are also threatened or degraded, and may not be sustainable. Staff considered the value of placing easements on mesquite stands with a higher value (at least to avian species) such as Stewart valley; however, few other stands of high quality occur in the basin, and they are already affected or by past and present groundwater declines, firewood cutting, the edge effects of urbanization, and expected continuing groundwater declines in this over-appropriated basin; thus they may not be sustainable over the long-term;

4. Stump Spring and the habitat surrounding the ACEC offer exceptional habitat values due in part to the presence of seasonal open water habitat. The presence of other active seeps and springs east of the project (Poff 2012) significantly increases the value of the habitats outside the ACEC to wildlife;

5. BLM is currently designing a new Area of Critical Environmental Concern (ACEC) to protect the mesquite and other resources just east of the project boundary and north of the existing Stump Spring ACEC (Poff, pers. comm);

6. Placing an easement on another mesquite stand does not mitigate for impacts to special-status species likely to use Stump Spring and other seeps and springs in the area, such as special-status bats, migratory birds, and special-status birds;

7. Allowing a net loss of mesquite habitat is in conflict with the goals and objectives for mesquite in Clark County MSHCP Mesquite Conservation Management Strategy (CMS), particularly for identified high priority conservation sites, which include Stump Springs and the Pahrump Valley metapatch (Crampton et al. 2006). The management goals include “maintaining woodlands at their current extent and restoring and enhancing remaining stands at year 2000 and higher levels”. The CMS objectives include “sustaining surface and groundwater levels at current or higher levels”. The CMS concludes “either all woodlands existing in 2000, including those on private lands, must be protected and restored, or the area and/or quality of remaining woodlands must be enhanced to compensate for a loss of woodlands in a way that allows the same numbers of individual plants and animals to exist with the same probabilities of persistence [in fewer but enhanced woodlands].” The CMS adds “it is not clear whether the latter option [enhancement] is feasible. Thus, the CMS emphasizes preserving all current woodlands, including private ones.”

Impacts to Regional Groundwater-Dependent Resources

BLM, The Nature Conservancy, Amargosa Conservancy, and others have expressed concern that pumping from the Pahrump Valley groundwater basin, combined with the cumulative effects of other past, present, and foreseeable future pumping, may cause impacts to the Amargosa Wild and Scenic River system, the Amargosa River ACEC, other mesquite woodlands in Pahrump Valley, Stump Springs ACEC, and other ecologically significant groundwater-dependent resources, including state and federal listed species. BLM and others have stressed the “outstanding remarkable values” of the federally-designated Amargosa Wild and Scenic River, which is wholly supported by groundwater in the form of seeps and springs. The project would pump from the Pahrump Valley basin-fill aquifer, which is included within and hydrologically connected to the Death Valley Regional Groundwater Flow System (DVRFS))Belcher & Sweetkind 2010).

Approximately 35 state and/or federal-listed species and other species exist in the Amargosa River and Ash Meadows regions that are found nowhere else globally. The Ash Meadows National Wildlife Refuge, one of several areas of exceptional biological importance also sustained by the regional groundwater basin, has the greatest concentration of rare and endemic species in the United States and the second

greatest in all of North America (USFWS 2012)[6] including several endemic pupfish species. Deacon (2007) demonstrated that some pupfish species may be highly sensitive to even minor changes in the groundwater.

In addition to the 35 state or federal-listed species, 22 other special-status species are known to depend on the areas groundwater system through seeps and springs, spring pools, the Amargosa River and its tributaries, and areas of shallow groundwater. The list does not include the abundance of unique, rare and sensitive groundwater-dependent natural communities.

BLM and others have expressed concern that there is insufficient information on the complex hydrogeology of the basin for the applicant to conclude no indirect or cumulative effect to the Amargosa Wild and Scenic River and other groundwater-dependent resources from project pumping. The applicant proposes that the project pumping would not affect these resources indirectly or cumulatively because of evidence they believe demonstrates that there is no hydraulic communication between the shallow aquifer (from which they will pump 140 afy) and the deeper carbonate aquifer.

The Water Supply analysis concluded that given the lack of evidence for a hydraulic connection, the relatively large intervening distance (about 20 miles), and uncertainty in potential flow barriers and permeability contrasts within the subsurface it would be speculative to conclude that project, pumping would adversely affect the Amargosa River. In the analysis, staff states there is no available data that identifies groundwater flow paths or confirms a hydraulic connection between the local basin-fill aquifer (the Pahrump Valley Groundwater Basin) and the Amargosa River, so the water consumed by project pumping may or may not be a source of inflow to the Amargosa River. Although staff concludes that a significant impact due to project pumping is unlikely, **WATER SUPPLY-1**, which requires an offset of project water use in the local basin-fill aquifer, would ensure there is likely no net overall change in subsurface outflow from the local aquifer that might affect the Amargosa River (See the “Water Supply” analysis of this FSA).

Impacts to Mesquite Dunes

The potential for impacts to dunes downwind of the project from obstruction of the wind-sand transport corridor by the project was considered because prevailing winds are from the northwest, and mesquite dune scrubs occur east and southeast of the project. Staff consulted two independent geologists with local expertise during a recent site visit (Brady & Vyverberg pers. comm. 2012). Their informal opinion (no report was prepared) is that the dunes developed along the Stateline Fault Zone as the Pleistocene lake retreated, and the exposed sands, or sands eroded from the sparsely vegetated hill slopes that developed under the new arid climate accumulated around mesquite associated with the fault-induced springs (Brady pers. comm. 2012). Indicators that the dunes are no longer active (accreting) include: 1) there is no apparent source area (dunes or other sand source) upwind of the dunes; 2) the leeward sides of the dunes are completely stabilized; 3) there is no loose sand in the stream channels around the

[6] USFWS. 2012. *Ash Meadows National Wildlife Refuge*. U.S. Fish and Wildlife Service.

dunes, and 4) the windward side is wind scoured and not accreting. The lee sides are also eroded but well-vegetated, and there is no sand there which, in an active system, would supply the next dune down wind. The conclusion was that the dunes would not occur where they are under the present climate; there is no source for the sand and no transport corridor to supply sand to the dunes. For these reasons, the mesquite dune scrub downwind of the project would not be affected by any obstructions upwind. Impacts to the dunes could occur if project-related groundwater pumping caused groundwater levels to drop below the level of effective rooting and the mesquite died, leaving dunes vulnerable to deflation (USACE 2012a; Brady pers. comm.); impacts to the coppice dunes and other groundwater-dependent ecosystems are described in the previous subsection of this FSA section.

Construction Impacts to Desert Washes

Jurisdictional Waters of the State and Waters of the U.S.

A total of 23.82 acres of jurisdictional Waters of the State, including single-thread channel and braided ephemeral streams, were delineated by the applicant on the proposed project site (URS 2012b). Of these 23.21 acres, 0.42 acres are also Waters of the United States. Six of the features are also depicted as blue line features on the U.S. Geological Survey (USGS) topographic maps. During an August 2012 field verification of the applicant's state waters delineation (URS 2012b), an additional nine ephemeral streams were identified within the project boundary. Features mapped as "nonjurisdictional waters" in the preliminary State waters delineation report (i.e., pooling areas, moist pooling areas, alkaline soils areas, sheet flow areas) were confirmed by the Energy Commission and CDFG as not constituting waters of the State. The CEC and CDFG conducted a site visit to verify the state waters delineation in August 2012. The CEC provided the applicant with data representing 9 additional drainages, adding an additional 3.13 acres of jurisdictional waters of the state within the project boundary. With the addition of the 3.13 acres by the CEC, the areal extent of State jurisdictional waters within the HHSEGS project boundary totals 23.21 acres (CH2 2012mm**)**.

Impacts to Ephemeral Streams

The applicant proposes to minimize impacts to desert washes by allowing them to pass through the site, rather than diverting them around the site in artificially constructed channels. This analysis recognizes that at least a portion of the hydrologic and geomorphic functions would be maintained, and mitigation ratios were reduced accordingly. However, staff and the CDFG maintain that the wildlife habitat functions and values of the streams would be eliminated or significantly diminished by a combination of partial site grading, road construction and maintenance, perimeter exclusion fencing, dust and weed control, vegetation mowing, mirror-washing, glare and lighting, human disturbance, and potential erosion and sedimentation of streams during storm events as the storm flows navigate around the mirror pylons and other obstructions. The functions and values of the 0.4 acres of streams delineated just upstream of the project's eastern boundary, within California, could be indirectly impacted from construction of the underground and overhead transmission line. Indirect effects to the upstream portion of the state waters include: human disturbance, glare, lighting, road maintenance, and potential headcutting (erosion) from trenching through the washes.

Importance of Ephemeral Desert Washes to Wildlife

The importance of ephemeral streams to wildlife in the desert is undisputed; it is well-documented in the literature, the sum of which represents decades of observations and surveys (Levick et al. 2008; Baxter 1988; Kirkpatrick et al. 2007; Kubick & Remsen 1977; Tomoff 1977; Daniels & Boyd 1979, and others). Loss of the habitat function and values of all or a significant portion of all streams across a 3,277-acre site is a substantial adverse effect on state jurisdictional waters. It conflicts with state LORS, and it is a significant impact.

Ephemeral and intermittent streams in the arid west provide important habitat for wildlife and are responsible for much of the biotic diversity (Levick et al. 2008). They have higher moisture content, and the topographic relief provides shade and cooler temperatures within the channel. In cases where the habitat is distinct in species composition, structure, or density, wash communities provide habitat values not available in the adjacent uplands. They provide movement corridors and seasonal access to water or moisture. Baxter (1988) noted that washes, because of their higher diversity plant communities, are probably important foraging locations for desert tortoise; in smaller washes, there is greater cover and diversity of spring annuals, providing important food sources. Researchers have noted the high diversity of herpetofauna in desert washes and many snakes and lizards preferentially use xeroriparian habitat because of its denser cover (*ibid.*). Kirkpatrick et al. (2007) noted that even dry, ephemeral washes have greater avian abundance and species richness than adjacent uplands. In a study of 66 plots on BLM lands in California, dry washes support 1.5 times more breeding species and twice as many wintering species as the more common desert scrub (Kubick & Remsen 1977; Tomoff 1977; Daniels & Boyd 1979, and others).

Staff's observations of the habitat functions and values provided by the washes on the project site, and observations of wildlife use of the features are consistent with the literature. During the state waters delineation field verification and other site visits, biologists from CDFG and staff noted the washes offer habitat functions and values distinct from the surrounding upland. For example, anywhere there are concentrations of water, the vegetation is denser and more robust, which in turn provides more shade, escape cover, more seed and other food sources, including more insects, which would in turn support more reptiles, etc. The washes also have greater plant species diversity; for example, germination of rattlesnake weed (*Chamaesyce albomarginata*), a preferred desert tortoise food, was abundant in the lower reaches of many channels, particularly at the terminus of the streams where soils remain saturated longer. Bunchgrasses (*Sporobolus airoides, Pleuraphis rigida*) are more abundant on some features. The terminus of these streams held water longer and thus provided sources of temporary pooling. Staff noted higher mammal density on the streams and their active floodplains, evidenced by greater bioturbation and more abundant coyote scat.

The applicant argues that CDFG's interpretation of Fish and Game Code (PSA pp. 4.2-44-45) is not consistent with the California Code of Regulations definition of "stream." The definition of a stream in Title 14, Section 1.72 of the California Code of Regulations (CCR) is not the definition used by Fish and Game Code (Section 1600 *et seq*.). The Section 1.72 definition was developed to address a specific sports fish issue that came before the Fish & Game Commission; while the definition does speak to periodic and

intermittent flow, Section 1.72 is limited to fish-bearing or aquatic life-bearing streams (Vyverberg pers. comm.).

Fish and Game Code Chapter 6, Fish and Wildlife Protection and Conservation, Section 1600 *et seq.* was enacted to provide for the conservation of fish *and* wildlife resources associated with stream ecosystems. The Fish and Game Code further defines fish and wildlife to include: "...*all wild animals, birds, plants, fish, amphibians, invertebrates, reptiles, and related ecological communities, including the habitat upon which they depend for continued viability."* (FGC Division 5, Chapter 1, section 45, and Division 2, Chapter 1, section 711.2(a), respectively)

Ephemeral Streams Not Excluded Under Fish and Game Code

The applicant's PSA comments assert that the washes on the project site have no value to wildlife because they are *narrow* or *ephemeral*. This assertion is not supported by the relevant literature. Moreover, it finds no support in law or the policies and practice of CDFG. For the purposes of implementing sections 1601 and 1603 of the Fish and Game Code, California Code of Regulations Title 14, section 720, requires submission to CDFG of general plans sufficient to indicate the nature of a project for construction by or on behalf of any person, governmental agency, state or local, and any public utility, of any project which will divert, obstruct or change the natural flow or bed of *any* river, stream or lake designated by the department, or will use material from the streambeds designated by the department, all rivers, streams, lakes, and streambeds in the State of California, including *all rivers, streams and streambeds which may have intermittent flows of water*, are hereby designated for such purpose. The term "*...intermittent flows...*" has long been interpreted by the courts and the Attorney General's office to include ephemeral flow (Vyverberg pers. comm.).

While Fish and Game Code sections 1600 *et seq.* do not include a definition for "stream", it has been the practice of the Lake and Streambed Alteration Program (LSA) to define a stream as: A body of water that flows perennially, intermittently, or ephemerally. Streams include a channel, banks, bed, and floodplains where present.

During the field verification of state waters, conducted after a 0.20-inch storm event, the smaller washes onsite contained water and/or evidence of recent inundation, and were expressed by a number of fresh fluvial indicators reflective of stream processes. Characteristic hydrology indicators, fluvial indicators and other geomorphic features used in staff's identification of state waters include: channel morphology; inundation or saturation; fresh deposition; ripples; changes in vegetation species composition, structure or density (relative to the adjacent creosote uplands); wrack; mud drapes; changes in sediment texture; sediment sorting; scour or shelving; and gravel ramps. The use of these indicators to delineate desert streams is well-documented in literature and agency guidance (USACE 2005; Lichvar & McColley 2008; Lichvar & Wakely 2004). Photos of a sampling of the stream features and indicators are provided in **Biological Resources Figure 3**.

All Desert Wash Vegetation Protected Under Fish and Game Code

Fish and wildlife resources are held in trust for the people of the State by and through the California Department of Fish and Game (FGC § 711.7). CDFG is responsible for

conserving, protecting, and managing fish, wildlife, native plants, and the habitat necessary for biologically sustainable populations of these species (Fish and Game Code Section 1802).

The importance of vegetation along streams to the function and values of the stream habitat is a matter of undisputed fact, supported by the body of scientific literature, and presumed by CDFG (Vyverberg pers. comm.). The applicant's argument that the vegetation is not linked to ecosystem function and the vegetation along the washes is not an integral part of the stream system is erroneous. Fish and Game Code links stream protection with the presence of fish, wildlife, *and their habitat.* Fish and Game Code Chapter 6, Fish and Wildlife Protection and Conservation, Section 1600 *et seq.* was enacted to provide for the conservation of fish *and* wildlife resources associated with stream ecosystems. The Fish and Game Code further defines fish and wildlife to include: "*...all wild animals, birds, plants, fish, amphibians, invertebrates, reptiles, and related ecological communities, including the habitat upon which they depend for continued viability."* (FGC Division 5, Chapter 1, section 45, and Division 2, Chapter 1, section 711.2(a), respectively).

The applicant also argues that the washes are "devoid of any plant life"; a statement with no basis in fact. The applicant's own delineation report discusses the vegetation along the washes and notes the distinctions in the species composition of the wash vegetation (URS 2012b). This is consistent with staff and CDFG's observations of the washes during numerous site visits, including the verification of the applicant's delineation of state waters, conducted approximately 7-10 days following a large storm event, and one day following a smaller (0.2 inch) storm event. As described above, staff found an abundance of germination of native annuals in the lower reaches of many washes, including the smallest washes; germination that was not apparent in the adjacent uplands. There were differences in the species composition of the wash vegetation on some (not all) washes; however, the vegetation is typically larger, more robust, and denser along the washes than in the adjacent uplands.

The regulations do not limit CDFG's protection or conservation authority to one specific type of vegetation community (e.g., woody riparian vegetation but not other wash communities). It has been the practice of the LSA Program to define "riparian" to mean: *areas adjacent to perennial, intermittent, and ephemeral streams, lakes, and estuarine-marine shorelines that are transitional between terrestrial and aquatic ecosystems and that are distinguished by gradients in biophysical conditions, ecological processes, and biota, areas through which surface and subsurface hydrology connect waterbodies with their adjacent uplands. Riparian areas include those portions of terrestrial ecosystems that significantly influence exchanges of energy and matter with aquatic ecosystems (i.e., a zone of influence)* (Vyverberg pers. comm.).

Conclusions and Discussion of Mitigation Regarding State Waters

It has been CDFG policy and practice to collect notification fees for Section 1600 *et seq.* jurisdictional "projects" in conjunction with Energy Commission (CEQA) projects (Condon pers. comm.). Applicants provide information regarding planned stream encroachments, water diversions (activities subject to Section 1600 *et seq.*) in a completed 1600 notification form, including fees, which facilitates the Energy Commission's and CDFG's review of the information. CDFG consults with the Energy

Commission with recommendations for minimization and mitigation measures. The Energy Commission includes those measures under the conditions of certification.

On October 10, 2012, the applicant submitted a
Notification of Lake or Streambed Alteration form and required fees, based on the revised delineation of state waters (CH2 2012mm). Fish and Game Code Section 1605 assumes implicitly that some form of mitigation will likely be part of any Lake and Streambed Alteration Agreement issued for a project. CDFGs no net loss policy for riparian/riverine habitat means that if a project results in a loss of one acre of stream then a minimum of two acres of compensatory stream mitigation are required to satisfy the no net loss goal (Vyverberg pers. comm.). In practice, compensatory mitigation is typically mitigated at a minimum mitigation-to-effect ratio of 3:1 for permanent effects and 1:1 for temporary effects.

The 2:1 mitigation ratio for impacts to desert washes proposed in Condition of Certification **BIO-22** (State Waters Compensatory Mitigation) is supported by CDFG (Branston pers. comm.). Although CDFG has received mitigation at a 3:1 ratio for impacts to desert washes, the regional office has agreed to a 2:1 ratio in recognition that at least some portion of the hydrologic and geomorphic function would be maintained (*Ibid.*). Staff and CDFG are united in their assessment that the impacts to habitat functions and values from perimeter exclusion fencing, partial site grading, road construction and maintenance, vegetation maintenance, spraying, noise, glare, and human disturbance are significant.

No compensatory mitigation is required for indirect impacts to streams in Nevada; however, there is a small (0.4 ac.) portion of the washes just east of the project that are located in California. The match of pre-and post-project flows will protect the soil and water resources downstream of the project but will not protect the upstream portion of the streams immediately adjacent to the project at the east boundary. Unless the trench fill and surface is fundamentally transparent to the stream, sediment can be expected to be removed preferentially from the trench area. Once a pipeline is exposed, the erosion will first be greatest on the downstream edge, eventually undermining the pipe, at which point headcutting is commonly initiated (Vyverberg pers. comm.). Headcutting and other erosion can be avoided or minimized through recommended erosion control measures.

With implementation of **BIO-22,** which includes the compensatory mitigation discussed above, impacts to state waters would be reduced to less-than-significant levels.

Introduction and Spread of Noxious Weeds and Other Invasive Plants

Noxious Weeds and Other Invasive Plants in the Project Area

Thirteen species of invasive weeds were documented in the project area, including two California Department of Food and Agriculture A-rated pests (Russian knapweed and halogeton). Project-related construction activities, vehicle and equipment use during operation and closure, mirror-washing, and sedimentation of streams from adjacent weedy areas are all expected to increase the spread of weeds into adjacent public and private lands from contaminated vehicle and equipment tires and undercarriages. Naturally disturbed habitats such as dunes and washes are particularly vulnerable to colonization by weeds. Many invasive non-native species are adapted to and promoted

by soil disturbance, and seeds are commonly transported on vehicles and by wind and water.

Vegetation management on the project site is expected to promote the proliferation of invasives, particularly cheat grass and red brome. Suppressing the surrounding taller native vegetation by mowing can give lower-growing weeds a competitive edge. The native perennial shrubs would be weakened and diminished in size, utilizing less moisture and nutrients, and increasing sunlight available to the weeds between shrubs. These in turn could spread into adjacent lands by contamination of vehicles and equipment, and along washes that pass through the site and drain into lower-lying areas. They can be spread along area roads and transmission corridors, which are common vectors for the spread of weeds.

New species not currently found in the project vicinity can be inadvertently introduced on the tires and undercarriages of workers vehicles commuting from southern Nevada (Inyo County 2012b).

County agricultural commissioners and have expressed concern about the spread of weeds, particularly the introduction of highly invasive species common in southern Nevada from which employees and contractors are likely to commute (Inyo County 2012b).

Ecological Consequences

About 42 percent of federally threatened or endangered species are listed because, among other factors, threats from invasive species (Brooks & Pyke 2002). They can directly affect wildlife and sensitive plants, or indirectly affect them by causing destructive changes in ecosystem processes. Accordingly, the management of invasive plants is now a top priority for land managers.

Invasive species out-compete native species for moisture and nutrients because of minimal water requirements, high germination potential and high seed production (Beatley 1966) and can become locally dominant, representing a serious threat to native desert ecosystems (Abella et al. 2008). In some areas of the western Mojave Desert, weeds now comprise 50 to 97 percent of the herbaceous plant material produced each spring. Showy wildflowers and special-status plants are swamped by monocultures of red brome and other annual weeds that contribute little or nothing to the food web (Pavlik 2008). Invasives have decreased the quality and quantity of plant foods available to desert tortoises and other herbivores and thereby affected their nutritional intake (Hazard et al. 2002; Nagy et al.1998).

Without consumption by wildlife, the dead material from the previous year accumulates to form a continuous, flammable canopy over thousands of acres in areas where fire was once infrequent for lack of fuel; areas that now burn frequently and with catastrophic consequences. Burned creosote and other native shrubs are typically replaced by short-lived perennials and non-native grasses (Brown & Minnich 1986), resulting in large-scale habitat conversions.

Weeds and the Increased Risk of Fire

Fire in desert ecosystems is well documented to cause catastrophic, landscape-scale ecosystem changes and impacts to the local species (Allen et al. 2011; Abella 2009; Belnap et al. 2005; Brooks & Esque 2002; Brooks et al. 2004; Brooks & Matchett 2006; Pavlik 2008; and others). The proliferation of non-native annual grasses and other weeds has dramatically increased the fuel load and frequency of fire in many desert ecosystems (Lovich & Bainbridge 1999). Unlike other ecosystems in California, fire was not an important part of the Mojave Desert ecosystems and most perennials are poorly adapted to even low-intensity fires; the animals that coevolved are not likely to respond favorably to fire either. Instead of occurring every 30 to 100 years as fires did historically in the region, wildfires are now recorded about every five years (*Ibid.*). Between 1980 and 1990 and average of 38 square miles was burned every year in the Mojave Desert. Because of the proliferation of annual grasses and other weeds, the fires sweep across the desert scrubs, incinerating the native species with no tolerance for the new form of disturbance. High temperatures also sterilize the soil of its beneficial fungi and kill desert tortoise and other wildlife. The effect is then magnified by the opportunistic colonization of newly burned areas by non-native annual grasses that in turn significantly delays or inhibits natural regeneration. This in turn results in permanent habitat conversations from diverse desert scrubs to weedy, flammable grasslands, or weed-infested scrubs that choke out special-status plants, offer little habitat value for wildlife and increase their risk of mortality under a new regime of frequent, catastrophic fires. Thus a relatively few invasive, productive, and unchecked non-native plants from other arid regions can create a cascade of habitat degradation (*ibid.*).

Wildfires are rare in the desert but the sharp increase in daily vehicle use would correspondingly increase the risk of ignition, particularly at pullouts and on partially vegetated unpaved roads where the exhaust system comes into contact with dry grass or other vegetation. Sparks generated by mowers, welders, grinders, and other equipment are also common ignition sources; fires caused by converter equipped vehicles can occur instantaneously once the vehicle has come to a stop on dry grass. The weeds that typically recolonize disturbed soils along roads and transmission corridors tend to increase the flammability of the roadside vegetation. The impacts to these poor-adapted desert communities and special-status wildlife, including desert tortoise, would be severe.

Conclusions and Discussion of Mitigation

Indirect effects from the introduction and spread of invasive weeds, and the concomitant increase in vegetation flammability and disruption of ecosystem processes are The applicant conducted thorough weed surveys and mapping as part of the pre-application studies. The applicant acknowledges the potential of the project to introduce and spread invasive weeds, and proposes to prepare a weed management plan (HHSEGS 2011a). Condition of Certification **BIO-18** provides guidelines and performance standards for the development of a weed plan. **BIO-18** requires the project owner to manage or contain weeds onsite for the life of the project to prevent their spread into adjacent offsite habitat, or to nearby communities via employees and contractors contaminated vehicles and equipment. **BIO-18** also includes measures for minimizing the accidental introduction or spread of weeds from contaminated vehicles and equipment entering the site during construction, operation, and closure. **BIO-18** requires the establishment of a washing station where construction vehicles and equipment would be inspected and

washed within an approved area or commercial facility prior to entry or exit to prevent the introduction and spread of invasive weeds.

Herbicides can help protect native vegetation from invasive weeds, but they can also have detrimental environmental impacts (CNPS 2008). Wildlife within and adjacent to the project can be directly or indirectly harmed by herbicide drift from sprayers, or residual soil toxicity from the use of some pre-emergent herbicides. Because of this, it is best to select a contact herbicide that has low toxicity and no residual toxicity (as many pre-emergent herbicides and soil fumigants have. The application method should be designed to minimize drift in or near sensitive species or native habitat offsite. Not all herbicides or application methods are equally appropriate, effective, or safe, given different site conditions and weed species. To avoid accidental harm to biological resources from weed management activities, **BIO-18** includes specifications for environmentally safe weed management, including: employing only manual methods of weed management within 100 feet of offsite biological resources; spraying only on windless days; using sprayer adapters that confine the width of the spray pattern and eliminate drift; and using rollers or brushes to apply herbicides rather than sprayers, and prohibiting the use of herbicides with residual soil toxicity.

BIO-8 and **BIO-18** contain additional measures for fire prevention to address the concomitant increased risk of fire from an increase in abundance and distribution of weeds, especially annual grasses such as red brome, cheat grass, and Mediterranean grass and potential ignition from mowing, welding, grinding, and increased vehicle

CUMULATIVE IMPACTS

“Cumulative” impacts refer to a proposed project’s incremental effect viewed over time together with other closely related past and present projects and projects in the reasonably foreseeable future whose impacts may compound or increase the incremental effect of the proposed project (Public Resources Code Section 21083; California Code of Regulations, Title 14, Sections 15064[h], 15065[c], 15130, and 15355). The following sections present a definition of the geographic extent within which cumulative impacts are analyzed and an analysis of the project’s potential incremental effects when combined with other past, present, and future projects.

The standard for a cumulative impacts analysis is defined by the use of the term "collectively significant" in the CEQA Guidelines section 15355; the analysis must assess the collective or combined effect of development. Cumulative impact assessments cannot conclude that contributions to cumulative impacts are not significant because the contributions represent a small percentage of the overall problem. Doing so could improperly omit facts relevant to an analysis of the collective effect that the project and other related projects would have upon biological resources. The result could be approval of projects based on an analysis that avoided evaluating the severity of impacts which, when taken in isolation appear insignificant, but when viewed together appear significant.

GEOGRAPHIC EXTENT

The geographic scope of staff's preliminary analysis of cumulative effects to special-status wildlife encompasses Pahrump Valley and makes a broad, regional evaluation of the impacts of reasonably foreseeable future projects that threaten special-status wildlife in the southern Amargosa Desert region, from the Las Vegas environs to Pahrump and Ash Meadows, and south to Sandy Valley. For some biological resources, a different geographic scope was warranted, such as the use of watershed boundaries to analyze cumulative effects to desert washes. The analysis of impacts from the inadvertent introduction and spread of invasive weeds considered species known to infest the communities from which most equipment and employee vehicle traffic will originate in southern Nevada. The analysis of the project's cumulative impacts to groundwater-dependent ecosystems makes a broader, regional evaluation of biological resources within the context or geographic scope of the Death Valley Regional Groundwater Flow System (DVRFS), which includes Pahrump Valley.

Because many species found in Pahrump Valley also extends into the state of Nevada, staff considered the potential for cumulative impacts from the Nevada side of the valley, or further, depending on the habitat needs and movement capability of each species, and the scope of the hydrological and vegetative cumulative impacts. Impacts to the Nevada portion of local population could indirectly affect the viability of the species' range in California; fragmentation of formerly large contiguous populations into smaller, isolated occurrences is generally believed to increase extinction risk, and reproduction needs depends on proximity to neighboring metapopulations. Ensuring connectivity between patches of suitable habitat and metapopulations helps to ensure species vigor and persistence.

EXISTING CUMULATIVE CONDITIONS

Over the past two hundred years, California's southern deserts have been subject to major human-induced changes that have threatened native plant and animal communities by habitat loss, fragmentation, and degradation. Some of the most conspicuous threats are those activities that have resulted in large scale habitat loss due to urbanization, agricultural uses, landfills, military operations, mining activities, as well as activities that fragment and degrade habitats such as roads, off-highway vehicle activity, recreational use, and grazing (Berry et al. 1996; Boarman and Sazaki 2006; Avery 1997; Jennings 1997). In addition, these development pressures facilitated the introduction of non-native plant species and increases in predators such as ravens, which contribute to population declines and range contractions for many special-status plant and animal species (Boarman 2002).

PROJECTS CONTRIBUTING TO CUMULATIVE EFFECTS TO BIOLOGICAL RESOURCES

Past and present projects in Pahrump Valley and adjacent areas in the northeastern Mojave Desert that have contributed to cumulative impacts to special-status species found in the project study area include:

- Conversion of natural communities for agriculture and groundwater pumping for irrigated agriculture (mostly cotton and alfalfa) during the last century, fragmenting and isolating populations; altering surface drainage patterns (dispersal pathways),

surface and groundwater hydrology, introducing agricultural weeds into the local ecosystem;

- Development of military reservations and military training activities;
- Past and present residential, commercial, and industrial development in the Pahrump environs, fragmenting populations, increasing the risk of fire, off road vehicles, and the spread of invasive plants;
- Construction of highways and other roads, modifying surface runoff patterns and acting as vectors for the spread of invasive plants;
- Transmission corridors, another common vector for weed spread; and
- BLM grazing allotments (sheep and cattle grazing), which also contributed to the spread of invasive weeds, particularly red brome and cheat grass.

Reasonably foreseeable future actions that are expected to contribute to cumulative impacts include:

- Pahrump Valley General Aviation Airport (650 acres on BLM lands);
- Element Power Solar project (2,560 acres on BLM lands);
- PSI Amargosa (Pacific Solar) (PV project on 1,700 acres of BLM lands);
- Amargosa Farm (4,350 acres of BLM lands);
- Silver State Solar Project (600 acres on BLM lands);
- Sandy Valley Solar Project (a 15,190-acre BrightSource Energy project on BLM lands);
- Table Mountain (8,549 acres on BLM lands);
- South Solar Ridge (8,549 acres on BLM lands);
- Southern Owens Valley Solar Ranch (3,100 acres on private lands);
- Lathrop Wells Solar (5,336 acres on BLM lands);
- Solar Express Transmission (122 miles on undetermined right of ways);
- St. Therese Mission (17.5 acres on private lands);
- Urban expansion in the Pahrump Valley and Sandy Valley areas;
- HHSEGS Hidden Hills Valley Electric Transmission Project (10 acres on BLM lands);
- Searchlight Wind Energy (18,949 acres on BLM and public lands);
- Stateline Solar Farm (2,114 acres on BLM lands in San Bernardino County); and
- Infrastructure development associated with urban expansion and renewable energy development

Approximately two percent of Inyo County is in private ownership. Large tracts of land are in public trust, held by the BLM. The BLM manages land for multiple uses. While maintenance of habitat features and functions is a priority, the BLM must allow uses that stand in direct conflict with many conservation goals. Mining claims, grazing leases,

renewable energy and other project development, and recreational uses may all be permittable under certain circumstances.

ANALYSIS OF CUMULATIVE EFFECTS TO BIOLOGICAL RESOURCES

This qualitative assessment of cumulative effects was based on a review of the project's onsite and offsite survey data, databases, literature, and consultation with regional experts. In addition to the combined effects of habitat loss and direct mortality, staff identified a range of indirect effects that combine with similar effects from other past, present, and foreseeable future project that must be factored into the cumulative analysis. This suite of indirect impacts to which the project would contribute includes: increase in ravens, coyotes, and other predators; introduction and spread of invasive weeds; the effects of groundwater pumping on springs and other dependent ecosystems; altered surface drainage patterns; fragmentation; increased risk of fire; erosion and sedimentation of streams; potential for the introduction and or spread of wildlife diseases; diminished habitat values from increased noise and lighting; exotic wildlife invasions; dust and air pollution; road kills; human disturbance; and other factors contributing to a significant cumulative effect.

Cumulative Impacts – Special-status Wildlife

Desert Tortoise

The geographic extent of the analysis of cumulative impacts to desert tortoise is the range of the Mojave Desert portion of the population with special emphasis on the Eastern Mojave Recovery Unit, as recognized by the USFWS (USFWS 2011a). The Mojave population's range encompasses the area north and west of the Colorado River in the Mojave and Sonoran/Colorado deserts in California, southern Nevada, southwestern Utah, and extreme northwestern Arizona (USFWS 2011a).

The proposed project is located in the Pahrump Valley which occurs in the south-central portion of the Eastern Recovery Unit. The Pahrump Valley has direct connectivity to adjacent valleys within the Amargosa Desert region in California and Nevada. However, the USFWS 2011 Recovery Plan noted that genetic differentiation occurred for desert tortoises at the Amargosa Desert and Pahrump Valley sites. This area is more confined than other units and movement has been more confined by the adjacent mountains and Death Valley. For this region a lack of desert tortoise habitat dedicated to conservation to the west of the Spring Mountains and in Las Vegas Valley highlights the need for careful management in these areas to maintain connectivity among populations and the genetic variation within this recovery unit (USGS 2011). Corridors north and south of the Spring Mountains warrant particular management attention to prevent genetic isolation of populations on either side of this mountain range. Ongoing development in these areas, including in and near Pahrump Valley contributes to the decline in habitat and may further isolate populations of desert tortoise.

To promote substantial populations for desert tortoise recovery in the Mojave population's range, the 1994 Recovery Plan (USFWS) designated six Recovery Units traversing all four abovementioned states. In 2011 the Recovery Units were revised to better reflect genetic and geographic boundaries and were reduced to five units. The establishment of the Recovery Units is intended to protect the species and its habitat

requirements so that desert tortoises can maintain self-sustaining within each recovery unit into the future. However, desert tortoises are slow-growing animals that do not reach sexual maturity until age 15 to 20 years and have a low reproductive rate over a long period of reproductive potential; these life history characteristics hinder recovery since tortoises experience high mortality rates prior to reaching sexual maturity (USFWS 2011a).

Urbanization/loss of habitat, deteriorating habitat quality from off-highway vehicles, invasion of non-native grasses and weeds, predation by ravens, collection, livestock grazing, and spread of an upper respiratory tract disease have all contributed to the decline of desert tortoise populations. In response to this decline, large expanses of desert tortoise critical habitat and numerous ACEC/DWMA areas have been identified or established within the NEMO southern recovery unit planning area. Cumulatively, the impacts of these projects to desert tortoises in the Mojave population would be significant.

The proposed project's incremental contribution to cumulative impacts to desert tortoise would be similar to the impacts of other solar developments in the range of the Mojave population, and would include loss of habitat, interference with regional movement, stress and potentially illness or mortality from translocation, and indirect impacts from an increase in predators such as the common raven. The current USGS Desert Tortoise Habitat Model (Nussear et al. 2009) maps the project area and portions of the Pahrump Valley as "Medium Quality" desert tortoise habitat, with scores of 0.7 to 0.9 on a scale of 0 to 1.0 (0 being the lowest quality and 1.0 being the highest quality). The model is a predictive model for mapping the potential distribution of desert tortoise habitat and is useful tool for evaluating different land-use issues that tortoises face at a landscape scale. It is not intended to be used, or viewed, as a substitute for ground-based and site-specific field surveys. Model scores reflect a hypothesized habitat potential given the range of environmental conditions where tortoise occurrence was documented. The report (Nussear et al. 2009) specifically states:

> "*. . . there are likely areas of potential habitat for which habitat potential was not predicted to be high, and likewise, areas of low potential for which the model predicted higher potential. Finally, the map of desert tortoise potential habitat that we present does not account either for anthropogenic effects, such as urban development, habitat destruction, or fragmentation, or for natural disturbances, such as fire, which might have rendered potential habitat into habitat with much lower potential in recent years*".

Based on staff's field observations, surveys conducted by the applicant, and historic land uses in portions of the project site, desert tortoise habitat quality on the project site ranges from good to somewhat degraded. Even so, the site is occupied habitat and the observations of desert tortoises of different age class, numerous burrows, and their sign suggest the site remains actively populated. Construction of the proposed project would have permanent and long-term impacts to approximately 3,258 acres of habitat at the solar field site. The project would also disturb habitat in occupied habitat in Nevada to support linear facilities including a natural gas pipeline and transmission line. The NEMO indicates there are approximately 172,000 acres of Class III desert tortoise in the Pahrump Valley. This area is defined by the NEMO as "the Pahrump Valley is bounded

by the Nopah Range on the west and northwest, the Nevada State line on the east, the town of Pahrump on the northeast, and the Inyo/San Bernardino county line on the south". Construction of the proposed project would result in a 0.02 percent loss of this existing habitat solely within the Pahrump Valley. Region wide the loss of habitat would be extremely low.

Mitigation measures to reduce project-level impacts to desert tortoise include: construction minimization measures (**BIO-8**); clearance surveys and exclusion fencing (**BIO-9**); preparation and implementation of a translocation plan (**BIO-10**); acquisition and conservation of compensation lands (**BIO-12**); and preparation and implementation of a plan to control ravens (**BIO-13**). Together these measures would reduce project-level impacts of the solar generator, generator tie-line, and interconnector substation to less than significant under CEQA and would fully mitigate those impacts under CESA. After implementation of these measures, the project's contribution to significant cumulative effects to desert tortoises would not be cumulatively considerable.

Nelson's Bighorn Sheep

The proposed project would not impact any identified connectivity corridors as identified by CDFG, or wildlife habitat management areas (WHMA) designated by BLM as protective of bighorn sheep habitat. Large-scale renewable energy development could significantly impact gene flow between sheep populations through significant cumulative impacts to connectivity corridors, potentially decreasing the viability of the metapopulation of bighorn sheep. The project itself, however, would have no direct contribution to the loss of habitat within the identified connectivity corridors or the WHMAs.

Proposed future projects could also cumulatively and significantly affect bighorn sheep through the loss of spring foraging habitat on the upper bajadas adjacent to occupied range. The impact of development within a 1-mile buffer from the base of occupied ranges (or potentially restored populations in unoccupied ranges) was assessed for potential impacts to bighorn sheep foraging habitat. No significant direct impacts to bighorn sheep WHMAs, connectivity corridors, or spring foraging habitat would result from the proposed project; therefore, no mitigation measures relating to bighorn sheep are proposed by staff.

The project's contribution to the loss of habitat, increased noise and lighting, road kills, fragmentation, and the spread of invasive pest plants is cumulatively considerable. However, the project's contribution to these effects would be reduced to a level less than cumulatively considerable through implementation of several conditions of certification designed to address indirect effects as well as habitat loss. These include completion of badger and kit fox specific pre-construction surveys, as well as impact avoidance and minimization measures in **BIO-14**; **BIO-8** (General Impact Avoidance and Minimization Measures) contains specific measures to minimize noise and lighting impacts; **BIO-18** (Weed Management Plan); **BIO-12** to acquire 6,358 acres of desert tortoise habitat, which is expected to contain suitable habitat for badger and kit fox; and **BIO-22**, which requires acquisition and protection of desert washes and adjacent habitat within the local watersheds, which will minimize future fragmentation in the vicinity of the project area by protecting lands from future development.

Although the project would be expected to affect wildlife movement and connectivity across the Pahrump Valley, the project is not expected to significantly affect—directly, indirectly, or cumulatively—bighorn sheep movement.

American Badger and Desert Kit Fox

Reasonably anticipated cumulative effects considered by staff in a qualitative manner include habitat fragmentation and the diminished habitat values of remaining habitat from increased noise, lighting, exotic plant invasions including their ability to fuel wildfires and alter fire regimes, exotic wildlife invasions, dust and air pollution, increase in predators, agriculture, urban development and the consequences of human intrusion into previously undisturbed habitats: hunting, use of rodenticides and other poisons, road kills, trapping, and human disturbance.

Approximately 63,000 acres of habitat, of which a large portion may be suitable for American badger and desert kit fox foraging or denning habitat, would be displaced by proposed future projects within the greater region of the project. This cumulative effect, when combined with the anticipated indirect effects to remaining habitat and populations described above, is cumulatively considerable. The project's contribution to the loss of habitat, increased noise and lighting, road kills, fragmentation, and the spread of invasive pest plants is cumulatively considerable. However, the project's contribution to these effects would be reduced to a level less than cumulatively considerable through implementation of several conditions of certification designed to address indirect effects as well as habitat loss. These include completion of badger and kit fox specific pre-construction surveys, as well as impact avoidance and minimization measures in **BIO-14**; **BIO-8** (General Impact Avoidance and Minimization Measures) contains specific measures to minimize noise and lighting impacts; **BIO-18** (Weed Management Plan); **BIO-12** to acquire 6,358 acres of desert tortoise habitat, which is expected to contain suitable habitat for badger and kit fox; and **BIO-22**, which requires acquisition and protection of desert washes and adjacent habitat within the local watersheds, which will minimize future fragmentation in the vicinity of the project area by protecting lands from future development.

Eagles and Passerine Birds

An estimated 63,000 acres of habitat for terrestrial and avian species will be lost if the projects listed for the cumulative analysis are constructed. This effect, when combined with the anticipated indirect effects to remaining habitat and populations described above, is cumulatively considerable. The project's contribution to the loss of habitat, increased noise and lighting, road kills, habitat fragmentation, potential to spread of invasive species, and hydrological impacts would be cumulatively considerable. At this time, staff is unable to make determinations of cumulative effects stemming from loss of golden eagle and migratory birds due to operation of the project. Project operation could result in injury or mortality (take) of golden eagle due to exposure to solar flux and or irradiance, and injury or mortality to migratory birds. Staff is expecting further data from the applicant regarding project impacts and feasible mitigation.

The project's contribution to these effects would be reduced through implementation of several conditions of certification designed to address direct and indirect effects as well as habitat loss; however staff observes that residual impacts of project operation are still

expected. These conditions of certification include **BIO-1** through **BIO-8** which requires avoidance and minimization measures during the life of the project, construction monitoring, worker training, fugitive dust control, fire prevention, weed management, and the presence of the designated biologist and/or biological monitors on the project site at all times during ground disturbance or any other construction activity. **BIO-8** also requires transmission lines and all electrical components to be designed, installed, and maintained in accordance with the Avian Power Line Interaction Committee guidelines. **BIO-15** the development of an avian and bat plan. **BIO-16** requires pre-construction monitoring and avoidance for nesting birds. **BIO-23** requires monitoring of ground water to ensure impacts to groundwater-dependent vegetation does not result in habitat degradation for these species. **BIO-23** also requires remedial action if monitoring detects impending ecosystem changes. **BIO-12** directs the acquisition of 6,358 acres of desert tortoise habitat, which is expected to contain suitable habitat for eagles and passerines; and **BIO-22**, which requires acquisition and protection of desert washes and adjacent habitat within the local watersheds, which will minimize future fragmentation in the vicinity of the project area by protecting lands from future development, and also provide high quality habitat for eagles and passerines.

Western Burrowing Owl

The project's contribution to the cumulative loss of burrowing owl habitat is comparable to the cumulative loss of badger and kit fox habitat, described above. The potential loss of habitat from all proposed future projects is significant, and the project's contribution to that effect is cumulatively considerable. The project will also contribute to a cumulatively considerable impact from habitat fragmentation, degradation of groundwater-dependent vegetation, edge effects, noise and lighting, increased road kills, increased risk of fire from weed invasion and increased ignition sources (vehicles), and an increase in avian predators, all of which ultimately degrade the function and values of the remaining habitat. The project's contribution to these indirect effects and loss of habitat would be mitigated to a level less than cumulatively considerable through implementation of **BIO-17** preconstruction surveys, avoidance and minimization measures, and compensatory mitigation; measures for addressing impacts from noise, lighting, and traffic (road kills) through a variety of measures in **BIO-8**; **BIO-18** (Weed Management Plan) to address the project's contribution to the spread of invasive weeds; **BIO-12** for acquisition of 6,358 acres of desert tortoise habitat, which is likely to contain suitable habitat burrowing owls; and **BIO-22** which requires acquisition and protection of desert washes and adjacent habitat within the local watersheds, which will minimize future fragmentation in the greater vicinity of the project by protecting the acquired desert wash habitat from future development.

Special-Status Bats

Approximately 63,000 acres of habitat could be lost to future development, of which portions may be suitable for bat roosting or foraging habitat. The project would not impact any bat roosts, so the project's contribution to the cumulative loss of special-status bat roosting habitat is not considered an issue. However, staff considers the loss of foraging habitat to be cumulatively significant. The project could contribute to a cumulatively considerable impact within the aquifer system underlying the Pahrump Valley. This effect is cumulatively considerable when combined with the anticipated indirect effects to remaining foraging habitat and bat populations. These indirect effects

include fragment habitat, degrade groundwater-dependent vegetation, increase competition for remaining food and roost sources, promote weeds and habitat degradation, and change in insect abundance. Operational impacts of the proposed project may also be cumulatively significant when considered with solar and wind development.

The project's contribution to these impacts and loss of habitat would be mitigated to a level less than cumulatively considerable through **WATER SUPPLY-4** (Groundwater Elevation Monitoring) and **BIO-23** (Groundwater-dependent Vegetation Monitoring Plan), which ensure groundwater pumping would minimize potential impacts to groundwater-dependent ecosystems, including springs; **BIO-18** (Weed Management Plan) which will address the project's contribution to the spread of invasive weeds; and **BIO-22** which requires acquisition and protection of desert washes and adjacent habitat within the local watersheds, which could preserve important foraging and roosting habitat.

Cumulative Impacts – Special-status Plants

The geographic scope of the analysis of cumulative effects to special-status plants encompasses the range of the affected species in California, and portions of the local population that extend into Nevada. The qualitative assessment was based on a review of the project's offsite survey data, databases, literature, and consultation with regional experts.

In addition to the project's contribution to the reduction and fragmentation of local populations from construction, the project also contributes to the cumulative, interactive, and synergistic impacts of multiple indirect threats from a variety of sources, including past, present, and future urban development, agriculture (crop lands), grazing, roads and other infrastructure development.

Past and present projects in Pahrump Valley and adjacent valleys that may have contributed to cumulative impacts to special-status plants found in the project study area include:

- Conversion of natural communities for agriculture and groundwater pumping for irrigated agriculture (mostly cotton and alfalfa) during the last century, fragmenting and isolating populations; altering surface drainage patterns (dispersal pathways), surface and groundwater hydrology, introducing agricultural weeds into the local ecosystem;
- Past and present residential, commercial, and industrial development in the Pahrump environs, including the Charleston View subdivision, fragmenting populations, increasing the risk of fire, ORV, and the spread of invasive plants;
- Construction of highways and other roads, modifying surface runoff patterns and acting as vectors for the spread of invasive plants;
- Transmission corridors, another common vector for weed spread; and
- BLM grazing allotments (sheep and cattle grazing), which also contributed to the spread of invasive weeds, particularly red brome and cheat grass.

Reasonably foreseeable future actions that are expected to contribute to cumulative impacts to special-status plants:

- Pahrump Valley General Aviation Airport
- Element Power Solar project
- PSI Amargosa (Pacific Solar) PV project
- Sandy Valley Solar project (a BrightSource Energy project)
- St. Therese Mission (a commercial facility)
- Urban expansion in the Pahrump Valley and Sandy Valley areas;
- HHSEGS Hidden Hills Valley Electric Transmission Project;
- Infrastructure development associated with urban expansion and renewable energy development

These future projects are expected to combine with the project's effects of fragmentation and isolation of populations, introduction and spread of invasive weeds, increased risk of fire, altered surface drainage patterns, and the interruption of dispersal pathways. The BLM Nevada botanist confirmed the projects listed above would have a cumulatively significant impact of the Nevada rare species Pahrump Valley buckwheat and Nye milk-vetch (Edwards pers. comm. 2012).

Large reserves of BLM or National Park Service wilderness lands in the project vicinity are not expected to contain occurrences of the special-status plants found in the project area, or to buffer or minimize cumulative effects. The wilderness areas are drawn around local mountain ranges and do not include the basin habitats known to support these species.

Where BLM lands in Pahrump and adjacent valleys do contain suitable habitat for the affected species, the lands outside ACECs have a multiple use management designation that limits the ability of the agency to protect the occurrences, in perpetuity, from renewable energy development or other authorized mixed uses.

Any quantitative analyses of the extent of a species known macro-habitat should not be misconstrued to conclude that the habitat is potentially occupied by special-status; plants are sessile organisms with very specific microhabitat requirements that are not well understood. The failure to find many new occurrences of most of the affected species after two years of focused offsite surveys is a testament to their rarity. The actual distribution of rare plants within their general habitat preferences is typically confined to small, scattered and infrequent occurrences within an already restricted range. Alternately, rare plants can also sometimes be locally abundant, but highly restricted in their range, such as Pahrump Valley buckwheat.

The most significant of cumulative effects to special-status plants in the region include: fragmentation and isolation of populations; introduction and spread of weeds; increased risk of fire; and fires of greater intensity and ecological damage from the increase and spread of annual grasses.

Staff considered the mitigated effect of the project after implementation of conditions of certification **BIO-19** (Special-status Plant Avoidance & Minimization Measures) and **BIO-20** (Special-status Plant Compensatory Mitigation). No monitoring or management of adjacent offsite special-status plant occurrences is proposed because adjacent lands are not owned or accessible to the project. Nor can the project manage any weeds that may have spread to offsite occurrences or been introduced into the vicinity on the contaminated vehicles and equipment of employees and contractors. Avoidance and minimization measures included in **BIO-19** will minimize the project's impacts to occurrences immediately adjacent to the project boundary. However, without monitoring and adaptive management of project-related weed occurrences offsite, fire prevention measures, and compensatory mitigation at ratios adequate to address the net loss of occurrences the project effects – although individually minor – are cumulatively considerable, when viewed in connection with the similar effects of past, present, and foreseeable future projects in the Pahrump Valley environs. These residual effects would be addressed with the addition of the following fire prevention measures:

- **BIO-20** (Special-status Plant Compensatory Mitigation) - requires mitigation at ratios greater than 1:1 to address the net loss of occurrences and the project's contribution to fragmentation of affected species;

- **BIO-6** (Worker Environmental Awareness Program) – measures added to ensure worker awareness of special-status plants, weeds, and fire;

- **BIO-18** (Weed Management Plan) – fire prevention measures added, including prohibiting the use of mowers and other mechanical methods of weed control during periods of high fire risk, requiring mowing be conducted during the early morning (low risk) hours, prohibiting disking (which increases weeds and thus the flammability of vegetation), and requiring basic fire prevention measures during mowing (contact information for fire personnel, a live water supply, shovels and extinguishers);

- **BIO-8** (Avoidance and Minimization Measures) – measures added for minimizing weed vectors and fire ignition sources.

    - Because washes are important dispersal pathways for rare plants, additional measures were added to **BIO-22** (State Waters Compensatory Mitigation and Avoidance & Minimization Measures) for minimizing the effects of erosion and sedimentation downstream or offsite and minimizing alteration of geomorphic and hydrologic functions downstream.

    - Conditions of certification **BIO-7** (BRMIMP) and a new condition, **BIO-21** (Qualified Botanist) will ensure the full and timely implementation of the measures described above under the supervision of a qualified botanist or vegetation ecologist.

Cumulative Impacts – Introduction and Spread of Invasive weeds

Nearly all of the past and present urban and agricultural development has occurred in northern Pahrump Valley; however, past grazing and other smaller residential and agricultural operations have impacted the southern Pahrump Valley. Transmission

corridors, railroads, paved and unpaved roads, and off-road vehicle routes are particularly effective as conduits for the spread of weeds, and these features have in the past and continue to spread weeds throughout the region.

Past and present projects or actions in the area between Pahrump Valley, Las Vegas, the project site, and Death Valley National Park that have contributed to the cumulative spread of invasive weeds include:

- Livestock grazing in Pahrump and adjacent valleys during the last and prior centuries, which introduced weeds on contaminated feed and animals, and established by overgrazing and poorly timed grazing, which favors weeds over native species;
- Construction and operation of highways 160, 178, 127, and 190 and associated local and interstate travel between Death Valley National Park, Pahrump, and Las Vegas; transportation routes are major vectors for long-distance dispersal of invasive plants;
- Tecopa Railroad and other area railroads from the late 19th and early 20th century fostered invasions for many weedy species, such as cheat grass and Russian thistle (Brooks & Pyke 2002);
- Residential development in Pahrump and Charleston View has caused a general increase in vehicle traffic, which facilitates the spread of weeds. Area residential development also promotes increased off-road vehicle use, which in turn introduces weeds into previously uninfested areas. The increase in weeds, particularly annual grasses, increases the frequency of fire, which in turn promotes further habitat conversions to weed-dominated habitats;
- Construction and maintenance of gas and electric transmission corridors are major vectors for the past, present and continued spread of invasive plants;
- Excessive groundwater pumping in Pahrump Valley for irrigated agriculture (mostly cotton and alfalfa) during the last century significantly lowered the basin groundwater table, and lowering groundwater favors the establishment of salt cedar over native mesquite in riparian areas.

Reasonably foreseeable future actions that are expected to contribute to cumulative spread of invasive weeds:

- Pahrump Valley General Aviation Airport, and the associated soil disturbance and increase in vehicle traffic;
- Element Power Solar project and its concomitant construction-related soil disturbance, particularly along linears, and increase in vehicle traffic;
- Pacific Solar project, construction-related soil disturbance, construction and maintenance of linears, and increase in vehicle traffic;
- Sandy Valley Solar project, construction-related soil disturbance, construction and maintenance of linears, and a corresponding increase in vehicle traffic;
- St. Therese Mission (a commercial facility), associated soil disturbance and increase in vehicle traffic;

- Urban expansion in the Pahrump Valley and Sandy Valley areas, associated soil disturbance, ORV, increased risk of fire and construction-related soil disturbance, and significant increase in vehicle traffic, which facilitates the spread of weeds on infected tires and undercarriage;
- Hidden Hills Valley Electric Transmission Project; and
- Infrastructure development and improvements associated with urban expansion and other renewable energy development; transmission and other corridors are major vectors.

The past, present, and foreseeable future projects listed above combine with the project's contribution to the spread of weeds and contribute to a cumulatively considerable effect. The effects of weeds are insidious and synergistic, and affect not only biological resources but also recreational and agricultural resources, and public safety. Invasive species rank second only to habitat destruction in causing species endangerment across the United States (Brooks & Pyke 2002).

Staff considered the mitigated effect of the project after implementation of **BIO-18** (Weed Management Plan). The Inyo-Mono County Agricultural Commissioner expressed particular concern – in comment letters and public workshops -- about the high potential for the employee commuter traffic and contractors to introduce new and virulent weed species into the area from the communities of Pahrump and Las Vegas. Because the project cannot monitor project-related increases in weeds along roads off the project site**, BIO-18** includes a requirement to pay a fee, as requested by Agricultural Commissioner, for increased monitoring and abatement costs.

Under Section 5421 of the California Food and Agriculture Code, the State, through its agricultural commissioner's, has the authority to require eradication or control. Under Section 5430 "…the amount which is incurred or expended by the county in the abatement is a lien on the land against which the expense is chargeable."

Other indirect effects that are individually minor but cumulatively considerable include an increased risk of fire from the proliferation of weeds onsite and along area roads from the increased traffic and increase in ignition sources. These effects would be addressed with the addition of fire prevention measures in **BIO-8** (General Avoidance and Minimization Measures), **BIO-6** (Worker Environmental Awareness Program), and **BIO-18. BIO-21** (Qualified Botanist) requires the weed plan be prepared by a qualified botanist or vegetation ecologist. With implementation of these additional measures, the project's contribution to these cumulative effects would be less than cumulatively considerable.

Cumulative Impacts – Groundwater-dependent Ecosystems

Prior to agricultural and urban development in southern Nevada, the distribution of mesquite and acacia woodlands was much greater; the Las Vegas Valley was a 3 mile by 12 mile expanse of mesquite and acacia woodlands when the first Europeans settled here (Paher 1971). The Virgin, Muddy, and Colorado rivers are also believed to have supported more extensive and denser stands of mesquite (Crampton et al. 2006).

The *Manual of California Vegetation* (Sawyer et al. 2009) reports that groundwater pumping in California is "a serious threat in many locations and has led to the decline of numerous stands." Sawyer et al. (2009) also report that the invasive salt cedar has invaded stands along much of the Colorado River, and other rivers and desert wetlands in California; salt cedar invasion is a common sight along hydrologically altered streams.

Firewood cutting has decimated many stands of mesquite in its range in California and Nevada (Sawyer et al. 2009; Crampton et al. 2006). Most firewood cutting has occurred near urban areas. In the California Mojave Desert region, the most extensive stands of mesquite remaining today are reported at Tecopa (Sawyer et al. 2006), approximately 20 miles west of the Nopah Range.

The most severe future threats to mesquite habitats are urbanization and water development/management, and, to a lesser degree, exotic plants, fire, and conversion to agriculture (Crampton et al. 2006).

As Nevada's most heavily allocated groundwater basin, Pahrump Valley has seen its population increase exponentially over the past 30 years. Data obtained from the Nevada Division of Water Resources (NVDWR) by Comartin (2010) demonstrate that annual pumping has continuously exceeded this sustainable basin yield estimate for over 50 years resulting in considerable water level declines.

The vast majority of the population growth has been in the Nye County, Nevada portion of the valley; the California portion remains sparsely populated. Until recently, there has been relatively little pumping in the southern portion of the valley near Stump Spring, but the recent push for renewable energy development has placed these important resources at risk. Declining groundwater elevations today are seen as far south as Stump Spring; however, the decline is greatest in the northern part of the valley. Mesquite stands closest to Pahrump are in obvious decline from lowering water tables but the well at Stump Spring has shown a steady background decline of approximately 0.3 feet per year.

Pahrump Valley currently has the highest density of domestic wells (approximately 11,000) in Nevada, and consequently is the most over-allocated groundwater basin in the state. The majority of domestic wells are drilled at an interval between 140 and 160 feet below land surface (Buqo 2006) and are vulnerable to substantial water table declines (Comartin 2010). Although extraction rates have steadily decreased since the late 1960s, current pumping rates of approximately 24,000 ac-ft/yr still significantly exceed the sustainable basin yield estimate of 19,000 ac-ft/yr estimated by Harrill (1986). If the population increases to the projected 50,000 residents by 2050 (Buqo 2006), the depletion of Pahrump Valley groundwater resources will continue.

The cumulative effect of urban growth in Pahrump, Nevada, where water rights are dangerously over-appropriated, and in California, where they are essentially unregulated; appropriated rights in Pahrump are 5 times greater than the basins' perennial groundwater yield. Compounding the impacts of over-appropriation, there is no single, coordinated groundwater management entity to ensure that future development on both sides of the bi-state basin will be sensitive to the groundwater

needs of the mesquite habitats and other groundwater-dependent plant and wildlife resources.

The strain placed on the Pahrump Valley groundwater system through unsustainable extraction rates throughout the valley threatens the future viability of the entire Pahrump Valley Metapatch of mesquite woodlands and coppice dunes.

Past and present impacts in Pahrump Valley groundwater basin that have already contributed to water table declines and impacts to area springs and mesquite habitats include:

- Groundwater pumping for irrigated agricultural operations during the last century (mostly cotton and alfalfa);
- Past and present groundwater pumping for residential, commercial, and industrial development in the Pahrump environs; and
- Construction of highways and other roads that modify the hydrologic balance of an area through increases in impermeable surfaces and modifications of surface runoff patterns.

The southern portion of the basin, where the project is located, has experienced very little of the past and present groundwater pumping for agricultural and urban uses. Declines in the northern portion of the basin are significantly greater than declines experienced in the southern portion, to date. Nevertheless, declines in water levels at the springs east of the project parallel the declines throughout the northern portion of the basin.

Reasonably foreseeable future actions in the southern portion of the Pahrump groundwater basin that were are expected to combine with the project's effects on area springs and mesquite habitats, or considered in the analysis, include:

- Pahrump Valley General Aviation Airport – acre feet/year (afy) groundwater use unknown
- PSI Amargosa PV Project – 0 afy
- Sandy Valley (BrightSource Energy Solar Partners) – 170 afy
- Element Power PV Solar Project – 5-7 afy
- St. Therese Mission (a commercial facility)– afy groundwater use unknown
- Climate change is expected to exacerbate already declining water levels and increase the demand for groundwater in the local basin.

The past, present, and foreseeable future projects listed above would combine with the project's contribution to the loss or degradation of remaining mesquite woodland ecosystems and their dependent common and special-status species – and contribute to a significant cumulative effect.

Although there is potential that the impact at Stump Spring ACEC could be individually minor, even seemingly minor impacts can be cumulatively considerable if they affect an extremely rare or ecologically significant resource.

WATER SUPPLY Figure 22 shows that the potential cumulative water level decline at Stump Springs could be greater than 60 feet. Although the sandy valley project is the primary contributor, the project nevertheless contributes to a cumulatively significant impact. The potential for the fault zone to buffer the project impacts to Stump Springs is speculative; monitoring wells across the fault zone would be required to assess the project's contribution to this effect. Fault zones more typically provide a partial – not complete – barrier to groundwater flow (Belcher pers. comm.; Comartin 2010).

Regarding a drawdown impact from cumulative pumping on the Amargosa River, the Water Supply analysis concluded there is inadequate information available to quantify the hydraulic connection between the basin and river. Given the lack of evidence for a hydraulic connection, the relatively large intervening distance (about 20 miles), uncertainty in potential flow barriers, permeability contrasts within the subsurface, and the presence of the fault zone which would isolate pumping effects from the Sandy Valley site, staff concluded that a significant cumulative impact at the Amargosa River due to project pumping is unlikely. However, **WATER SUPPLY-1** which requires an offset of project water use in the local groundwater basin would ensure there is likely no net cumulative overall change in subsurface outflow from the PVGB that might affect the Amargosa River.

Although there is potential that the impact at Stump Spring ACEC could be individually minor, even seemingly minor impacts can be cumulatively considerable if they affect an extremely rare or ecologically significant resource.

Given the cumulative concerns described above, combined with the limited quantity and reliability of the data, and the ecological significance and sensitivity of the resources at risk, a conservative approach must be applied that combines long-term groundwater elevation monitoring and monitoring the health of the mesquite, with clear and detailed triggers for adaptive action if impending impacts are detected.

Long-term vegetation monitoring data are capable of providing early warning signs of impending changes in ecosystem processes (Patten et al. 2007). Combined with the data on groundwater and climate, sampling of vegetation responses can provide sensitive metrics for assessing ecological changes over time. However, to ensure that the information is appropriate for management, it is important that monitoring and analysis be designed to test for magnitudes of changes rather than just existence of change, a phenomenon that can occur under disturbance or non-disturbance conditions.

Staff consulted local and regional experts in groundwater hydrology, the impacts of groundwater pumping on dependent resources, and sampling and monitoring plant populations and prepared a peer-reviewed condition of certification (**BIO-23**) that would ensure the project's effects are rendered less than cumulatively considerable.

Conditions of certification **BIO-23** (Groundwater-dependent Vegetation Monitoring) and **WATER SUPPLY-4** (Groundwater Level Monitoring) would minimize the project's contribution to cumulative impacts to Stump Springs and other groundwater-dependent resources in the local basin.

Under **BIO-23**, if water level monitoring, as described in WATER SUPPLY-4, identifies a 0.5 foot or greater water level decline at the property boundary due to project pumping, the project owner shall cease pumping. Pumping cannot resume unless the project provides evidence, subject to review and approval by the CPM and interested agencies, that either: 1) the pumping can be reduced or modified to maintain groundwater levels above the 0.5 ft. drawdown threshold at the project boundary; 2) the drawdown trigger was exceeded due to factors other than the project pumping and the project did not contribute to the drawdown; or 3) through vegetation monitoring and soil coring described in the condition, and predictive hydrologic trend analysis described in **WATER SUPPLY-4**, a greater groundwater drawdown will not result in adverse impacts to the groundwater-dependent vegetation from which it cannot recover fully in one season.

A full range of mitigation options was considered; these are discussed in detail under "Impacts to Groundwater-dependent Ecosystems" subsection of this FSA section, including the rationale for the proposed and the rejected mitigation options.

Cumulative Impacts – Desert Washes

The geographic scope for the analysis of cumulative impacts to desert washes encompassed the Pahrump Valley watershed. Pahrump Valley Playa, located 3 miles northwest of the project, is the receiving basin for the desert washes that drain the watershed. The desert washes that cross the project site are alluvial fan distributary channels that drain the western flank of the Spring Mountains in Nevada.

Although the project would attempt to maintain existing surface drainage, rather than divert the runoff around the project perimeter, staff considers the perimeter exclusion fencing, and regular vegetation mowing and spraying and road construction and maintenance, and human activity to be a significant impact to the habitat functions and value of the streams.

Past and present projects in Pahrump Valley and adjacent valleys that have contributed to cumulative impacts to desert washes include:

- Conversion of basin and alluvial fan habitats for agriculture during the last century, which lowered groundwater tables and dried springs and spring channels and affected the base flows of spring-fed streams, and spread the highly invasive salt cedar into riparian areas and degraded habitat quality;
- Past and present residential, commercial, and industrial development in the Pahrump Valley watershed, which fragmented stream habitat, diverted flows and altered surface and groundwater hydrology, increased the risk of fire in riparian areas, increased ORV and the spread of invasive plants along washes, and increased erosion and sedimentation; and

- Construction of highways and other roads, modifying surface runoff patterns and acting as vectors for the spread of invasive plants;

Reasonably foreseeable future actions that are expected to contribute to cumulative impacts to desert washes:

- Pahrump Valley General Aviation Airport
- Element Power Solar project
- Pacific Solar project
- Sandy Valley Solar project
- St. Therese Mission (a commercial facility)
- Urban expansion in the Pahrump Valley and Sandy Valley areas
- Infrastructure development associated with urban expansion and renewable energy development (paved and unpaved maintenance roads, transmission lines (gas and electric, underground and overhead)

The effects of these past, present, and foreseeable future projects combine with the project's effects and contribute to a significant cumulative effect on desert washes in the local watershed, particularly on the habitat functions and value of the washes. Desert washes are also important dispersal pathways for the seed of common and special-status plants, and where the habitat is distinct from the adjacent uplands in composition, density, or structure, they may provide important habitat values that are not present in the adjacent uplands.

Staff considered the mitigated effect of the project after implementation of **BIO-22** (compensatory mitigation for state waters) and added additional avoidance and minimization measures for protecting adjacent offsite washes near construction, and design guidelines for road crossings and discharge points to minimize erosion and sedimentation, and included measures in **BIO-18** (Weed Management Plan) to prohibit the use of herbicides that could be harmful to wildlife using adjacent washes. Further loss and/or fragmentation of remaining washes in the basin would be minimized through acquisition and preservation of washes within the local watershed and at a ratio of 2:1, and restoration of degraded washes as described in **BIO-22** (compensatory mitigation and avoidance and minimization measures for state waters), **BIO-7** (monitoring and reporting requirements), **BIO-8** (Impact Avoidance and Minimization Measures), **BIO-21** (Designated Botanist), **BIO-2** (Designated Biologist), and **BIO-4** (Designated Biological Monitor) will ensure that these mitigation measures are fully implemented.

CUMULATIVE IMPACTS - SUMMARY OF CONCLUSIONS

Construction and operation of the proposed project will have effects on a number of biological resources that are individually limited but cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects. However, cumulative impact assessments cannot conclude that contributions to cumulative impacts are not

significant merely because the contributions represent a small percentage of the overall problem.

The project's contribution to significant cumulative effects to listed species and sensitive wildlife such as the desert tortoise are not cumulatively considerable after the implementation of conditions of certification intended to minimize or fully mitigate those impacts. For desert tortoise these include construction and minimization measures (**BIO-8**), clearance surveys and exclusion fencing (**BIO-9**), preparation and implementation of a translocation plan (**BIO-10**), acquisition and conservation of compensation lands (**BIO-12**), and preparation and implementation of a plan to control ravens (**BIO-13**).

The project's contribution to desert kit fox, American badger, bats, and Nelsons bighorn sheep are cumulatively considerable but mitigated by the implementation of conditions of certification **BIO-8** (General Impact Avoidance and Minimization Measures), **BIO-14** which requires the development of a management plan for kit fox and American badger, **BIO-18** (Weed Management Plan); **BIO-12** for acquisition of 6,358 acres of desert tortoise habitat, which is expected to contain suitable habitat for badger and kit fox and dispersal habitat for bighorn sheep; and **BIO-22**, which requires acquisition and protection of desert washes and adjacent habitat within the local watersheds.

The HHSEGS project's contribution to significant cumulative effects to migratory birds and golden eagles is cumulatively considerable when combined with the anticipated indirect effects to remaining habitat and populations. The project's contribution to the loss of habitat, increased noise and lighting, road kills, habitat fragmentation, potential to spread of invasive species, and hydrological impacts is cumulatively considerable. Staff considers the cumulative effects stemming from the loss of golden eagle and migratory birds that may occur due to operation of the project to be cumulatively considerable even with the implementation of proposed Conditions of Certification. The following impact avoidance, minimization, and mitigation Conditions would address the project's contribution to many of the significant cumulative impacts described above: **BIO-16**, a nesting bird management plan, **BIO-8** (Impact Avoidance and Best Management Practices), and **BIO-16** (Pre-construction Nest Surveys).

The project's incremental contribution to cumulatively significant impacts to other wildlife, desert washes, and groundwater-dependent ecosystems is cumulatively considerable. Conditions of certification **BIO-1** through **BIO-26** contain measures for avoiding, minimizing, and compensating for direct and indirect impacts. Funding mechanisms, worker environmental compliance training, mitigation monitoring and reporting, and requirements for designated biologists, monitors, and a designated botanist will ensure accountability and full implementation of conditions. Staff assessed the mitigated effect and considered whether new mitigation measures were needed to address any residual effects. New conditions of certification were added, and other conditions strengthened to ensure that the project's contributions to these significant cumulative impacts are less than cumulatively considerable.

COMPLIANCE WITH LORS

The proposed project must comply with state and federal LORS that address state and federally listed species, as well as other sensitive species and their habitats. Applicable LORS are presented in **BIOLOGICAL RESOURCES Table 1**.

STATE LORS

Under the Warren-Alquist Act (Pub. Resources Code § 25500) the Energy Commission's certificate for thermal power plants 50 MW and more is "in lieu of" other state, local, and regional permits (*ibid*.). All required terms and conditions that might otherwise be included in state permits are incorporated into the Energy Commission's certificate or license. When conditions of certification are finalized in the FSA, staff expects the proposed mitigation measures would satisfy the following state LORS and take the place of terms and conditions that, but for the Commission's exclusive authority, would be addressed for the following LORS and state permits:

Incidental Take Permit: California Endangered Species Act (Fish and Game Code §§ 2050 et seq.). The California Endangered Species Act (CESA) prohibits the "take" (defined as "to hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill"") of state-listed species except as otherwise provided in state law. Construction and operation of the proposed project would result in the take of desert tortoise, listed as threatened under CESA. No other state-listed species would be affected by the project. Condition of Certification **BIO-12** specifies compensatory mitigation for desert tortoise habitat loss. Ratios proposed by staff include 1:1 for areas dominated by shadscale scrub and 3:1 for areas dominated by Mojave Desert scrub. In total compensatory mitigation would require the acquisition and preservation of approximately 6,358 acres of desert tortoise habitat. Avoidance and minimization measures described in conditions of certification **BIO-6** through **BIO-10**, **BIO-12**, and **BIO-13 (**Raven Management Plan) would also mitigate for potential impacts to desert tortoise. **BIO-9** and **BIO-10** require the applicant to fence the project site and translocate tortoise from the project site prior to construction. Conditions of certification **BIO-1** through **BIO-5** for a Designated Biologist and Biological Monitor, **BIO-6** (Worker Environmental Awareness Program) and **BIO-7** (Biological Resources Mitigation Implementation and Monitoring Plan) would ensure timely and thorough compliance under the supervision of qualified biologists. Implementation of these conditions of certification would ensure compliance with CESA.

Streambed Alteration Agreement: California Fish and Game Code §§ 1600-1607. Pursuant to these sections, CDFG typically regulates all changes to the natural flow, bed, or bank, of any river, stream, or lake that supports fish or wildlife resources. Construction and operation of the project would result in direct impacts to approximately 23.21 acres of jurisdictional state waters, and indirect impacts to 4.51 acres, according to the applicant's delineation. Condition of Certification **BIO-22** specifies compensatory mitigation for the loss of state waters at a ratio of 2:1. The compensatory mitigation requirements and avoidance and minimization measures in **BIO-22** would minimize and offset direct and indirect impacts to state waters, and would assure compliance with California Fish and Game Code that provides protection to these waters and their associated riparian vegetation.

Protected furbearing mammals (California Code of Regulations, Title 14, Section 460). This regulation specifies that fisher, marten, river otter, desert kit fox and red fox may not be taken at any time. Condition of Certification **BIO-14** (American Badger and Kit Fox Management Plan) requires the development of a management plan to safely exclude animals from the project site and ensure compliance with the California Fish and Game Code that provides protection to these species. The California Department of Fish and Game (CDFG) does not issue Incidental Take Permits or Memoranda of Understanding to permit the capture or handling of desert kit fox.

Fully Protected Species (Fish and Game Code, sections 3511, 4700, 5050, and 5515). Designates certain species as fully protected and prohibits the take of such species or their habitat unless for scientific purposes (see also California Code of Regulations Title 14, section 670.7). Golden eagle and bighorn sheep are fully protected species that occur in the project area. Condition of Certification **BIO-15** requires the completion of Avian, Bat, and Golden Eagle Protection Plans, and **BIO-16** (Pre-construction Nesting Bird Surveys) will avoid direct take of golden eagles during construction. Staff notes that these conditions will not ensure full protection of golden eagles during project operations. Condition **BIO-15** requires mitigation should a golden eagle be taken by the project, however, any take of golden eagles even if mitigated as required under CEQA, could violate the state Fish and Game Code due to the both species' status as migratory birds and fully protected species. To mitigate for lost habitat, **BIO-12** (Desert Tortoise Compensatory Mitigation) will ensure the preservation and management of large areas of natural lands. Bighorn sheep are not expected to be taken during project construction and impacts to this species would be mitigated through the implementation of avoidance and minimization measures identified in conditions of certification **BIO-1** through **BIO-8**.

Nelson's bighorn sheep (Fish and Game Code section 4902). Regulates adoption of sound biological management practices, included sport hunting, of the Nelson's bighorn sheep. Bighorn sheep are not expected to be taken during project construction and impacts to this species would be mitigated and compliance achieved through the implementation of avoidance and minimization measures identified in conditions of certification **BIO-1** through **BIO-8**.

Nest or Eggs (Fish and Game Code section 3503). This regulation protects California's birds by making it unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Implementation of conditions of certification **BIO-8** (Impact Avoidance and Best Management Practices) and **BIO-16** (Pre-construction Nest Surveys) would ensure the project complies with regulations that protect nesting birds and their nests.

Birds of Prey (Fish and Game Code section 3503.5.) This regulation identifies that it is unlawful to take, possess, or destroy any birds in the orders Falconiformes and Strigiformes or to take, possess, or destroy the nest or eggs of any such bird. Implementation of conditions of certification **BIO-8** (Impact Avoidance and Best Management Practices) and **BIO-16** (Pre-construction Nest Surveys) would ensure the project complies with regulations that protect nesting birds and their nests.

Migratory Birds (Fish and Game Code section 3513). This regulation protects California's migratory birds by making it unlawful to take or possess any migratory nongame bird as designated in the Migratory Bird Treaty Act or any part of such migratory nongame birds. Implementation of conditions of certification **BIO-8** (Impact Avoidance and Best Management Practices) and **BIO-16** (Pre-construction Nest Surveys) would ensure the project complies with regulations that protect nesting birds and their nests. Condition of Certification **BIO-15** requires development of Avian, Bat, and Golden Eagle Protection Plans, however, no feasible mitigation to avoid operational impacts of the project is available. **Nongame mammals (Fish and Game Code section 4150).** This regulation makes it unlawful to take or possess any non-game mammal or parts thereof except as provided in the Fish and Game Code or in accordance with regulations adopted by the California Fish and Game Commission. Implementation of conditions of certification **BIO-8** (Impact Avoidance and Best Management Practices) would ensure the project complies with regulations that protect nongame animals.

Migratory Birds (Fish and Game Code section 355-357). The Fish and Game Commission may, annually, adopt regulations pertaining to migratory birds to conform with or to further restrict the rules and regulations prescribed pursuant to the Migratory Bird Treaty Act. Implementation of conditions of certification **BIO-8** (Impact Avoidance and Best Management Practices) and **BIO-16** (Pre-construction Nest Surveys) would ensure the project complies with regulations that protect migratory birds.

California Native Plant Protection Act of 1977 (Fish and Game Code section 1900 and following) designates state rare, threatened, and endangered plants. No state listed Rare, Threatened, or Endangered plant species occur on the project site or would be indirectly affected by the project construction or operation. Implementation of conditions of certification **BIO-8** (Impact Avoidance and Best Management Practices), **BIO-18** (Weed management Plan), **BIO-19** (Special-Status Plant Impact Avoidance and Minimization), and **BIO-20** (Special-Status Plant Compensatory Mitigation) would ensure the project complies with regulations that protect native plants.

California Desert Native Plants Act of 1981 (Food and Agricultural Code section 80001 and following and California Fish and Game Code sections 1925-1926) protects non-listed California desert native plants from unlawful harvesting on both public and private lands in Imperial, Inyo, Kern, Los Angeles, Mono, Riverside, San Bernardino, and San Diego counties. Unless issued a valid permit, wood receipt, tag, and seal by the commissioner or sheriff, harvesting, transporting, selling, or possessing specific desert plants is prohibited. The Inyo-Mono Counties Agricultural Commissioner would issue a permit to the project owner for the removal of three common cactus species that occur within the project boundaries. Condition of Certification **BIO-7** (Biological Resources Mitigation Implementation & Monitoring Plan) requires the applicant provide a copy of all state and federal permits.

Porter-Cologne Water Quality Control Act. This act is administered by the state regional water quality control boards (RWQCB), which regulates discharges of waste and fill material to waters of the State, including "isolated" waters and wetlands. For

projects under the jurisdiction of the Energy Commission, applicants file a waste discharge report to the RWQCB, who then issues waste discharge requirements (WDRs) for inclusion in the Energy Commission's license. For HHSEGS, the Lahontan RWQCB will issue the WDRs, which will be incorporated into the Condition of Certification **BIO-7** (Biological Resources Mitigation Implementation & Monitoring Plan), which requires the project owner provide a copy of all state and federal permits and implement all provisions of those permits ensure compliance with the Porter-Cologne Water Quality Control Act. These WDRs have yet to be issued. The Lahontan RWQCB will separately issue a Clean Water Act Section 401 Water Quality certification for the project.

FEDERAL LORS

The project is located on private lands and is therefore not subject to the provisions of BLM's California Desert Conservation Area (CDCA) Plan or the Northern and Eastern Mojave Desert Management Plan (NEMO). Staff considered the following federal LORS and the management direction of the designations described below:

Areas of Critical Environmental Concern (ACEC) are specific, legally defined, BLM designations where special management is needed to protect and prevent irreparable damage to important historical, cultural, scenic values, fish and wildlife, and natural resources or to protect life and safety from natural hazards. The project is not included within any designated ACEC; the potential for indirect impacts to biological resources and groundwater resources of the Stump Spring ACEC from project groundwater pumping were assessed.

To avoid adverse impacts to the ACEC, conditions of certification **WATER SUPPLY-4** and **BIO-23** require monitoring of the response of groundwater and dependent vegetation to project pumping for the life of the project. If water level monitoring, as described in **WATER SUPPLY-4**, identifies a 0.5 foot or greater water level decline at the property boundary due to project pumping, the project owner shall cease pumping. Pumping cannot resume unless the project provides evidence, subject to review and approval by the CPM, in consultation with BLM and Inyo County water Department, that either: 1) the pumping can be reduced or modified to maintain groundwater levels above the 0.5 ft. drawdown threshold at the project boundary; 2) the drawdown trigger was exceeded due to factors other than the project pumping and the project did not contribute to the drawdown; or 3) through vegetation monitoring and soil coring described in this condition, and predictive hydrologic trend analysis described in **WATER SUPPLY-4**, a greater groundwater drawdown will not result in impacts to the mesquite.

Critical Habitat consists of specific areas defined by the USFWS as areas essential for the conservation of the listed species, which support physical and biological features essential for survival and that may require special management considerations or protection. The project would not result in direct or indirect impacts to critical habitat for any federal listed species.

Endangered Species Act (ESA; 16 USC Section 1531 et seq.). Potential take of the desert tortoise or its habitat, listed as threatened by the USFWS, requires compliance with the federal Endangered Species Act (ESA) (16 USC §§ 1531 et

seq.). No other federal-listed species would be affected by the project. “Take” of a federally listed species is prohibited without an Incidental Take Permit, which would be obtained through a Section 7 consultation between BLM and the USFWS. The applicant will submit a Draft Biological Assessment (BA) for the project to BLM, and when BLM has reviewed and made appropriate revisions to the draft BA it will be submitted to the USFWS so that the formal Section 7 consultation process can be initiated. A draft BA is not yet available for review. Implementation of the conditions of certification **BIO-1** through **BIO-10**, **BIO-12**, and **BIO-13**, summarized above, would ensure compliance with the federal ESA. When available, a copy of the BO would be required (**BIO-7**).

Bald and Golden Eagle Protection Act (Title 16, United States Code, Sections 668-668c) A recently issued Final Rule (September 2009) provides for a regulatory mechanism under the Bald and Golden Eagle Protection Act (Eagle Act) to permit take of bald or golden eagles comparable to incidental take permits under the ESA. This rule adds a new section at 50 CFR 22.26 to authorize the issuance of permits to take bald eagles and golden eagles on a limited basis. The proposed project could potentially result in “take” of the golden eagle from the loss of foraging habitat or collision with facility structures. Proposed conditions of certification **BIO-15**, which requires the completion of Avian, Bat, and Golden Eagle Protection Plans and **BIO-16** (Pre-construction Nesting Bird Surveys) will avoid direct take of this species during construction. To mitigate for lost habitat **BIO-12** (Desert Tortoise Compensatory Mitigation) will ensure the preservation and management of large areas of natural lands that would also provide suitable eagle foraging habitat. While acquisition does not address the net loss of foraging habitat in the immediate future, it would reduce future losses of habitat by placing a permanent conservation easement and deed restrictions on private lands. Condition of Certification **BIO-15** will facilitate data collection and advance understanding of project impacts, and requires mitigation for take of golden eagle. The USFWS has encouraged the project owner to apply for an Eagle Conservation Permit, which would permit take of golden eagle.

Migratory Bird Treaty Act (16 U.S.C. §§ 703 et seq.) This law makes it illegal to “pursue, hunt, take capture, or kill” any migratory bird or nest or egg of such bird, except as allowed by permit or regulations. While the project would kill birds, such kill is incidental to a legal commercial activity, and would not likely be considered a violation of the Act if unintentional and consistent with all agency mitigation requirements and recommendations.

Clean Water Act (Title 33, United States Code, sections 1251 through 1376, and Code of Federal Regulations, part 30, section 330.5(a)(26)) Section 404 of the federal Clean Water Act (CWA) requires permitting and monitoring of all discharges to surface water bodies. On March 19, 2012, a new Nationwide Permit (NWP 51) was issued for "Land-Based Renewable Energy Generation Facilities" affecting 1/2 acre or less of non-tidal Waters of the U.S., or 300 linear feet of streambed. In a December 14, 2011 correspondence to the applicant, the Corps verified the applicant’s delineation of Waters of the U.S and determined that only two streams, totaling 0.42 acre, were subject to USACE jurisdiction. Condition of Certification **BIO-22** requires 2:1 compensatory mitigation for the loss of 23.21acres of state

waters, which includes compensation for impacts to 0.42 acres of federal jurisdictional waters. **BIO-22** and issuance of a permit by the Corps will ensure compliance with these provisions of the Clean Water Act. Condition of Certification **BIO-7** (Biological Resources Mitigation Implementation & Monitoring Plan) requires the project owner provide a copy of all state and federal permits and implement all provisions of those permits. In addition, the preservation of lands to mitigate desert tortoise as required by **BIO-12** (Desert Tortoise Compensatory Mitigation) will also preserve desert habitat that may potentially have Waters of the U.S. or influence Waters of the U.S.

LOCAL LORS

Inyo County Renewable Energy Ordinance (Title 21). Title 21 is intended to support, encourage and regulate the development of the County's solar and wind resources while protecting the health, safety and welfare of its citizens and its environment. Specific to biology, Title 21 requires restoration and revegetation of a renewable energy project site once the facility is decommissioned or otherwise ceases to be operational. To ensure the project complies with this local ordinance, staff has recommended **BIO-26** (Facility Closure, Revegetation, and Reclamation Plan).

NOTEWORTHY PUBLIC BENEFITS

The HHSEGS project would result in significant impacts to sensitive biological resources, and would permanently diminish the extent and habitat value of native plant and animal communities in the region. Staff has therefore concluded that the HHSEGS project would not provide any noteworthy public benefits related to biological resources.

FACILITY CLOSURE

When facility closure occurs, whether planned or unexpected, it must be done in such a way as to protect the environment and public health and safety. Inyo County requires that applicants for renewable energy projects prepare a plan for closure, reclamation and revegetation of the site in the event the facility is decommissioned, or ceases to be operational (County Ordinance 1158 § 3, 2010.). Reclamation plans must be site-specific, based upon the character of the surrounding area, characteristics of the property as type of native vegetation, soil type, habitat, climate, water resources, and the existence of public trust resources.

Based on applicant's data response Set 2E (CH2 2012y), applicant acknowledges this local ordinance and confirms its intent to comply with these regulations. Condition of Certification **BIO-26** (Closure, Revegetation, and Reclamation Plan) would ensure the project complies with Inyo County's Title 21. This plan will present the goals and objectives of reclamation of the site, methods of revegetation, success criteria and monitoring to insure all standards are met, and other activities, project owner responsibilities, or and closure requirements of Inyo County Title 21. The **Land Use** section presents further information, including description of funding sufficient for these activities, as required by **LAND-2**. Facility closure mitigation measures would also be included in the BRMIMP prepared by the project owner as required in Condition of Certification **BIO-7.** Staff also notes that per Title 21 (Section 21.20.030), a draft

reclamation plan is required at the time an applicant applies for a renewable energy permit from the County.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Staff received comments on the Biological Resources section of the Preliminary Staff Assessment (**PSA**) from the following parties.

- Inyo County (INYO 2012j)
- Bureau of Land Management (BLM 2012b)
- National Park Service (NPS 2012a)
- The Nature Conservancy (TNC 2012a)
- Amargosa Conservancy (ARM 2012a)
- Basin and Range Watch (BRW 2012b)
- Pahrump Paiute Tribe (PAIU 2012a)
- Richard Arnold, Pahrump Paiute Tribe (PAIU 2012b)
- Big Pine Tribe of Owens Valley (PINE 2012a)
- Intervenor Cindy MacDonald (MAC 2012b)
- Intervenor Center for Biological Diversity (CBD 2012b)
- Intervenor, Old Spanish Trail Association (OSTA 2012c)
- Applicant, BrightSource Energy, Inc. (CH2 2012ee)

Energy Commission staff has summarized these comments and provided responses in **Appendix 1** -- PSA Response to Comments, Biology.

CONCLUSIONS REGARDING LORS COMPLIANCE

With implementation of proposed conditions of certification, the project may comply with most laws, ordinances, regulations, and standards (LORS), and most direct, indirect, and cumulative impacts would be avoided, minimized, or mitigated to less than significant levels. However, even with the implementation of the proposed conditions of certification the project would kill or injure a large number of birds from either collisions with structures (including mirrors) or from solar flux damage. Birds at risk include golden eagles, a species often seen at the site. Should take of golden eagle occur, a federal permit for such would be required pursuant to federal law. Since state law does not allow take of golden eagle, such take could not be in compliance with state law.

STAFF'S PROPOSED FINDINGS OF FACT

1. Construction and operation of HHSEGS will disturb approximately 3,277 acres of desert habitat, of which approximately 77 acres has previously been developed or significantly disturbed.

2. Invasive non-native weeds occur across much of the eastern two-thirds of the project site but the density and ecological threat or impact varies from low to high.

3. The plant communities and landscape features in and around the HHSEGS site provide suitable foraging breeding for a variety of wildlife including nesting birds, and/or facilitate wildlife movement throughout the greater region.

4. A total of 23.21 acres of jurisdictional Waters of the State, a CDFG-designated sensitive habitat, occur on the project site. A total of 0.42 acres are also Waters of the United States, and six of the washes are also depicted as blue line features on the U.S. Geological Survey (USGS) topographic maps.

5. The project would maintain a portion of the hydrologic and geomorphic processes of many of the affected washes by allowing them to pass through the site, rather than diverting them around the site in artificially constructed channels; however these processes would be altered by the berm constructed across the downstream boundary of the project to control stormwater, partial site grading, and the obstruction of flow paths by mirror pylons and roads.

6. The perimeter exclusion fencing, required to exclude desert tortoise, in conjunction with ongoing operational activities would eliminate the habitat function and values for most wildlife. These activities include: regular human disturbance, lighting and glare, noise, regular vegetation mowing, mirror washing, dust and weed control, and other operational activities.

7. Ephemeral desert washes comprise the majority of streams in the desert and CDFG recognizes the habitat function and values to wildlife provided by ephemeral desert, including: seasonal or temporary sources of water higher biotic diversity; higher moisture content, topographic and habitat complexity; denser and more robust vegetation; shade and cooler temperatures; greater food sources; greater abundance of native annuals.

8. Wildlife habitat functions and values were observed and documented by Energy Commission and CDFG staff during multiple site visits, and habitat along most washes was observed to be distinct from the adjacent uplands.

9. Condition of Certification **BIO-22** (State Waters Compensatory Mitigation) would offset impacts to state waters through acquisition and preservation of comparable habitat offsite. To address a no net loss policy for riparian and riverine (stream) habitat, **BIO-22** would require compensation at a ratio of 2:1, or two acres of washes protected for every acre affected, and would fully mitigate loss of state waters.

10. Condition of Certification **BIO-8** requires that a copy of the Army Corps of Engineers permit or official communication confirming no permit is necessary be provided to the Energy Commission, and all requirements implemented on the project site, to mitigate for waters of the U.S.

11. One state and federally listed threatened species, the desert tortoise, occurs on the HHSEGS site.

12. Portions of the project site support relatively intact habitat for desert tortoise, but the habitat value is not uniform.

13. Desert tortoise sign (i.e., live animals, tracks, burrows, or scat) is present across most of the site but is concentrated near the eastern border of the project.

14. Tortoise present near the boundary of the project site will be affected by the project, and should be considered for determining project impacts and mitigation.

15. Impacts to desert tortoise can be fully mitigated by requiring compensatory mitigation at a 3:1 ratio for creosote bush scrub habitat and a 1:1 ratio for shadscale habitat.

16. One state fully protected species, the golden eagle, forages on the HHSEGS site, and nests within ten miles of HHSEGS project site.

17. Structures that are part of the HHSEGS project, including the heliostats, ancillary facilities, and the power tower, could cause bird deaths from collisions. The actual frequency of collisions is unknown, and collisions may be secondary to flux exposure.

18. The impact of avian collisions with project features generally is significant, and is significant, although adaptive measures may reduce the number of such collisions

19. Operation of the HHSEGS project will concentrate solar flux. This is expected to result in bird injury and death from exposure in excess of avian tolerance. Birds may also die from exposure to repeated low levels doses of solar flux, or die from exposure after leaving the project site.

20. The impact of solar flux on bird species is potentially significant inasmuch as morbidity and mortality is likely for golden eagle and migratory birds, for which no incidental take is permitted under state law.

21. The project site supports a variety of common and special status wildlife including the American Badger and burrowing owl; species considered by the California Department of Fish and Game as species of special concern. The site also supports desert kit fox. The desert kit fox is designated as a protected furbearer, which may not be trapped or taken.

22. American badger, kit fox, and burrowing owl would be displaced by HHSEGS project construction.

23. Impacts to American badger, kit fox, and burrowing owl are adverse but are less than significant with the adoption of feasible mitigation measures required by the Commission.

24. The HHSEGS site provides occasional forage and dispersal pathways for the fully protected Nelson's bighorn sheep. This species would still be able to complete intermountain travel.

25. Implementation of conditions of certification **BIO-9**, **BIO-12**, **BIO-18** through **BIO-20**, and **BIO-1** through **BIO-22** would reduce impacts to Nelson's bighorn sheep and their habitat. The project is not expected to pose significant impacts to movement for this species.

26. The project impacts to Nelson's bighorn sheep are adverse but less than significant with the adoption of feasible mitigation measures required by the Commission.

27. Implementation of conditions of certification **BIO-1** through **BIO-10**, **BIO-12**, and **BIO-13** will reduce significant impacts to the desert tortoise, considered "take" under CESA.

28. Implementation of conditions of certification **BIO-14**, **BIO-1** through **BIO-9**, **BIO-14**, and **BIO-18** through **BIO-23** will reduce impacts to American badger and kit fox to a level that is less than significant.

29. Implementation of conditions of certification **BIO-1** though **BIO-8**, **BIO-12, BIO-17** will reduce impacts to burrowing owl to a level that is less than significant.

30. Construction noise is not expected to have a substantial impact on nearby wildlife with the implementation of Conditions **NOISE-1** through **NOISE-7, BIO-15, and BIO-16**.Implementation of Conditions of certification **BIO-1** through **BIO-8**, **BIO-14, BIO-18 and BIO-12, BIO-15, BIO-16, and BIO-25 will re**duce impa**cts to nesting birds and sp**ecial-status bat species to less than significa**nt.**

31. Construction and operation of the project would directly and indirectly impact 28 occurrences of 11 special-status plant species located within the project boundary.

32. None of the affected species are state or federally listed Threatened, Endangered, Rare, or Candidate species but nine of the 11 species have a highly restricted range in California.

33. All 11 species onsite have distribution outside California but are rare in California (CRPR Rank 2; formerly CNPS List 2), and meet the criteria in Section 15380 of the CEQA Guidelines for designation as "rare".

34. Nine additional occurrences of eight special-status (CRPR rank 1B and 2) species were documented offsite in very close proximity to the project boundary, and thus in close proximity to construction and operation.

35. Conditions of certification **BIO-19, BIO-18**, and **BIO-8** specify Best Management Practices and other measures for avoiding and minimizing indirect impacts to these occurrences in close proximity from fugitive dust, herbicide and other chemical drift, the introduction and spread of weeds, and increased risk of fire.

36. Condition of Certification **BIO-20** (Special-status Plant Compensatory Mitigation) offers two options for offsite mitigation to offset impacts to occurrences onsite: 1) preservation, and 2) restoration of at-risk occurrences, and includes performance standards for each option. Mitigation ratios for preservation are based on the degree of rarity and extinction risk.

37. The HHSEGS project will lower groundwater levels within an area proximate to the site's pumps, as well as in the water basin generally.

38. How far and fast project pumping cone of depression will propagate cannot be determined with certainty given certain geological complexities in the area.

39. Large concentrations of groundwater-dependent mesquite habitats occur in close proximity to the project in Nevada, some within a half-mile or less of the project.

40. The mesquite habitats located near the project include the Stump Springs Area of Critical Environmental Concern (ACEC), an area designated for protection of its biological and cultural resources by the Bureau of Land Management. Stump Springs ACEC also contains an active seasonal spring.

41. The applicant mapped 4,040 acres of groundwater-dependent habitats within an approximate 5 to 6-mile radius of the project; most of these occur on lands administered by the Nevada Bureau of Land Management.

42. One of the largest concentrations of mesquite patches in southern Nevada occurs in Pahrump Valley; the 9,047-acre Pahrump Valley metapatch; no mesquite or other groundwater-dependent communities occur within the project boundary.

43. At least three active seasonal seeps and springs occur within a 5-mile radius of the project, and several additional inactive springs that stopped flowing during the period of heavy agricultural pumping in the last century.

44. The Nevada Bureau of Land Management Mesquite-Acacia Conservation Management Strategy states mesquite have significant biological and cultural importance in southern Nevada, and identified the mesquite habitats in Pahrump Valley and Stump Springs areas as conservation priorities.

45. The Conservation Management Strategy states that the Stump Springs area has significant wildlife habitat values, and that in a landscape dominated by desert scrub, mesquite patches serve as important breeding and foraging areas for wildlife, including many special-status species.

46. The Bureau of Land Management Southern Nevada District is currently considering establishing a new ACEC to protect the mesquite and other resources north of Stump Springs and east of the project boundary.

47. Project groundwater pumping could have significant direct and cumulative impacts on the mesquite habitats east of the project and the Stump Springs ACEC if project pumping should result in water levels being lowered below the effective rooting depth of the mesquite and other groundwater-dependent species.

48. If mesquite habitats are adversely affected, dependent wildlife would also be affected, including some special-status species.

49. Mesquite rooting depths are highly variable and the ability of mesquite to track a declining water table is not well documented.

50. Groundwater levels across the entire Pahrump Valley have already declined as a result of basin groundwater pumping, particularly in the northern valley or areas closest to Pahrump.

51. There has been a severe over-allocation of water rights in the Pahrump Valley groundwater basin.

52. There is a fault zone between the project site and Stump Springs ACEC and other mesquite habitats that may buffer the effects of project pumping but the protective properties of this fault zone are not presently known or established.

53. The hydrogeology of this portion of the Death Valley Regional Flow System is complex and not well understood.

54. Groundwater monitoring is necessary to determine whether there will be drawdown that will negatively affect Stump Springs ACEC and other mesquite habitats and area seeps and springs.

55. Vegetation monitoring and/or soil cores to examine rooting depths are necessary to determine the tolerance of mesquite to declining water tables and to determine whether project water use is negatively affecting Stump Springs ACEC and the area mesquite habitats.

56. There is significant public interest on the groundwater issues of the project, and the potential for project pumping to negatively impact area mesquite habitats, dependent wildlife, and springs.

57. Several local, state, and federal agencies submitted scoping comments and/or PSA comments expressing concern about groundwater pumping impacts to biological (and cultural) resources.

58. The Bureau of Land Management submitted scoping comments and PSA comments urging the Energy Commission to adopt conditions of certification requiring groundwater monitoring and groundwater-dependent vegetation monitoring to protect these resources on adjacent BLM lands, and require the project stop, reduce or modify pumping if monitoring detects a groundwater drawdown beyond the project boundary.

59. Implementation of conditions of certification **BIO-23**, **WATER SUPPLY-2**, **and** WATER **SUPPLY-4** will avoid or minimize indirect impacts from project pumping to less than significant levels.

60. Thirteen species of invasive weeds were documented in the project area, including two California Department of Food and Agriculture (CDFA) A-rated pests (Russian knapweed and halogeton) subject to state-enforced actions including eradication.

61. Increased vehicle and equipment use during construction and operation could increase the spread of weeds into adjacent public and private lands from contaminated vehicle and equipment tires and undercarriages.

62. Mowing and mirror-washing and soil disturbance could also increase the spread of weeds by making the habitat more vulnerable to invasion by weeds.

63. The spread of invasive plants is a major threat to biological resources in the Mojave Desert, causing destructive changes in ecosystem processes and increasing the risk of catastrophic fire and fire frequency.

64. Condition of Certification **BIO-18** (Weed Management Plan) requires the project owner to manage or contain weeds onsite for the life of the project to prevent their spread into adjacent offsite habitat, or to nearby communities via employees and contractors contaminated vehicles and equipment.

65. **BIO-18** includes specifications for environmentally safe weed management to avoid accidental harm to biological resources from weed management activities.

66. Construction and operation of the project will have effects on a number of biological resources that are individually limited but cumulatively considerable when viewed in connection with the effects of past, current, and probable future projects.

67. The project's contribution to significant cumulative effects to desert tortoise are not cumulatively considerable after implementation of conditions of certification **BIO-8, BIO-9, BIO-10, BIO-12 and BIO-13** to minimize or fully mitigate those impacts.

68. The project's contribution to significant cumulative effects to desert kit fox, American badger, special-status bat species, and Nelson's bighorn sheep are not cumulatively considerable after implementation of Conditions of Certification **BIO-8, BIO-12, BIO-14, BIO-18, and BIO-22**.

69. The project's contribution to significant cumulative effects to migratory birds and golden eagles is cumulatively considerable when combined with the anticipated indirect effects to remaining habitat and populations.

70. The significant cumulative effect from the loss of migratory birds and golden eagles that may occur during project operation would be cumulatively considerable even with the implementation of conditions of certification **BIO-8**, **BIO-15**, and **BIO-16** which address impact avoidance and minimization measures would address the project's contribution to this significant cumulative impact.

71. The project's contribution to significant cumulative effects to other wildlife, desert washes, and groundwater-dependent communities are not cumulatively considerable after implementation of Conditions of Certification **BIO-1** through **BIO-26**.

PROPOSED CONDITIONS OF CERTIFICATION

Staff proposes the following conditions of certification:

DESIGNATED BIOLOGIST SELECTION AND QUALIFICATIONS[7]

BIO-1 The project owner shall submit the resume of the proposed Designated Biologist, with at least three references and contact information, to the Energy Commission Compliance Project Manager (CPM) for approval. The Designated Biologist must meet all qualifications as stated within the U.S. Fish and Wildlife Service's (USFWS's) Biological Opinion (BO) for the HHSEGS project. Those qualifications at a minimum shall include at least three references and contact information.

The Designated Biologist must meet the following minimum qualifications:

1. Bachelor's degree in biological sciences, zoology, botany, ecology, or a closely related field;

2. Three years of experience in field biology or current certification of a nationally recognized biological society, such as The Ecological Society of America or The Wildlife Society;

3. Have at least one year of field experience with biological resources found in or near the project area;

4. Meet the current USFWS Authorized Biologist qualifications criteria (USFWS 2008), demonstrate familiarity with protocols and guidelines for the desert tortoise, and be approved by the USFWS; and

5. Possess a California ESA Memorandum of Understanding pursuant to Section 2081(a) for desert tortoise.

Verification: No less than 90 days prior to the start of any project-related ground disturbing activity, the project owner shall provide the CPM and CDFG a copy of the Commission Designated Biologist (= USFWS Authorized Biologist(s)) selection for the HHSEGS project and a copy of the above specified qualifications or the qualifications as required by the federal Biological Opinion. The project owner shall submit the specified information to the CPM and CDFG within 1 (one) week of receipt from the USFWS. No site or related ground disturbing activities shall commence until the appropriate number of approved Designated Biologist(s) is/are available to be on site.

If a Designated Biologist needs to be replaced, copies of the above specified information of the proposed replacement, as well as the USFWS new designated Authorized Biologists (= Commission title of Designated Biologist) for the HHSEGS project must be submitted to the CPM and CDFG within 48 hours of receipt of USFWS's authorization of a new Designated Biologist for the HHSEGS project site. In an emergency, the project owner shall immediately notify the CPM, CDFG, and USFWS to discuss the qualifications and approval of a short-term replacement, and/or enact any

[7] USFWS <www.fws.gov/ventura/speciesinfo/protocols_guidelines/docs/dt> designates biologists who are approved to handle tortoises as "Authorized Biologists." Such biologists have demonstrated to USFWS that they possess sufficient desert tortoise knowledge and experience to handle and move tortoises appropriately, and have received USFWS approval. Authorized Biologists are permitted to then approve specific monitors to handle tortoises, at their discretion. The California Department of Fish and Game (CDFG) must also approve such biologists, potentially including individual approvals for monitors approved by the Authorized Biologist. Designated Biologists are the equivalent of Authorized Biologists. Only Designated Biologists and certain Biological Monitors who have been approved by the Designated Biologist would be allowed to handle desert tortoises.

emergency provisions as specified in the USFWS Biological Opinion for the HHSEGS project.

DESIGNATED BIOLOGIST DUTIES

BIO-2 The project owner shall ensure that the Designated Biologist performs the following during any site (or related facilities) mobilization, ground disturbance, grading, construction, operation, or other activities as otherwise directed by the CPM. The Designated Biologist may be assisted by the approved Biological Monitor(s) but remains the contact for the project owner and the CPM. The Designated Biologist Duties shall include the following:

1. Advise the project owner's Construction and Operation Managers on the implementation of the biological resources conditions of certification;

2. Approve and submit the Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) to the CPM;

3. Be available to supervise, conduct and coordinate mitigation, monitoring, and other biological resources compliance efforts, particularly in areas requiring avoidance or containing sensitive biological resources, such as special-status species or their habitat;

4. Clearly mark sensitive biological resource areas and inspect these areas at appropriate intervals for compliance with regulatory terms and conditions;

5. Inspect active construction areas where animals may have become trapped prior to construction commencing each day. At the end of the day, inspect for the installation of structures that prevent entrapment or allow escape during periods of construction inactivity. Periodically inspect areas with high vehicle activity (e.g., parking lots) for animals in harm’s way;

6. Inspect heliostat fields after rain events for presence of standing water in planned retention area and document the intensity and duration of the rain event via rain collectors. At least two collectors shall be placed within the project boundaries, one in each solar field, and marked on all project planning maps. The perimeter of the ponded area shall be mapped with GPS, and all above information, including readings of rain collectors and photographic documentation must be included within Monthly Compliance Reports;

7. Determine and oversee implementation of remedial actions any time water has been observed standing onsite for 24 hours. The Designated Biologist shall initiate remedial methods no later than 24 hours after standing water has been observed on the project site. Remedial methods may include grading, pumping spraying, tilling, or any other means to disperse or ensure evaporation and/or absorption of standing water. Other remedial efforts may be determined in conjunction with CPM review and approval. Descriptions of remedial efforts, including photo documentation, and

discussion of results of remedial efforts must be included in the Monthly Compliance Report;

8. Notify the project owner and the CPM of any non-compliance with any biological resources condition of certification;

9. Respond directly to inquiries of the CPM and Biological Resources Staff regarding biological resource issues;

10. Respond immediately to reports of onsite kit fox mortality or injury, and to the extent possible, reports of dead or injured kit fox offsite and immediately adjacent the project boundaries or on access roads, notify the CDFG and CPM within 24 hours, and undertake restorative and/or disease prevention actions as specified within the American Badger and Kit Fox Management Plan, or as directed by the CDFG, with copies of all CDFG guidance provided to the CPM within 24 hours of receipt;

11. Maintain compliance with the provisions of the Avian, Bat, and Golden Eagle Protection Plans, USFWS Golden Eagle Conservation Permit (if issued), and/or any other directions from the USFWS, CDFG, or CPM with respect to golden eagle, and special-status birds and bats.

12. Maintain written records of the tasks specified above and those included in the BRMIMP. Summaries of these records shall be submitted in the Monthly Compliance Report and the Annual Compliance Report;

13. Train the Biological Monitors as appropriate, and ensure their familiarity with the BRMIMP, Worker Environmental Awareness Program (WEAP) training, and USFWS guidelines on desert tortoise surveys and handling procedures <www.fws.gov/ventura/speciesinfo/protocols_guidelines>, and; and

14. Maintain the ability to be in regular, direct communication with the CPM and representatives of CDFG and USFWS including notifying these agencies of dead or injured listed species and reporting special-status species observations to the California Natural Diversity Data Base.

Verification: The Designated Biologist shall submit in the Monthly Compliance Report to the CPM and copies of all written reports and summaries that document biological resources compliance activities. If actions may affect biological resources during operation a Designated Biologist shall be available for monitoring and reporting. During project operation, the Designated Biologist shall submit record summaries in the Annual Compliance Report unless his/her duties cease, as approved by the CPM.

BIOLOGICAL MONITOR(S) SELECTION AND QUALIFICATIONS

BIO-3 The project owner's approved Designated Biologist shall submit the resume, at least three references, and contact information of the proposed Biological Monitor(s) to the CPM. The resume shall demonstrate, to the satisfaction of the CPM the appropriate education and experience to accomplish the

assigned biological resource tasks. The Biological Monitor is the equivalent of the USFWS designated Desert Tortoise Monitor (USFWS 2008).

Biological Monitor(s) training by the Designated Biologist shall include familiarity with the conditions of certification, BRMIMP, WEAP, and USFWS guidelines on desert tortoise surveys and handling procedures <www.fws.gov/ventura/speciesinfo/protocols_guidelines>.

Verification: The project owner shall submit the specified information to the CPM for approval at least 30 days prior to the start of any project-related site disturbance activities. The Designated Biologist shall submit a written statement to the CPM confirming that individual Biological Monitor(s) has been trained including the date when training was completed. If additional biological monitors are needed during construction the specified information shall be submitted to the CPM and for approval at least 10 days prior to their first day of monitoring activities, or within 24 hours of receipt of USFWS decision approving acceptability as tortoise monitors, whichever comes sooner.

BIOLOGICAL MONITOR DUTIES

BIO-4 The Biological Monitors shall assist the Designated Biologist in conducting surveys and in monitoring of mobilization, ground disturbance, grading, construction, operation, and closure activities. The Designated Biologist shall remain the contact for the project owner and the CPM.

Verification: The Designated Biologist shall submit in the Monthly Compliance Report to the CPM copies of all written reports and summaries that document biological resources compliance activities, including those conducted by Biological Monitors. If actions may affect biological resources during operation of the project, a Biological Monitor, under the supervision of the Designated Biologist, shall be available for monitoring and reporting. During project operation, the Designated Biologist shall submit record summaries in the Annual Compliance Report unless their duties cease, as approved by the CPM after receiving verification from the USFWS that their services are not required for compliance with federal permits, with a copy of the USFWS decision document provided to the CPM.

DESIGNATED BIOLOGIST AND BIOLOGICAL MONITOR AUTHORITY

BIO-5 The project owner's construction/operation manager shall act on the advice of the Designated Biologist and Biological Monitor(s) to ensure conformance with the biological resources conditions of certification.

The Designated Biologist shall have the authority to immediately stop any activity that is not in compliance with these conditions and/or order any reasonable measure to avoid take of an individual of a listed species. If required by the Designated Biologist and Biological Monitor(s) the project owner's construction/operation manager shall halt all site mobilization, ground disturbance, grading, construction, and operation activities in areas specified by the Designated Biologist. The Designated Biologist shall:

1. Require a halt to all activities in any area when determined that there would be an unauthorized adverse impact to biological resources if the activities continued;

2. Inform the project owner and the construction/operation manager when to resume activities; and

3. Notify the CPM and CDFG within 24 hours if there is a halt of any activities and advise them of any corrective actions that have been taken or will be instituted as a result of the work stoppage.

If the Designated Biologist is unavailable for direct consultation, the Biological Monitor shall act on behalf of the Designated Biologist.

Verification: The project owner shall ensure that the Designated Biologist or Biological Monitor notifies the CPM immediately (and no later than the morning following the incident, or Monday morning in the case of a weekend) of any non-compliance or a halt of any site mobilization, ground disturbance, grading, construction, and operation activities. The project owner shall notify the CPM of the circumstances and actions being taken to resolve the problem.

Whenever corrective action is taken by the project owner, a determination of success or failure will be made by the CPM within five working days after receipt of notice that corrective action is completed, or the project owner will be notified by the CPM that coordination with other agencies will require additional time before a determination can be made.

WORKER ENVIRONMENTAL AWARENESS PROGRAM (WEAP)

BIO-6 The Designated Biologist shall develop and implement project-site-specific Worker Environmental Awareness Program (WEAP). The WEAP shall be administered to all onsite personnel including surveyors, construction engineers, employees, contractors, contractor's employees, supervisors, inspectors, subcontractors, and delivery personnel. The WEAP shall be implemented during site mobilization, ground disturbance, grading, construction, operation, and closure. The WEAP shall:

1. Be developed by or in consultation with the Designated Biologist, be responsive of CPM, and/or input CDFG, and consist of an on-site or training center presentation in which supporting written material and electronic media, including photographs of protected species, is made available to all participants. The training presentation shall be made available in the language best understood by the participants;

2. Discuss the locations and types of sensitive biological resources on the project site and adjacent areas, and explain the reasons for protecting these resources; provide information to participants that no snakes, reptiles, or other wildlife shall be intentionally harmed (unless posing a reasonable and immediate threat to humans);

3. Place special emphasis on desert tortoise, including information on physical characteristics, distribution, behavior, ecology, sensitivity to human activities, legal protection, penalties for violations, reporting requirements, and protection measures;

4. Provide pictures of desert tortoise, golden eagles, American badger, kit fox, and burrowing owl, provide information on sensitivity to human activities, legal protection, reporting requirements, and how to identify construction avoidance zones for these species as marked by flagging, staking, or other means, also describe the protections for bird nests and provide information as described above;

5. Provide overview [for operational staff] of potential impacts to avian species from concentrated solar flux created during operations phase, reporting requirements, and protection measures;

6. Include a discussion of fire prevention measures to be implemented by workers during Project activities and request workers to: a) use designated smoking areas and dispose of cigarettes and cigars appropriately and not leave them on the ground or buried, b) keep vehicles on graveled or well-maintained roads at all times, unless performing prescribed construction activities, to prevent vehicle exhaust systems from coming in contact with roadside weeds, c) use and maintain approved spark arresters on all power equipment, and d) keep a fire extinguisher on hand at all times;

7. Present the meaning of various temporary and permanent habitat protection measures;

8. Identify whom to contact if there are further comments and questions about the material discussed in the program; and

9. Include a training acknowledgment form to be signed by each worker indicating that they received training and shall abide by the guidelines.

The specific program can be administered by a competent individual(s) acceptable to the Designated Biologist, and documented within the Monthly Compliance Report.

Verification: At least 60 days prior to the start of any project-related site disturbance activities, the project owner shall provide to the CPM (for review and approval, and to the CDFG and/or USFWS for review and comment), electronic copies of the WEAP and all supporting written materials and/or electronic media prepared by the Designated Biologist and a resume of the person(s) administering the program. At least 30 days prior to the start of any project-related ground disturbing activities, the project owner will provide two copies of the final WEAP to the CPM and implement the training for all workers.

The project owner shall provide in the Monthly Compliance Report the number of persons who have completed the training in the prior month and a running total of all persons who have completed the training to date.

Training acknowledgement forms signed during construction shall be kept on file by the project owner for at least six months after the start of commercial operation.

Throughout the life of the project, the worker education program shall be repeated annually for permanent employees, and shall be routinely administered within one week of arrival to any new construction personnel, foremen, contractors, subcontractors, and other personnel potentially working within the project area. Upon completion of the orientation, employees shall sign a form stating that they attended the program and understand all protection measures. These forms shall be maintained by the project owner and shall be made available to the CPM upon request. Workers shall receive and be required to visibly display a hardhat sticker or certificate that they have completed the training.

During project operation, signed statements for operational personnel shall be kept on file for six months following the termination of an individual's employment.

BIOLOGICAL RESOURCES MITIGATION IMPLEMENTATION AND MONITORING PLAN (BRMIMP)

BIO-7 The project owner shall develop and implement a Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) for the project. The BRMIMP shall incorporate avoidance and minimization measures described in final versions of the Desert Tortoise Translocation Plan, the USFWS Biological Opinion for the HHSEGS project, the Raven Management Plan, the American Badger and Kit Fox Management Plan, the Avian, Bat, and Golden Eagle Protection Plans, Burrowing Owl Impact Avoidance and Minimization Measures, and Closure, Revegetation, and Reclamation Plan.

The BRMIMP shall be prepared in consultation with the Designated Biologist and include the following:

1. All biological resources mitigation, monitoring, and compliance measures proposed by the project owner and approved by the Commission;

2. All biological resources mitigation, monitoring, and compliance measures specified in the conditions of certification;

3. All biological resource mitigation, monitoring and compliance measures required in state and federal agency terms and conditions, including but not limited to: USFWS Biological Opinion, USFWS Golden Eagle Conservation Permit (if issued), U.S. Army Corps of Engineers 404 Certification, 401 Certification from the Lahontan Regional Water Quality Control Board, California Department of Fish and Game Lake and Streambed Alteration Agreement, and a Food and Agricultural Code Section 80001 native plant harvesting permit;

4. All sensitive biological resources to be impacted, avoided, or mitigated by project construction, operation, and closure;

5. All required mitigation measures for each sensitive biological resource and remedial actions for standing water onsite, including known or suspected disease outbreaks on the project site;

6. All locations on a map, at an approved scale, of sensitive biological resource areas and two rain collectors subject to disturbance and areas requiring temporary protection and avoidance during construction and operation;

7. Aerial photographs, at an approved scale, of all areas to be disturbed during project construction activities; include one set prior to any site or related facilities mobilization disturbance and one set subsequent to completion of project construction. Provide planned timing of aerial photography and a description of why times were chosen. Provide a final accounting of the before/after acreages and a determination of whether additional habitat compensation is necessary in the Construction Termination Report;

8. Duration for each type of monitoring and a description of monitoring methodologies and frequency;

9. Performance standards to be used to help decide if/when proposed mitigation is or is not successful;

10. All performance standards and remedial measures to be implemented if performance standards are not met;

11. A discussion of biological resources-related facility closure measures; and

12. A process for proposing plan modifications to the CPM.

Verification: The project owner shall submit two copies of the draft BRMIMP to the CPM for review and approval at least 60 days prior to start of any project-related site disturbance activities. No less than 30 days prior to any project-related ground disturbing activities, the final revised BRMIMP shall be submitted to the CPM. No ground disturbance may occur prior to approval of the final BRMIMP by the CPM.

If there are any permits that have not yet been received when the BRMIMP is first submitted, these permits shall be submitted to the CPM within five days of their receipt, and the BRMIMP shall be revised or supplemented to reflect the permit condition within at least 10 days of their receipt by the project owner.

The project owner shall notify the CPM no less than five working days before implementing any modifications to the approved BRMIMP.

Any changes to the approved BRMIMP must be approved by the CPM and in consultation with appropriate agencies to ensure no conflicts exist.

Implementation of BRMIMP measures (construction activities that were monitored, species observed) will be reported in the Monthly Compliance Reports by the Designated Biologist. Within 30 days after completion of project construction, the project owner shall provide to the CPM, for review and approval, a written construction termination report identifying which items of the BRMIMP have been completed, a summary of all modifications to mitigation measures made during the project's site

mobilization, ground disturbance, grading, and construction phases, and which mitigation and monitoring items are still outstanding.

GENERAL IMPACT AVOIDANCE AND MINIMIZATION MEASURES

BIO-8 The project owner shall undertake the following measures to manage the construction site and related facilities in a manner to avoid or minimize impacts to biological resources:

1. Limit Disturbance Area. The boundaries of all areas to be disturbed (including staging areas, access roads, and sites for temporary placement of spoils) shall be delineated with stakes and flagging prior to construction activities in consultation with the Designated Biologist. All disturbances, vehicles, and equipment shall be confined to the flagged areas.

2. Minimize Road Impacts. New and existing roads that are planned for construction, widening, or other improvements shall not extend beyond the flagged impact area as described above. All vehicles passing or turning around will do so within the planned impact area or in previously disturbed areas. Where new access is required outside of existing roads (e.g. new spur roads) or the construction zone, the route will be clearly marked (i.e., flagged and/or staked) prior to the onset of construction.

3. Minimize Traffic Impacts. Vehicular traffic during project construction and operation shall be confined to existing routes of travel to and from the project site, and cross country vehicle and equipment use outside designated work areas shall be prohibited. With the exception of the dirt roads that run between Tecopa Road and the project site, overland vehicle traffic shall be prohibited. The speed limit shall not exceed 25 miles per hour within the project area, on maintenance roads for linear facilities, or on dirt access roads to the HHSEGS site. Vehicles shall abide by posted speed limits on paved roads.

4. Monitor During Construction. The Designated Biologist or Biological Monitor shall be present at the construction site during all project activities that have potential to disturb soil, vegetation, and wildlife. In areas that could support desert tortoise or any other sensitive wildlife species, the USFWS-approved Designated Biologist or Biological Monitor shall walk immediately ahead of equipment during brushing and grading activities.

5. Salvage Wildlife during Clearing and Grubbing. The Designated Biologist or Biological Monitor shall salvage and relocate sensitive wildlife during clearing and grading operations. The species shall be salvaged when conditions will not jeopardize the health and safety of the monitor and relocated off-site habitat.

6. Avoid Roosting Bats. The project owner shall minimize disturbance to roosting bats. If night or day roosting bats are identified in project structures they shall not be disturbed and a 100 foot non disturbance buffer shall be placed around the bats. If the Designated Biologist, in

consultation with a qualified bat biologist, determines roosting bats consist of a non-breeding roost the individuals shall be safely evicted, under the direction of a qualified bat biologist. The CPM and CDFG shall be notified of any bat evictions within 48 hours. Maternity colonies shall not be disturbed. The CPM shall be notified within 48 hours of any active nurseries that are identified within the construction area.

7. Minimize Impacts of Transmission/Pipeline Alignments, Roads, and Staging Areas. For construction activities outside of the plant site (transmission line, pipeline alignments) access roads, pulling sites, and storage and parking areas shall be designed, installed, and maintained with the goal of minimizing impacts to native plant communities and sensitive biological resources. Transmission lines and all electrical components shall be designed, installed, and maintained in accordance with the Avian Power Line Interaction Committee's (APLIC's) *Suggested Practices for Avian Protection on Power Lines* (APLIC 2006)and *Mitigating Bird Collisions with Power Lines* (APLIC 2004)to reduce the likelihood of bird electrocutions and collisions.

8. Avoid Use of Toxic Substances. Road surfacing and sealants as well as soil bonding and weighting agents used on unpaved surfaces shall be non-toxic to wildlife and plants. Anticoagulants shall not be used for rodent control. Pre-emergents and other herbicides with documented residual toxicity shall not be used. Herbicides shall be applied in conformance with federal, State, and local laws and according to the guidelines for wildlife-safe use of herbicides in **BIO-18** (Weed Management Plan).

9. Minimize Lighting Impacts. Facility lighting shall be designed, installed, and maintained to prevent side casting of light towards wildlife habitat.

10. Cap Vertical Pipes. All vertical pipes greater than 4-inches in diameter shall be capped to prevent the entrapment of birds or bats.

11. Avoid Vehicle Impacts to Desert Tortoise. Parking and storage shall occur within the area enclosed by desert tortoise exclusion fencing to the extent feasible. No vehicles or construction equipment parked outside the fenced area shall be moved prior to an inspection of the ground beneath the vehicle for the presence of desert tortoise. If a desert tortoise is observed, it shall be left to move on its own. If it does not move within 15 minutes, a Designated Biologist or Biological Monitor under the Designated Biologist's direct supervision may remove and relocate the animal to a safe location if temperatures are within the range described in the USFWS' 2009 Desert Tortoise Field Manual (http://www.fws.gov/ventura/speciesinfo/protocols_guidelines). All access roads outside of the fenced project footprint shall be delineated with temporary desert tortoise exclusion fencing on either side of the access road, unless otherwise authorized by the CPM.

12. Avoid Wildlife Pitfalls.

a. Backfill Trenches. At the end of each work day, the Designated Biologist shall ensure that all potential wildlife pitfalls (trenches, bores, and other excavations) have been backfilled. If backfilling is not feasible, all trenches, bores, and other excavations shall be sloped at a 3:1 ratio at the ends to provide wildlife escape ramps, or covered completely to prevent wildlife access, or fully enclosed with desert tortoise-exclusion fencing. All trenches, bores, and other excavations outside the areas permanently fenced with desert tortoise exclusion fencing shall be inspected periodically, but no less than three times, throughout the day and at the end of each workday by the Designated Biologist or a Biological Monitor. Should a tortoise or other wildlife become trapped, the Designated Biologist or Biological Monitor shall remove and relocate the individual as described in the Desert Tortoise Relocation/Translocation Plan. Any wildlife encountered during the course of construction shall be allowed to leave the construction area unharmed.

b. Avoid Entrapment of Desert Tortoise. Any construction pipe, culvert, or similar structure with a diameter greater than 3 inches, stored less than 8 inches aboveground, and within desert tortoise habitat (i.e., outside the permanently fenced area) for one or more nights, shall be inspected for tortoises before the material is moved, buried, or capped. As an alternative, all such structures may be capped before being stored outside the fenced area, or placed on pipe racks. These materials would not need to be inspected or capped if they are stored within the permanently fenced area after the clearance surveys have been completed.

13. Minimize Standing Water. Water applied to dirt roads and construction areas (trenches or spoil piles) for dust abatement shall use the minimal amount needed to meet safety and air quality standards in an effort to prevent the formation of puddles, which could attract desert tortoises and common ravens to construction sites. A Biological Monitor shall patrol these areas to ensure water does not puddle and attract desert tortoise, common ravens, and other wildlife to the site and shall take appropriate action to reduce water application where necessary.

14. Minimize Standing Water in the Retention Basin. Water shall be prohibited from collecting or pooling for more than 24 hours after a storm event within the project retention basin. Standing water within the retention basin shall be removed, pumped, raked, or covered. Alternative methods or the time water is allowed to pool may be approved with the approval of the CPM.

15. Minimize Spills of Hazardous Materials. All vehicles and equipment shall be maintained in proper working condition to minimize the potential for fugitive emissions of motor oil, antifreeze, hydraulic fluid, grease, or other hazardous materials. The Designated Biologist shall be informed of any hazardous spills immediately as directed in the project Hazardous Materials Plan. Hazardous spills shall be immediately cleaned up and the

contaminated soil properly disposed of at a licensed facility. Servicing of construction equipment shall take place only at a designated area. Service/maintenance vehicles shall carry a bucket and pads to absorb leaks or spills.

16. Dispose of Road-killed Animals. Road-killed animals or other carcasses detected on Tecopa Road and other project roads within one mile of the project site shall be picked up immediately and delivered to the Biological Monitor. For special-status species road kill, the Biological Monitor shall contact USFWS and CDFG within 1 working day of receipt of the carcass for guidance on disposal or storage of the carcass. The Biological Monitor shall report the special-status species record as described in Condition of Certification **BIO-2**.

17. Worker Guidelines. During construction all trash and food-related waste shall be placed in self-closing containers and removed daily from the site. Workers shall not feed wildlife or bring pets to the project site. Except for law enforcement or security personnel, no workers or visitors to the site shall bring firearms or weapons.

18. Avoid Spread of Noxious Weeds. The project owner shall implement the following Best Management Practices during construction and operation, and all other measures as required in the final approved Weed Management Plan (**BIO-18**) to prevent the spread and propagation of noxious weeds and other invasive plants:

    a. Limit the size of any vegetation and/or ground disturbance to the absolute minimum and limit ingress and egress to defined routes;

    b. Prevent spread of non-native plants via vehicular sources by implementing Trackclean™ or other methods of vehicle cleaning for vehicles coming and going from construction sites. Earth-moving equipment shall be cleaned prior to transport to the construction site; and

    c. Use only weed-free straw, hay bales, and seed for erosion control and sediment barrier installations.

19. Implement Erosion Control Measures. Standard erosion control measures shall be implemented for all phases of construction and operation where sediment run-off from exposed slopes threatens to enter “Waters of the State”. Sediment and other flow-restricting materials shall be moved to a location where they shall not be washed back into the stream. All disturbed soils and roads within the project site shall be stabilized to reduce erosion potential, both during and following construction. Areas of disturbed soils (access and staging areas) with slopes toward a drainage shall be stabilized to reduce erosion potential.

20. Monitor Ground-Disturbing Activities Prior to Site Mobilization. If ground-disturbing activities are required prior to site mobilization, such as for

geotechnical borings or hazardous waste evaluations, a Designated Biologist or Biological Monitor shall be present to monitor any actions that could disturb soil, vegetation, or wildlife.

21. Control and Regulate Fugitive Dust. To reduce the potential for the transmission of fugitive dust the owner shall implement dust control measures. These shall include:

    a. The owner shall apply non-toxic soil binders, equivalent or better in efficiencies than the CARB- approved soil binders, to active unpaved roadways, unpaved staging areas, and unpaved parking area(s) throughout construction to reduce fugitive dust emissions.

    b. Water the disturbed areas of the active construction sites at least three times per day and more often if uncontrolled fugitive dust is noted.

    c. Enclose, cover, water twice daily, and/or apply non-toxic soil binders according to manufacturer's specifications to exposed piles with a 5% or greater silt content. Agents with known toxicity to wildlife shall not be used unless approved by the CPM.

    d. Establish a vegetative ground cover (in compliance with biological resources impact mitigation measures above) or otherwise create stabilized surfaces on all unpaved areas at each of the construction sites within 21 days after active construction operations have ceased.

    e. Increase the frequency of watering, if water is used as a soil binder for disturbed surfaces, or implement other additional fugitive dust mitigation measures, to all active disturbed fugitive dust emission sources when wind speeds (as instantaneous wind gusts) exceed 25 mph.

All mitigation measures and their implementation methods shall be included in the BRMIMP and implemented. Implementation of the measures shall be reported in the Monthly Compliance Reports by the Designated Biologist. Within 30 days after completion of project construction, the project owner shall provide to the CPM, for review and approval, a written construction termination report identifying how measures have been completed.

DESERT TORTOISE CLEARANCE SURVEYS AND EXCLUSION FENCING

BIO-9 The project owner shall undertake appropriate measures to manage the construction site and related facilities in a manner to avoid or minimize impacts to desert tortoise. Methods for clearance surveys, fence specification and installation, tortoise handling, artificial burrow construction, egg handling and other procedures shall be consistent with those described in the USFWS' 2009 *Desert Tortoise Field Manual*<http://www.fws.gov/ventura/speciesinfo/protocols_guidelines> or more current guidance provided by CDFG and USFWS. The project owner

shall also implement all terms and conditions described in the Biological Opinion for the project prepared by USFWS. These measures include, but are not limited to, the following:

1. Desert Tortoise Exclusion Fence Installation. To avoid impacts to desert tortoises, permanent desert tortoise exclusion fencing shall be installed along the permanent, which may or may not be combined with the perimeter security fence. Temporary fencing along the underground utility corridors in California may be required for activities that require trenching and will be implemented at the approval of the CPM. The proposed alignments for the permanent perimeter fence and utility rights-of-way fencing shall be flagged and surveyed within 24 hours prior to the initiation of fence construction. Clearance surveys of the perimeter fence and utility rights-of-way alignments shall be conducted by the Designated Biologist(s) using techniques approved by the USFWS and CDFG and may be conducted in any season with USFWS and CDFG approval. Biological Monitors may assist the Designated Biologist under his or her supervision with the approval of the CPM and USFWS. These fence clearance surveys shall provide 100 percent coverage of all areas to be disturbed and an additional transect along both sides of the fence line. This fence line transect shall cover an area approximately 90 feet wide centered on the fence alignment. Transects shall be no greater than 15 feet apart. All desert tortoise burrows, and burrows constructed by other species that might be used by desert tortoises, shall be examined to assess occupancy of each burrow by desert tortoises and handled in accordance with the USFWS' 2009 *Desert Tortoise Field Manual,* or the most recent agency guidance with the approval of the CPM. Any desert tortoise located during fence clearance surveys shall be handled by the Designated Biologist(s) in accordance with the USFWS' 2009 *Desert Tortoise Field Manual* or the most recent agency guidance with the approval of the CPM.

    a. Timing, Supervision of Fence Installation. The exclusion fencing shall be installed prior to the onset of site clearing and grubbing. Fencing shall also be placed on the proposed access roads in tortoise habitat unless otherwise approved by the CPM. The fence installation shall be supervised by the Designated Biologist and monitored by the Biological Monitors to ensure the safety of any tortoise present. The CPM shall be notified within 48 hours of fence completion. If the project is constructed in phases, prior to the initiation of clearing or grubbing for each solar plant, the project owner shall enclose the boundary of the affected solar plant with chain link fencing for security purposes and permanent desert tortoise exclusion fencing.

    b. Fence Material and Installation. The permanent tortoise exclusionary fencing shall be constructed in accordance with the USFWS' 2009 *Desert Tortoise Field Manual* (Chapter 8 – Desert Tortoise Exclusion Fence) or the most recent agency guidance with the approval of the CPM.

c. Temporary Construction Activities: Temporary construction activities including staging or parking outside of the permanent fencing shall be temporarily fenced with desert tortoise fencing to fully encompass the area prior to grounds disturbing activities to prevent desert tortoise from entering the area. The fencing use of the fencing in specific areas may be adjusted in consultation with the CPM. All fencing but be installed compliant with the timing and survey requirements identified in paragraph a, above.

d. Security Gates. Security gates shall be designed with minimal ground clearance to deter ingress by tortoises. The gates may be electronically activated to open and close immediately after the vehicle(s) have entered or exited to prevent the gates from being kept open for long periods of time. Cattle grating designed to safely exclude desert tortoise shall be installed at the gated entries to discourage tortoises from gaining entry.

e. Fence Inspections. Following installation of the desert tortoise exclusion fencing for both the permanent site fencing and temporary fencing in the utility corridors, the fencing shall be regularly inspected. Any fencing, whether temporary or permanent that is installed when tortoise are active shall be inspected two to three times daily for two weeks to ensure that desert tortoise are not fence walking to the point of exhaustion or overexposure. The same process shall occur for the first two weeks of the activity period if the fence is installed during the winter. Thereafter, permanent fencing shall be inspected monthly and during and within 24 hours following all major rainfall events. A major rainfall event is defined as one for which flow is detectable within the fenced drainage. Any damage to the fencing shall be temporarily repaired immediately to keep tortoises out of the site, and permanently repaired within 48 hours of observing damage. Inspections of permanent site fencing shall occur for the life of the project. Temporary fencing shall be inspected weekly and more often, as needed where activities are occurring in the vicinity that could damage the fence. Where drainages intersect the fencing, fencing shall be during and within 24 hours following major rainfall events. All temporary fencing shall be repaired immediately upon discovery and, if the fence may have permitted tortoise entry while damaged, the Designated Biologist shall inspect the area for tortoise.

2. Desert Tortoise Clearance Surveys within the Plant Site. Following construction of the permanent perimeter security fence and the attached tortoise exclusion fence, the permanently fenced power plant site shall be cleared of tortoises by the Designated Biologist, who may be assisted by the Biological Monitors. Clearance surveys shall be conducted in accordance with the USFWS' 2009 *Desert Tortoise Field Manual* (Chapter 6 – Clearance Survey Protocol for the Desert Tortoise – Mojave Population) or the most recent agency guidance with the approval of the CPM and shall consist of two surveys covering 100% the project area by walking transects no more

than 15-feet apart. If a desert tortoise is located on the second survey, a third survey shall be conducted. Each separate survey shall be walked in a different direction to allow opposing angles of observation. Clearance surveys of the power plant site may only be conducted when tortoises are most active (April through May or September through October). Surveys outside of these time periods require approval by USFWS and CDFG. Any tortoise located during clearance surveys of the power plant site shall be relocated and monitored in accordance with the Desert Tortoise Relocation/Translocation Plan (Condition of Certification **BIO-10**).

3. Burrow Searches. During clearance surveys all desert tortoise burrows, and burrows constructed by other species that might be used by desert tortoises, shall be examined by the Designated Biologist, who may be assisted by the Biological Monitors, to assess occupancy of each burrow by desert tortoises and handled in accordance with the USFWS' 2009 *Desert Tortoise Field Manual*. To prevent reentry by a tortoise or other wildlife, all burrows shall be collapsed once absence has been determined. Tortoises taken from burrows and from elsewhere on the power plant site shall be relocated or translocated as described in the Desert Tortoise Relocation/Translocation Plan.

4. Burrow Excavation/Handling. All potential desert tortoise burrows located during clearance surveys shall be excavated by hand (unless authorized by the CPM and USFWS), tortoises removed, and the burrows collapsed or blocked to prevent occupation by desert tortoises. All desert tortoise handling and removal, and burrow excavations, including nests, would be conducted by the Designated Biologist, who may be assisted by a Biological Monitor in accordance with the USFWS' 2009 *Desert Tortoise Field Manual.*

5. Monitoring Following Clearing. Following the desert tortoise clearance and removal from the power plant site and utility corridors, workers and heavy equipment shall be allowed to enter the project site to perform clearing, grubbing, leveling, and trenching. A Designated Biologist shall monitor clearing and grading activities to find and move tortoises missed during the initial tortoise clearance survey. Should a tortoise be discovered, it shall be relocated or translocated as described in the Desert Tortoise Relocation/ Translocation Plan to an area approved by the Designated Biologist.

6. Reporting. The Designated Biologist shall record the following information for any desert tortoises handled: a) the locations (narrative and maps) and dates of observation; b) general condition and health, including injuries, state of healing and whether desert tortoise voided their bladders; c) location moved from and location moved to (using GPS technology); d) gender, carapace length, and diagnostic markings (i.e., identification numbers or marked lateral scutes); e) ambient temperature when handled and released; and f) digital photograph of each handled desert tortoise as described in the paragraph below. Desert tortoise moved from within

project areas shall be marked and monitored in accordance with the Desert Tortoise Relocation/Translocation Plan.

Verification: All mitigation measures and their implementation methods shall be included in the BRMIMP and implemented during project construction and operation. Implementation of the measures shall be reported in the Monthly Compliance Reports by the Designated Biologist. Within 30 days after completion of desert tortoise clearance surveys the Designated Biologist shall submit a report to the CPM, USFWS, and CDFG describing implementation of each of the mitigation measures listed above. The report shall include the desert tortoise survey results, capture, and release locations of any relocated desert tortoises, and any other information needed to demonstrate compliance with the measures described above. All of these measures will be done in accordance with the approved Desert Tortoise Relocation Plan (see Condition of Certification **BIO-10**, below).

DESERT TORTOISE RELOCATION/TRANSLOCATION PLAN

BIO-10 The project owner shall develop and implement a Desert Tortoise Relocation/Translocation Plan (Plan) that is consistent with current USFWS approved guidelines. The goal of the plan shall be to safely exclude desert tortoises from within the fenced project area and relocate/translocate them to suitable habitat capable of supporting them, while minimizing stress and potential for disease transmission. The plan shall be developed in consultation with the USFWS to ensure the document does not conflict with conditions issued under an Incidental Take Statement. The plan shall include but not be limited to:

1. Translocation and Control Locations. The plan shall identify the proposed translocation recipient sites and control area. Sites shall be ranked based on the distance from the project site; distance from known hazards such as off highway vehicle locations, busy roads, or other known treats; proximity to existing populations; and known linkage areas. Translocation sites shall consider the value for recovery of local populations. The plan shall utilize the most recent USFWS guidance on translocation that includes required siting criteria. If moved outside their home range the translocation criteria include:

    a. The translocation site supports desert tortoise habitat suitable for all life stages.

    b. Disease prevalence within the resident desert tortoise population is less than 20 percent.

    c. The site is at least 10 km from major unfenced roads or highways. Distance from roads may be reduced if the proposed action includes provisions to install and maintain desert tortoise exclusion fencing as a minimization measure.

    d. The site is within 40 km of the project site, with no natural barriers to movement between them, to ensure that the desert tortoises at the two

sites were likely part of a larger mixing population and similar genetically.

e. The site occurs on lands where desert tortoise populations have been depleted or extirpated yet still support suitable habitat. Depleted areas may include lands adjacent to highways.

f. The site has no detrimental rights-of-way (ROWs) or other encumbrances.

g. The site will be managed for conservation so that potential threats from future impacts are precluded. In the project region, DWMAs, designated critical habitat units (CHUs), areas of critical environmental concern (ACECs), National Park Service lands, and BLM Wilderness Areas are managed for conservation.

2. Control Site. The plan shall consider the following USFWS guidelines for the control site.

   a. be similar in habitat type/quality, desert tortoise population size/structure, and disease status to the recipient sites;

   b. not have been previously used as a recipient site for other projects; and

   c. be a minimum distance of 10 km (6 miles) from an unfenced recipient site that has no substantial anthropogenic or natural barriers to prevent the interaction of control, resident, and translocated desert tortoises.

3. Host Population. The plan shall provide an evaluation of the habitat quality on the translocation and control sites; provide a determination of existing tortoise density, and an assessment of the sites' ability to accommodate additional tortoises above baseline conditions.

4. Holding Pens. The plan shall provide information on the type holding pens for quarantined translocated tortoises prior to their release into host populations. Pens shall be located on the project site in an area capable of ensuring the protection of the tortoises. The size of the pen shall be designed based on the expected number of desert tortoise that occur on the project site or in an area approved by the CPM. The pen shall contain adequate cover and be in an area supporting suitable soils for burrowing.

5. Tracking, Monitoring, Disease Testing, and Reporting. The plan shall provide information on the use of tracking units (GPS) on tortoises from the project site, translocation site, and control site; provide information on the short and long term monitoring and reporting of control, translocated and host populations; provide information on disease testing for long distance translocated tortoises, host, and control sites; and, identify remedial actions should excessive predation or mortality be observed. The plan shall also include provisions for removing diseased tortoises; the

development of quarantine pens; accommodating eggs hatchlings or juvenile tortoise.

Verification: At least 90 days prior to the start of any project-ground disturbing activity, the project owner shall submit the draft Desert Tortoise Relocation/Translocation Plan to the CPM for review and approval and to USFWS and CDFG for review and comment. No less than 30 days prior to the start of any project-ground disturbing activity, the project owner shall provide the CPM with the final version of a Desert Tortoise Relocation/Translocation Plan. No relocation/translocation activities may occur prior to approval of the final plan by the CPM. Any modifications to the approved plan shall be made only after approval by the CPM and in consultation with USFWS and CDFG.

Within 30 days after initiation of relocation and/or translocation activities, the Designated Biologist shall provide to the CPM for review and approval, a written report identifying which items of the plan have been completed, and a summary of all modifications to measures made during implementation of the plan. Written monthly progress reports shall be provided to the CPM for the duration of the plan implementation.

COMPLIANCE VERIFICATION

BIO-11 This condition of certification has been deleted.

DESERT TORTOISE COMPENSATORY MITIGATION

BIO-12 To fully mitigate for habitat loss and potential take of desert tortoise, the project owner shall provide compensatory mitigation for impacts to 3,258 acres of habitat or whatever acreage is actually impacted by the project footprint. Impacts to areas supporting Mojave Desert scrub shall be mitigated at ratio of 3:1 ratio (1580.5 acres) for and areas that support shadscale scrub communities at a ratio of 1:1 (1,616.5 acres). The total compensatory land acquisition required to mitigate impacts to desert tortoise shall be 6,358 acres or the ratio of lands actually impacted by the project footprint. The requirements for acquisition of the 6,358 acres of compensation lands shall include the following:

1. Responsibility for Acquisition of Lands: The responsibility for acquisition of lands may be delegated by written agreement from the CPM to a third party, such as a non-governmental organization supportive of habitat conservation. Such delegation shall be subject to approval by the CPM, in consultation with USFWS and CDFG, prior to land acquisition, enhancement, or management activities. If habitat disturbance exceeds that described in this analysis, the project owner shall be responsible for funding acquisition, habitat improvements, and long-term management of additional compensation lands or additional funds required to compensate for any additional habitat disturbances. Additional funds shall be based on the adjusted market value of compensation lands at the time of construction to acquire and manage habitat. Water and mineral rights shall be included as part of the land acquisition. Agreements to delegate land acquisition to CDFG or an approved third party and to manage

compensation lands shall be implemented within 18 months of the Energy Commission's License Decision.

2. Selection Criteria for Compensation Lands. The compensation lands selected for acquisition to meet Energy Commission and CESA requirements shall:

   a. be of equal or better habitat quality for desert tortoise and within the Eastern Mojave Recovery Unit or other location approved by the CPM in consultation with the CDFG and USFWS, with potential to contribute to desert tortoise habitat connectivity and build linkages between desert tortoise designated critical habitat, known populations of desert tortoise, and/or other preserve lands;

   b. provide habitat for desert tortoise with capacity to regenerate naturally when disturbances are removed;

   c. be near larger blocks of lands that are either already protected or planned for protection, or which could feasibly be protected long-term by a public resource agency or a non-governmental organization dedicated to habitat preservation;

   d. be connected to lands currently occupied by desert tortoise, ideally with populations that are stable, recovering, or likely to recover;

   e. not have a history of intensive recreational use or other disturbance that exceed conditions on the project site that might make habitat recovery and restoration infeasible;

   f. Compensation lands may not include existing roads in the calculations of habitat acreages;

   g. not be characterized by densities of invasive species that exceed those on the project site, either on or immediately adjacent to the parcels under consideration, that might jeopardize habitat recovery and restoration; and

   h. not contain hazardous wastes.

3. Review and Approval of Compensation Lands Prior to Acquisition. A minimum of three months prior to acquisition of the property, the project owner shall submit a formal acquisition proposal to the CPM, CDFG, and USFWS describing the parcel(s) intended for purchase. This acquisition proposal shall discuss the suitability of the proposed parcel(s) as compensation lands for desert tortoise in relation to the criteria listed above. Approval from the CPM, in consultation with CDFG and the USFWS, shall be required for acquisition of all parcels comprising the compensation acres.

4. Commission Mitigation Security: The project owner shall provide written verification to the CPM and CDFG with copies of the document(s) to the USFWS, to guarantee that an adequate level of funding is available to implement the Energy Commission Complementary Mitigation Measures described in this condition. These funds shall be used solely for implementation of the measures associated with the project. Alternatively, financial assurance can be provided to the CPM and CDFG in the form of an irrevocable letter of credit, a pledged savings account or another form of security ("security") prior to initiating ground-disturbing project activities. Prior to submittal to the CPM, the security shall be approved by CDFG and the CPM, in consultation with the USFWS, to ensure funding in the amount of $21,779,329.00. This security amount was calculated as follows and may be revised upon completion of a Property Analysis Record (PAR) or PAR-like analysis of the proposed compensation lands:

    a. land acquisition costs for compensation lands, calculated at $1,000/acre = $6,358,000;

    b. costs of initial habitat improvements to compensation lands, calculated at $250/acre = $1,589,500.00;

    c. costs of establishing an endowment for long-term management of compensation lands, calculated at $1,450/acre = $9,219,100.00;

    d. costs associated with conducting required surveys, assessments for hazardous materials, escrow fees, third party administrative costs and agency costs to accept the parcel; calculated at $4,612,729.00 (See Biological resource Table 9 for a breakdown of these costs).

5. Compensation Lands Acquisition Conditions: The project owner shall comply with the following conditions relating to acquisition of the compensation lands after the CPM, in consultation with CDFG and the USFWS, has approved the proposed compensation lands and received security as applicable and as described above.

    a. Preliminary Report: The project owner, or approved third party, shall provide a recent preliminary title report, initial hazardous materials survey report, biological analysis, and other necessary documents for the proposed acquisition acres. All documents conveying or conserving compensation lands and all conditions of title/easement are subject to a field review and approval by CDFG and the CPM, in consultation with the USFWS, California Department of General Services and, if applicable, the Fish and Game Commission and/or the Wildlife Conservation Board.

    b. Title/Conveyance: The project owner shall transfer fee title or a conservation easement to the compensation lands to CDFG under terms approved by CDFG. Alternatively, a non-profit organization qualified to manage compensation lands (pursuant to California

Government Code section 65965) and approved by CDFG and the CPM may hold fee title or a conservation easement over the habitat mitigation lands. If the approved non-profit organization holds title, a conservation easement shall be recorded in favor of CDFG in a form approved by CDFG. If the approved non-profit holds a conservation easement, CDFG shall be named a third party beneficiary. If a Security is provided, the project owner or an approved third party shall complete the proposed compensation lands acquisition within 18 months of the start of project ground-disturbing activities.

c. Initial Habitat Improvement Fund. The project owner shall fund the initial protection and habitat improvement of the compensation lands. Alternatively, a non-profit organization may hold the habitat improvement funds if they are qualified to manage the compensation lands (pursuant to California Government Code section 65965) and if they meet the approval of CDFG and the CPM. If CDFG takes fee title to the compensation lands, the habitat improvement fund must go to CDFG.

d. Long-Term Management Endowment Fund. Prior to ground-disturbing project activities, the project owner shall provide to CDFG a capital endowment in the amount determined through the Property Analysis Record (PAR) or PAR-like analysis that would be conducted for the compensation acres. Alternatively, a non-profit organization may hold the endowment fees if they are qualified to manage the compensation lands (pursuant to California Government Code section 65965) and if they meet the approval of CDFG and the CPM. If CDFG takes fee title to the compensation lands, the endowment must go to CDFG, where it would be held in the special deposit fund established pursuant to California Government Code section 16370. If the special deposit fund is not used to manage the endowment, the California Wildlife Foundation or similarly approved entity identified by CDFG shall manage the endowment for CDFG and with CDFG supervision.

e. Interest, Principal, and Pooling of Funds. The project owner, CDFG and the CPM shall ensure that an agreement is in place with the endowment holder/manager to ensure the following conditions:

   i. Interest. Interest generated from the initial capital endowment shall be available for reinvestment into the principal and for the long-term operation, management, and protection of the approved compensation lands, including reasonable administrative overhead, biological monitoring, improvements to carrying capacity, law enforcement measures, and any other action approved by CDFG designed to protect or improve the habitat values of the compensation lands.

   ii. Withdrawal of Principal. The endowment principal shall not be drawn upon unless such withdrawal is deemed necessary by the CDFG or the approved third-party endowment manager to ensure the continued viability of the species on the compensation lands. If

CDFG takes fee title to the compensation lands, monies received by CDFG pursuant to this provision shall be deposited in a special deposit fund established pursuant to Government Code section 16370. If the special deposit fund is not used to manage the endowment, the California Wildlife Foundation or similarly approved entity identified by CDFG would manage the endowment for CDFG with CDFG supervision.

iii. Pooling Endowment Funds. CDFG, or a CPM and CDFG approved non-profit organization qualified to hold endowments pursuant to California Government Code section 65965, may pool the endowment with other endowments for the operation, management, and protection of the compensation lands for local populations of desert tortoise. However, for reporting purposes, the endowment fund must be tracked and reported individually to the CDFG and CPM.

iv. Reimbursement Fund. The project owner shall provide reimbursement to CDFG or an approved third party for reasonable expenses incurred during title, easement, and documentation review; expenses incurred from other State or State-approved federal agency reviews; and overhead related to providing compensation lands.

The project owner is responsible for all compensation lands acquisition/costs, including but not limited to, title and document review costs, as well as expenses incurred from other State agency reviews and overhead related to providing compensation lands to the department or approved third party; escrow fees or costs; environmental contaminants clearance; and other site cleanup measures. The project owner shall receive a credit or refund of commission mitigation securities for all unused project areas.

Verification: No less than 30 days prior to beginning project ground-disturbing activities, the project owner shall provide written verification to the CPM that the security has been established in accordance with this condition of certification. No less than 90 days prior to acquisition of the property, the project owner shall submit a formal acquisition proposal to the CPM, CDFG, and USFWS describing the parcels intended for purchase.

The project owner, or an approved third party, shall complete and provide written verification of the proposed compensation lands acquisition within 18 months of the start of project ground-disturbing activities. Within 180 days of the land or easement purchase, as determined by the date on the title, the project owner, or an approved third party, shall provide the CPM, CDFG, and USFWS with a management plan for the compensation lands and associated funds. The CPM shall review and approve the management plan, in consultation with CDFG and the USFWS.

Within 90 days after completion of project construction, the project owner shall provide to the CPM and CDFG an analysis with the final accounting of the amount of habitat disturbed during project construction.

RAVEN MONITORING, MANAGEMENT, CONTROL PLAN AND FEE

BIO-13 The project owner shall design and implement a Raven Monitoring, Management, and Control Plan (Raven Plan) that is consistent with the most current USFWS-approved raven management guidelines. The goal of the Raven Plan shall be to minimize predation on desert tortoises by minimizing project-related increases in raven abundance. The Raven Plan shall include but not be limited to:

1. Prepare and Implement a Raven Management Plan that includes the following:

   a. Identify conditions associated with the project that might provide raven subsidies or attractants;

   b. Describe management practices to avoid or minimize conditions that might increase raven numbers and predatory activities;

   c. Describe control practices for ravens;

   d. Address monitoring and nest removal during construction and for the life of the project, and;

   e. Discuss reporting requirements.

2. Contribute to the REAT Regional Raven Management Program. The project owner shall submit payment to the project sub-account of the REAT Account held by the National Fish and Wildlife Foundation (NFWF) to support the REAT Regional Raven Management Program. The amount shall be a one-time payment of $105 per acre (3,258 acres) of permanent disturbance plus a two percent fund management fee of $348,932.00.

   For the first year of reporting the project owner shall provide quarterly reports describing implementation of the Raven Plan. Thereafter the reports shall be submitted annually for the life of the project.

Verification: At least 60 days prior to any project-related ground disturbance activities, the project owner shall submit the draft Raven Plan to the CPM for review and approval and CDFG and USFWS for review and comment. At least 30 days prior to start of any project-related ground disturbance activities, the project owner shall provide the CPM the final version of the Raven Plan. No ground disturbing activities may occur until the final plan is approved by the CPM. Any modifications to the approved Raven Plan must be approved by the CPM in consultation with USFWS and CDFG. The project owner shall notify the CPM no less than five working days before implementing any CPM approved modifications to the Raven Plan.

No fewer than 30 days prior to the start of any project-related ground disturbing activity, the project owner shall provide written verification to the CPM that the Raven Management Fee has been paid to NFWF.

Within 30 days after completion of project construction, the project owner shall provide to the CPM for review and approval a report identifying which items of the Raven Plan have been completed, a summary of all modifications to mitigation measures made during the project's construction phase, and which items are still outstanding.

AMERICAN BADGER AND DESERT KIT FOX MANAGEMENT PLAN

BIO-14 The owner shall prepare and implement an American Badger and Desert Kit Fox Management Plan. The plan shall be prepared in accordance with the most current CDFG guidelines for these species. The Management Plan must be approved by the CPM prior to implementation, and shall contain the following provisions:

Preconstruction surveys and mapping efforts: biological monitors shall perform pre-construction surveys for badger and kit fox dens in the project area, including areas within 250 feet of all project facilities, utility corridors, and access roads. If dens are detected, each den shall be classified as potentially active, or known active, including characterization of den type for kit fox (natal, pupping, likely satellite, atypical) per CDFG and/or CPM guidance, and mapped along with major project design elements.

Directions for collapse of inactive dens. Inactive dens that would be directly impacted by construction activities shall be excavated by hand and backfilled to prevent reuse by badgers or kit fox. Potentially and known active dens shall not be disturbed during the whelping/pupping season (approximately February 1 – September 30). A den may only be declared "inactive" after three days of monitoring via camera(s) and tracking medium have shown no kit fox or American badger activity.

Monitoring requirements:potentially and definitely active dens that would be directly impacted by construction activities shall be monitored by the Biological Monitor for three consecutive nights (during weather conditions favorable for detection) using a tracking medium (such as diatomaceous earth or fire clay) and/or infrared camera stations at the entrance. If no tracks are observed in the tracking medium or no photos of the target species are captured after three nights, the den shall be excavated and backfilled by hand. Backfilling dens ensure no badgers or kit fox are trapped in the den.

Passive relocation strategies: the management plan shall contain, at a minimum, several strategies to passively relocate animals from the site. These methods may entail strategic mowing, fencing, or other feasible construction methods to assist in moving animals offsite toward desirable land. The plan shall also detail methods used to discourage occupation of dens within the project site, such as use of noisemakers, citronella-based chemical deterrents, strobe lighting, ect., and shall incorporate temperature constraints if requested by the CPM or CDFG. The Plan shall address location of preferred offsite movement of animals, based on CDFG data and land ownership. Private land is to be avoided to the maximum extent practicable. The Plan shall also indicate that passive hazing is not to be used at natal dens, and shall include guidelines specific to determining when kit fox

pups are functioning independently, and when passive relocation strategies may be safely implemented. The Plan shall also prescribe use of buffer zones around dens to protect against accidental collapse or crushing by people or equipment.

Kit fox disease prevention measures. The Designated Biologist shall notify the CDFG and CPM within 24 hours if a dead kit fox is found or appears sick. The plan must also detail a response to a kit fox injury, including a necropsy plan, reporting methods, and scope of adaptive methods in the event of a known or suspected outbreak. The project owner will pay for any necropsy work.

Verification: At least 60 days prior to any project-related ground disturbing activity, the project owner shall submit an American badger and desert kit fox management plan to the CPM for review and approval and to CDFG for review and comment. No less than 30 days prior to any ground disturbing activity, the project owner shall provide one copy of the final approved plan to the CPM and implement the plan.

The project owner shall submit a report to the CPM and CDFG within 30 days of completion of badger and kit fox surveys. The report shall describe survey methods, findings, provide preliminary classification of dens and rationale, and map dens along with project features. Results of ongoing monitoring and relocation efforts shall be reported in the Monthly Compliance Reports. The project owner shall provide the CPM 24 hour notice before excavating a den classified as natal.

AVIAN, BAT, AND GOLDEN EAGLE PROTECTION PLANS

BIO-15 The project owner shall implement the following measures to monitor, mitigate and adaptively manage operational impacts to birds and bats.

1. Monitoring Study: The project owner shall prepare and implement a monitoring study to monitor the death and injury of birds and bats caused by collisions with project facilities including heliostats and solar receiver tower, injury caused by flying through concentrated solar energy within the solar field, or other project-related causes of injury or mortality including the gen-tie line and evaporation ponds. The study design shall be based on the USFWS's Monitoring Migratory Bird Take at Solar Power Facilities: An Experimental Approach (Nicolai et al 2011) or more current guidelines if available. Visual surveillance of the heliostat field shall be incorporated into study design, with the intent of documenting species and flight behavior of birds entering heliostat field, measuring elevation at which birds are flying, and documentation of effects of solar flux exposure. Special effort shall be made to collect the carcass of any bird observed colliding with project features or coming to the ground within the project boundaries, including recording Global Positioning Satellite (GPS) data. The Monitoring Study shall be subject to review and approval by the CPM in consultation with CDFG and USFWS, shall be incorporated into the project's BBCS and BRMIMP, and implemented by the Designated Biologist in coordination with the project owner, CPM, CDFG, and USFWS. The study shall be implemented, for a period of not less than 5 years (60 months) total, including the entire construction phase and not

less than 2 years during the operational phase and shall continue until the CPM concludes, in consultation with the other agencies, that the cumulative monitoring data provide sufficient basis for estimating long-term bird mortality for the project. Compensatory mitigation, if required by the CPM, shall be developed using results of the monitoring study, and in consultation with the USFWS and CDFG.

The Monitoring Study shall also detail disposition of avian and bat carcasses. All carcasses found on the solar field should be collected, labeled, and stored in a freezer. The Monitoring Study shall provide techniques and protocols to follow in proper techniques for collection, processing, and preservation of carcasses; and specifically, shall specify that flight feathers must be plucked and bagged separately from the carcass. Feather samples are not to be frozen or refrigerated. Carcass and feather samples shall be provided to the CPM or CPM's designee upon request. The CPM shall receive notification within 24 hours of detection of a threatened, endangered, or special status bird or bat carcass, and procedures to report other mortality or sublethal injury will also be included in the Monitoring Study.

2. Bird and Bat Conservation Strategy (BBCS): The project owner shall prepare and implement a Bird and Bat Conservation Strategy adopting **BIO-16**, and all applicable guidelines recommended by the USFWS (2010e) or more current guidelines that may be released. The BBCS will describe all proposed measures to minimize death and injury of birds or bats from (1) collisions with facility features including the heliostats, power towers, and gen-tie line towers or transmission lines and (2) concentrated solar energy (flux) present in the airspace over each heliosat field, and require implementation of conservation actions in response to bird, bat, and golden eagle mortality.

3. Eagle Conservation Plan (ECP): The project owner shall prepare and implement an Eagle Protection Plan adopting all applicable guidelines recommended by the USFWS (2011b) or more current guidelines that may be released. The ECP may be prepared as a stand-alone document or it may be included as a chapter within the BBCS. The ECP shall describe all available baseline data on golden eagle occurrence, seasonality, activity, and behavior throughout the project area and vicinity. The ECP shall outline a study protocol to include annual pedestrian and/or helicopter surveys of golden eagle breeding sites within a 10 mile radius of the project site, to be reviewed and approved by the CPM, in consultation with the USFWS.

   The ECP shall describe all proposed measures to minimize death and injury of eagles from (1) collisions with facility features including the heliostats, power towers, and gen-tie line towers or transmission lines, electrocutions on transmission lines or other project components, and (3) concentrated solar flux created over the solar field. The ECP shall specify the project owner's anticipated take of golden eagles. The ECP shall provide an inventory of existing electrical distribution lines within a 20-mile radius of the project site that do not conform to APLIC (2006) design

standards to prevent golden eagle electrocution. The inventory shall identify the owner or operator and estimate the number of non-conforming poles for each distribution line. The ECP shall specify that for each anticipated project-related take of a bald or golden eagle, 11 utility poles will be retrofitted to APLICstandards within one year of the take.

The ECP shall also include any feasible modifications to proposed plant operation to avoid or minimize focusing heliostats at standby points and, instead, move heliostats into a stowed position or another alternative configuration when the power plant is in partial standby mode. The ECP also shall identify any additional feasible conservation measures to minimize collisions and exposure to solar flux. The ECP shall provide a reporting schedule for all monitoring or other activities related to bird or bat conservation or protection to be taken during project construction or operation. The ECP shall be subject to review and approval by the CPM in consultation with CDFG and USFWS, and shall be incorporated into the project's BRMIMP and BBCS, and implemented.

Verification: The draft Monitoring Study, BBCS and ECP shall be submitted to the CPM for review in consultation with CDFG, and USFWS, and shall be finalized by the project owner and submitted to the CPM and other agencies no less than 30 days prior to construction. At least 30 days prior to the start of any project-related ground disturbance activities, the project owner shall provide the CPM, CDFG, and USFWS with the a final draft of all three documents, as reviewed and approved by the CPM in coordination with the other agencies. The project owner shall obtain the CPM's written approval of the Monitoring Study, BBCS and ECP prior to the start of any project-related ground disturbance activities.

The project owner shall provide the CPM with copies of any written or electronic transmittal from the USFWS indicating the status of Monitoring Study, BBCS and ECP review and any permit that may be required, and any follow-up actions required by the applicant, within 30 days of receiving such transmittal from USFWS.

Methods and results of the Monitoring Study shall be submitted to the CPM in Monthly and Annual Compliance Reports throughout the course of the study and until the CPM, in consultation with the other agencies, concludes that the cumulative monitoring data provide sufficient basis for estimating long-term bird mortality for the project. The Reports will include all monitoring data required as part of the monitoring program.

Each year throughout the minimum 5 year monitoring period, the Designated Biologist shall submit an Annual Report to the CPM, CDFG, and USFWS by January 31 of each calendar year, summarizing all available bird and bat mortality data (species, date and location collected, evidence of injury and cause of death) collected over the course of the year. The report shall provide any recommendations for future monitoring and adaptive management actions. The report also shall summarize any additional wildlife mortality or injury documented on the project site during the year, regardless of cause. The Annual Report shall be subject to review and approval by the CPM in consultation with CDFG and USFWS. The project owner shall submit revisions within 30 days of receiving written comments from the CPM. At the direction of the CPM, in consultation with the other agencies, the study period will be extended based on data quality and

sufficiency for analysis or if needed to document efficacy of any adaptive management measures undertaken by the project owner. If a carcass of a golden eagle or any state or federally listed threatened or endangered species is found at any time, the project owner or Designated Biologist shall contact CDFG and USFWS within one working day of receipt of the carcass to report the mortality and for guidance on disposition of the carcass.

PRE-CONSTRUCTION NESTING BIRD SURVEYS

BIO-16 Pre-construction nest surveys shall be conducted if construction activities will occur from February 1 through August 15. The Designated Biologist or Biological Monitor conducting the surveys shall be experienced bird surveyors and familiar with standard nest-locating techniques. Surveys shall be conducted in accordance with the following guidelines:

1. Surveys shall cover all potential nesting habitat in the project site and within 500 feet of the boundaries of the plant site and linear facilities;

2. At least two pre-construction surveys shall be conducted, separated by a minimum 10-day interval. One of the surveys shall to be conducted within the 10 days preceding initiation of construction activity. Additional follow-up surveys may be required if periods of construction inactivity exceed one week in any given area, an interval during which birds may establish a nesting territory and initiate egg laying and incubation;

3. If active nests are detected during the survey, a no-disturbance buffer zone (protected area surrounding the nest, the size of which is to be determined by the Designated Biologist in consultation with CDFG, USFWS, and CPM) and a monitoring plan shall be developed. The nesting bird plan shall identify the types of birds that may nest in the project area, the proposed buffers, monitoring requirements, and reporting standards that will be implemented to ensure compliance with the Migratory Bird Treaty Act and Fish and Game Codes 3505 and 3505.3. Nest locations shall be mapped using GPS technology and submitted, along with a weekly report stating the survey results, to the CPM; and

4. The Designated Biologist shall monitor the nest until he or she determines that nestlings have fledged and dispersed. Activities that might, in the opinion of the Designated Biologist and in consultation with the CPM, disturb nesting activities shall be prohibited within the buffer zone until such a determination is made.

Verification: At least 10 days prior to the start of any project-related ground disturbance activities, the project owner shall provide the CPM a letter-report describing the findings of the pre-construction nest surveys, including the time, date, and duration of the survey; identity and qualifications of the surveyor(s); and a list of species observed. If active nests are detected during the survey, the report shall include a map or aerial photo identifying the location of the nest and shall depict the boundaries of the no-disturbance buffer zone around the nest. All nest avoidance measures will be implemented and reported in the Monthly Compliance Report.

BURROWING OWL IMPACT AVOIDANCE, MINIMIZATION, AND COMPENSATION MEASURES

BIO-17 The project owner shall implement the following measures to avoid and offset impacts to burrowing owls:

1. Pre-Construction Surveys. Concurrent with desert tortoise clearance surveys the Designated Biologist shall conduct pre-construction surveys for burrowing owls within the project site and along all linear facilities in accordance with CDFG guidelines (CDFG 2012). Pre-construction surveys for burrowing owls shall occur no more than 30 days prior to initiation of ground disturbance or site mobilization activities. The survey area shall include the Project Disturbance Area (the Project Disturbance Area means all lands disturbed in the construction and operation of the HHSEGS Project) and surrounding 500 foot survey buffer where access is legally available.

2. Implement Impact Avoidance Measures. If an active burrowing owl burrow is detected within 500 feet from the Project Disturbance Area the following avoidance and minimization measures shall be implemented:

   a. Establish Non-Disturbance Buffer. Fencing shall be installed at a 250-foot radius from the occupied burrow to create a non-disturbance buffer around the burrow. The non-disturbance buffer and fence line may be reduced to 160 feet if all project-related activities that might disturb burrowing owls would be conducted during the non-breeding season (September 1st through January 31st). Signs shall be posted in English and Spanish at the fence line indicating no entry or disturbance is permitted within the fenced buffer.

   b. Monitoring: If construction activities would occur within 500 feet of the occupied burrow during the nesting season (February 1 – August 31st) the Designated Biologist or Biological Monitor shall monitor to determine if these activities have potential to adversely affect nesting efforts, and shall implement measures to minimize or avoid such disturbance.

3. Prepare Burrowing Owl Relocation and Mitigation Plan. The project owner shall prepare and implement a Burrowing Owl Relocation and Mitigation Plan, in addition to the avoidance measures described above. The final Burrowing Owl Relocation and Mitigation Plan shall be approved by the CPM, in consultation with USFWS and CDFG, and shall:

   a. Identify and describe potential relocation sites on lands controlled by the applicant and describe measures to ensure that burrow installation or improvements would not affect sensitive species habitat or existing burrowing owl colonies in the relocation area;

   b. Provide guidelines for creation or enhancement of at least two natural or artificial burrows per relocated owl, including a discussion of timing

of burrow improvements, specific location of burrow installation, and burrow design. Design of the artificial burrows shall be consistent with CDFG guidelines (CDFG 2012) and shall be approved by the CPM in consultation with CDFG and USFWS;

c. Passive relocation sites shall be in areas of suitable habitat for burrowing owl nesting, and be characterized by minimal human disturbance and access. Relative cover of non-native plants within the proposed relocation sites shall not exceed the relative cover of non-native plants in the adjacent habitats;

d. Provide detailed methods and guidance for passive relocation of burrowing owls occurring within the Project Disturbance Area; and

4. Acquire Compensatory Mitigation Lands for Burrowing Owls. For the purposes of the FSA staff is assuming that a minimum of two burrowing owl territories would be lost on the project site. Assuming the project will result in the loss of two territories (each with a territory of 300 acres (CDFG 2012) the Project owner shall acquire, in fee or in easement, 600 acres of land the total compensatory requirements for this project will be based on the number of burrowing owls determined during pre-construction surveys but shall be no less than two territories described in this condition.

   The project owner shall provide funding for the enhancement and long-term management of these compensation lands. The acquisition and management of the compensation lands may be delegated by written agreement to CDFG or to a third party, such as a non-governmental organization dedicated to habitat conservation, subject to approval by the CPM, in consultation with CDFG and USFWS prior to land acquisition or management activities. Additional funds shall be based on the adjusted market value of compensation lands at the time of construction to acquire and manage habitat. In lieu of acquiring lands itself, the Project owner may satisfy the requirements of this condition by depositing funds into the Renewable Energy Action Team (REAT) Account established with the National Fish and Wildlife Foundation (NFWF), as described in Section 3.i. of Condition of Certification **BIO-12**.

   Criteria for Burrowing Owl Mitigation Lands. The terms and conditions of this acquisition or easement shall be as described in Paragraph 1 of **BIO-12** [Desert Tortoise Compensatory Mitigation], with the additional criteria to include: 1) the mitigation land must provide suitable habitat for burrowing owls, and 2) the acquisition lands must either currently support burrowing owls or be within dispersal distance from an active burrowing owl nesting territory (generally approximately 5 miles). The burrowing owl mitigation lands may be included with the desert tortoise mitigation lands ONLY if these two burrowing owl criteria are met. If the burrowing owl mitigation land is separate from the acquisition required for desert tortoise compensation lands, the Project owner shall fulfill the requirements described below in this condition.

Security. If burrowing owl mitigation land is separate from the acreage required for desert tortoise, the project owner or an approved third party shall complete acquisition of the proposed compensation lands prior to initiating ground-disturbing Project activities. The project owner shall provide financial assurances to the CPM and CDFG to guarantee that an adequate level of funding is available to implement the Energy Commission Complementary Mitigation Measures described in this condition. These funds shall be used solely for implementation of the measures associated with the project. Alternatively, financial assurance can be provided to the CPM and CDFG in the form of an irrevocable letter of credit, a pledged savings account or another form of financial security ("security") prior to initiating ground-disturbing project activities. Prior to submittal to the CPM, the security shall be approved by CDFG and the CPM, to ensure funding in the amount of $1,185,000.00. This security amount was calculated as follows and may be revised upon completion of a Property Analysis Record (PAR) or PAR-like analysis of the proposed compensation lands:

a. land acquisition costs for compensation lands, calculated at $1,000/acre = $600,00.00;

b. costs of initial habitat improvements to compensation lands, calculated at $250/acre = $150,000.00;

c. costs of establishing an endowment for long-term management of compensation lands, calculated at $1,450/acre = $870,000.00.

d. costs associated with conducting required surveys, assessments for hazardous materials, escrow fees, third party administrative costs and agency costs to accept the parcel; calculated at $585,000.00 (See Biological resource Table 9 for a breakdown of these costs).

The final amount due will be determined by the PAR analysis conducted pursuant to **BIO-12**.

Verification: If staff determines that compensatory mitigation is required, the project owner will provide the CPM with verification that security has been provided prior to the start of any project-related ground disturbance activities.

If pre-construction surveys detect burrowing owls within 500 feet of proposed construction activities, the Designated Biologist shall provide to the CPM, CDFG and USFWS documentation indicating that non-disturbance buffer fencing has been installed at least 10 days prior to the start of any construction-related ground disturbance activities. The project owner shall report monthly to the CPM, CDFG, and USFWS for the duration of construction on the implementation of burrowing owl avoidance and minimization measures. Within 30 days after completion of construction the project owner shall provide to the CPM, CDFG and USFWS a written construction termination report identifying how mitigation measures described in the plan have been completed.

If pre-construction surveys detect burrowing owls within the Project Disturbance Area, the project owner shall notify the CPM, CDFG and USFWS no less than 10 days of completing the surveys that a relocation of owls is necessary. The project owner shall do all of the following if relocation of one or more burrowing owls is required:

1. Within 30 days of completion of the burrowing owl pre-construction surveys, submit to the CPM, CDFG and USFWS a Burrowing Owl Relocation and Mitigation Plan.

2. No later than 30 days prior to the start of construction-related ground disturbing activities, the project owner shall provide written verification to the CPM of the establishment of the financial security in accordance with this condition of certification.

3. Within 90 days of the land or easement purchase, as determined by the date on the title, the project owner shall provide the CPM with a management plan for review and approval, in consultation with CDFG and USFWS, for the compensation lands and associated fund.

4. No less than 90 days prior to acquisition of the burrowing owl compensation lands, the project owner, or an approved third party, shall submit a formal acquisition proposal to the CPM, CDFG, and USFWS describing the parcel intended for purchase. At the same time the project owner shall submit a PAR or PAR-like analysis for the parcels for review and approval by the CPM, CDFG and USFWS.
5. No later than 18 months after the start of construction-related ground disturbance activities, the project owner shall provide written verification to the CPM, CDFG and USFWS that the compensation lands or conservation easements have been acquired and recorded in favor of the approved recipient.

6. By January 31st of each year following construction for a period of five years, the Designated Biologist shall provide a report to the CPM, USFWS, and CDFG that describes the results of monitoring and management of the burrowing owl relocation area, if applicable. The annual report shall provide an assessment of the status of the relocation area with respect to burrow function and weed infestation, and shall include recommendations for actions the following year for maintaining the burrows as functional burrowing owl nesting sites and minimizing the occurrence of weeds.

WEED MANAGEMENT PLAN

BIO-18 To minimize the potential indirect effects of weeds on biological resources adjacent to the project, the project owner shall submit a draft Weed Management Plan subject to review and approval by the CPM. The general objective of the Weed Management Plan shall be to: 1) manage or contain weed species of greatest environmental concern for the life of the project to prevent their spread into adjacent offsite habitat, and 2) prevent the accidental introduction of new weed species from contaminated vehicles and equipment entering the site during construction or soil disturbing activities

"Target" weed species for long-term containment shall include any weed occurring within the WMAs described above that meet the following definition: a) California Invasive Plant Council (Cal-IPC) "High"-rank weeds; b) California

Department of Food & Agriculture (CDFA) and Nevada Department of Agriculture (NDA) "A"-rated and "B"-rated weeds, and c) all weeds on the Federal weed list. Only the species of greatest environmental concern and/or limited distribution onsite shall be mandated for eradication. Weed management is not required for common and widespread weed species.

The draft weed management plan shall include the following:

1. Weed Plan Requirements. The draft plan shall include the following information: a) specific weed management objectives and measures for each target non-native weed species; b) description of the baseline conditions; c) map of the weed management and monitoring areas showing locations of existing populations of target weeds; d) weed risk assessment based on Cal-IPC[8],Nature Conservancy[9]; BLM, or other acceptable criteria, and e) measures that would be used to contain, manage, or monitor identified priority weed species; f) measures that would be used to prevent the introduction and spread of weeds on vehicles, equipment, and materials (e.g., infested seed, straw, gravel, etc.); g) measures to minimize the risk of unintended harm to wildlife and other plants from weed control activities; h) monitoring and surveying methods; and i) reporting requirements.

2. Avoidance and Treatment of Dense Weed Populations. The draft plan shall include guidelines for avoiding or treating dense populations of the weed species identified as priorities for containment. If grading and construction cannot avoid the worst, they shall be contained by one of the following methods: a) requiring tires of vehicles and equipment operating in infested areas to be cleaned before leaving the infested area; b) treating the infested areas in the season prior to construction and spraying the new crop of plants that emerge in early spring, c) removing the upper 2 inches of soil and disposing it offsite at a sanitary landfill or other site approved by the County Agricultural Commissioner, or d) burying the infested soil, e.g., under the solar facility or in a pit, and covering the infested soil with at least three feet of uncontaminated soil.

3. Cleaning Vehicles and Equipment. The draft plan shall include specifications and requirements for establishing a cleaning station for removal of weed seed and weed plant parts from vehicles and equipment entering and leaving the site. Vehicles and equipment working in weed-infested areas (including previous job sites) shall be required to clean the equipment tires, tracks, and undercarriage before entering the project area and before moving from infested areas of the project site to uninfested

[8] Warner, Peter J., Carla C. Bossard, Matthew L. Brooks, Joseph M. DiTomaso, John A. Hall, Ann M. Howald, Douglas W. Johnson, John M. Randall, Cynthia L. Roye, Maria M. Ryan, and Alison E. Stanton. 2003. *Criteria for Categorizing Invasive Non-Native Plants that Threaten Wildlands.*California Exotic Pest Plant Council and Southwest Vegetation Management Association. 24 pp. Online:.

[9]Morse, L.E., J.M. Randall, N. Benton, R. Hiebert, and S. Lu. 2004. *An Invasive Species Assessment Protocol: Evaluating Non-Native Plants for Their Impact on Biodiversity.*[v1]. The Nature Conservancy. Arlington, Va. Online: http://www.natureserve.org/library/invasiveSpeciesAssessmentProtocol.pdf

areas. Cleaning shall adequately remove all visible dirt and plant debris. Cleaning using hand tools, such as brushes, brooms, rakes, or shovels, is preferred. If water must be used, the water/slurry shall be contained to prevent seeds and plant parts from washing into adjacent habitat.

4. Treatment of Weed Populations near Special-status Plants. The draft plan shall include a requirement to prioritize the containment of invasive non-native weeds onsite that occur onsite and within 100 feet of any of the nine offsite special-status plant occurrences immediately adjacent to the project boundary. The draft plan shall also include measures for preventing accidental harm to the adjacent offsite occurrences during spraying or other weed management activities according to the guidelines in #6, below. The plan shall not include spraying or mechanical treatments of common and widespread weeds around the perimeter to avoid harming wildlife; the focus shall instead be on spot treatment of new outbreaks and small populations of the most invasive species, and according to the guidelines for wildlife-safe herbicide use described under #7 and #8, below.

5. Employee Weed Awareness Training. A program shall be developed and incorporated into the WEAP and BRMIMP to train construction and operation employees to recognize the most common and most invasive species in the area, how to avoid contaminating vehicles and equipment, how to avoid spreading weeds offsite or introducing new weed species onsite, and how to protect wildlife and adjacent offsite special-status plant occurrences from accidental harm during weed management activities. Employees shall be trained to understand the common vectors and conduits for spread, the economic and ecological impacts of weeds, and trained on procedures for reporting infestations.

6. Compensate Local Agencies for Increased Weed Monitoring and Abatement. The project owner and the Inyo/Mono Agricultural Commissioner shall establish an amount for a fee to be paid annually by the project owner to the local agency for increased offsite monitoring and abatement costs resulting from the construction and operation of the project. A summary of California's weed laws is available online: <http://www.cdfa.ca.gov/plant/ipc/encycloweedia/winfo_weedlaws.htm>

7. Safe Use of Herbicides. The draft plan shall include a list of herbicides and soil stabilizers that will be used on the project with manufacturer's guidance on appropriate use. The draft plan shall indicate under what circumstances herbicides will be used, and what techniques will be used to avoid chemical drift. Guidance for safe herbicide use is available in *Safe Herbicide Handling in Natural Areas* (Hillmer et al. 2003). Only weed control measures for target weeds with a demonstrated record of success shall be used, based on the best available information from sources such as The Global Invasive Species Team "Invasipedia"[10], Cal-IPC Invasive

[10] http://wiki.bugwood.org/Invasipedia

Plant Profiles[11],and the California Department of Food & Agriculture Encycloweedia[12].

8. Weed Control Methods. The methods for weed control described in the draft plan shall meet the following criteria:

   a. Manual: Seed heads and plants removed manually must be disposed of in accordance with guidelines from the Inyo County Agricultural Commissioner (or Clark or Nye County commissioners if disposed in Nevada).

   b. Chemical: Herbicides known to have residual toxicity, such as soil fumigants, pre-emergent herbicides and pellets shall not be used. In sensitive areas immediately adjacent to offsite special-status plant occurrences, sprayers shall be operated at low pressure or with a shield attachment to control drift, and spraying conducted on windless days;

   c. Biological: Biological methods, if used, shall be subject to agency review to avoid inadvertent naturalizing, hybridizing with native species;

   d. Mechanical: Mechanical trimmers shall not be used during periods of high fire risk or shall only be implemented during early morning hours when the fire risk is lowest. Contact information for the local fire department and Cal-Fire shall be clearly posted at all times. A live water supply, shovels, and fire extinguishers shall be available at all times during mowing and other mechanical weed controls.

Verification: At least 90 days prior to the start of any project-ground disturbing activity, the project owner shall submit the draft Weed Management Plan to the CPM for review and approval. No less than 30 days prior to the start of any project-ground disturbing activity, the project owner shall provide the CPM with the final version of the Weed Management Plan. Any modifications to the approved plan shall be made only after approval by the CPM.

No less than 60 days prior to start of any project-related ground disturbance activities, the project owner shall provide the CPM with a copy of an agreement between the project owner and local agricultural commissioner(s) regarding compensation for increased weed monitoring and abatement costs, and provide written evidence that the first annual fee has been paid.

Within 60 days after completion of project construction, the project owner shall provide to the CPM for review and approval a written report identifying which items of the Weed Management Plan have been completed, a summary of all modifications to mitigation measures made during the project's construction phase, and which items are still outstanding.

[11] http://www.cal-ipc.org/ip/management/plant_profiles/index.php

[12] http://www.cdfa.ca.gov/plant/ipc/encycloweedia/encycloweedia_hp.htm

As part of the Annual Compliance Report, each year following construction the Designated Biologist shall provide a report to the CPM that includes: a) a summary of the results of noxious weed surveys and management activities for the year; b) discussion of whether weed management goals and objectives for the year were met; c) documentation that weeds targeted for containment did not spread offsite (beyond existing background levels for species that also occur offsite); documentation that methods were employed to prevent accidental harm to adjacent sensitive resources, and d) recommendations for weed management activities for the upcoming year.

SPECIAL-STATUS PLANT IMPACT AVOIDANCE AND MINIMIZATION MEASURES

BIO-19 The project owner shall prevent accidental impacts to special-status plant occurrences offsite that are in close proximity to project activities through the measures described below. The project owner is not responsible for managing or monitoring special-status plant occurrences offsite. The project owner shall incorporate all measures for protecting special-status plants in close proximity to the site into the BRMIMP (BIO-7). These measures shall include the following elements:

a. Modify construction techniques: Incorporate modifications to construction techniques to avoid accidental and indirect impacts to special-status plants around the project perimeter. Examples include: limiting the width of the work area; adjusting the location of staging areas, lay downs, secondary access roads; and modifying the location of discharge points of any diverted channels to maintain existing surface drainage patterns.

b. Establish Environmentally Sensitive Areas (ESAs). Prior to the start of any ground- or vegetation-disturbing activities, the Biological Monitor shall establish special-status plants located outside of the project and adjacent to the project boundary as temporary Environmentally Sensitive Areas (ESAs) to protect the offsite occurrences from accidental impacts during construction and operation. The adjacent offsite occurrences shall be marked at the project boundary with temporary construction fencing and temporary signage during construction activities in close proximity to the offsite occurrences. The adjacent offsite occurrences shall also be clearly depicted on construction drawings as ESAs.

c. Worker Environmental Awareness Program (WEAP). The WEAP **(BIO-6)** shall include a requirement for informing employees and contractors about the presence of adjacent offsite special-status plant occurrences and components specific to protection of special-status plants as outlined in this condition.

d. Herbicide and Soil Stabilizer Drift Control Measures. Special-status plant occurrences shall be protected from herbicide as described in the Weed Management Plan (**BIO-18**), and shall also be protected from fugitive dust and soil stabilizer drift..

e. Avoid Weed Contaminated Erosion and Sediment Control Materials. Any seed mixes used for erosion control shall not include invasive plants. Erosion-control seed mixes, straw, and other mulches, if used, shall be certified weed-free. These specifications shall be incorporated in the Drainage, Erosion, and Sedimentation Control Plan required under **SOIL-1**.

f. Locate Staging, Parking, Spoils, and Storage Areas Away from Special-Status Plant Occurrences. Spoil piles, equipment, vehicles, and materials storage areas, parking areas, equipment and vehicle maintenance areas, and wash areas shall be placed at least 100 feet from any offsite special-status plant occurrences.

g. Monitoring and Reporting Requirements. The Designated Biologist shall conduct regularly scheduled monitoring of the ESAs and other measures designed to protect adjacent offsite special-status plant occurrences during construction activities in close proximity. The monitoring report shall include: a) dates of worker awareness training sessions and attendees; b) map showing the location of all special-status plant occurrences within 100 feet of the project boundary (including linears and access roads); c) location and description of avoidance measures implemented; d) description of the status, health, and threats to special-status plant occurrences adjacent to the project boundary; e) location description of any unanticipated or unpermitted adverse impacts to occurrences and remedial action taken; and f) outstanding follow-up items and recommendations for remedial action in the next year.

Verification: The Monthly Compliance Reports prepared by the Designated Biologist during construction shall include documentation that the special-status plant avoidance and minimization measures were implemented as described in this condition.

The project owner shall submit a monitoring report every year for the life of the project according to the specifications listed above to monitor effectiveness of protection measures for all avoided special-status plants to the CPM.

SPECIAL-STATUS PLANT COMPENSATORY MITIGATION PLAN

BIO-20 To mitigate for significant impacts to special-status plants that occur on the project site, the project owner shall implement mitigation to offset the impact as described below. One or more mitigation options could be implemented to fulfill the mitigation ratios and requirements described below. These options include: a) acquisition of mitigation lands containing viable occurrences that meet the criteria and performance standards described below, and protecting those occurrences in perpetuity under a conservation easement, or b) restoration of at-risk occurrences according to the criteria and performance standards described below. The project owner shall provide funding for the acquisition and long-term maintenance and management of the acquired lands as described below.

1) Compensatory Mitigation Ratio for Compensation Lands. Significant impacts to four species (gravel milk-vetch, Wheeler's skeletonweed, Torrey's joint-fir, and Preuss' milk-vetch) shall be mitigated by acquiring and preserving offsite occurrences under a permanent conservation easement. Three offsite occurrences shall be protected for every S1 ("critically imperiled") species affected and two offsite occurrences protected for every S2 ("imperiled") species affected. Range ranks (e.g., an S1S2 rank) shall defer to the more imperiled rank. Acquisition lands containing more than one of the affected species shall be credited for both species. Integration of special-status plant mitigation land with other mitigation lands is described below.

   The compensation lands selected for acquisition must meet the following selection criteria: a) the compensation lands selected for acquisition shall be occupied by the target plant population and shall be characterized by site integrity and habitat quality adequate to sustain the population, and b) shall be of equal or better habitat quality than that of the affected occurrence. The occurrence of the target special-status plant on the proposed acquisition lands should be viable, stable or increasing.

2) Review and Approval of Compensation Lands Prior to Acquisition. A Draft Special-status Plant Mitigation Plan (Plan) shall be prepared subject to review and approval of the CPM prior to acquisition. The Draft Plan shall discuss the suitability of the proposed parcel(s) as compensation lands for special-status plants in relation to the criteria listed above. The project owner shall submit the final Plan and formal acquisition proposal to the CPM describing the parcel(s) intended for purchase, and must be approved by the CPM.

3) Management Plan. The project owner, or approved third party as described below under "Title and Conveyance", shall prepare a management plan for the compensation lands in consultation with the entity that will be managing the lands. The goal of the management plan shall be to support and enhance the long-term viability of the target special-status plant occurrences. The management plan shall also include long-term monitoring and reporting on the implementation, effectiveness and compliance with the conservation goals and objectives of the mitigation. The Management Plan shall be submitted for review and approval to the CPM.

4) Integrating Special-Status Plant Mitigation with Other Mitigation Lands. If all or any portion of the acquired Desert Tortoise, Waters of the State, or other required compensation lands meets the criteria above for special-status plant compensation lands, the portion of the other species' or habitat compensation lands that meets any of the criteria above may be used to fulfill that portion of the obligation for special-status plant mitigation. Mitigation obligations for special-status plants shall not be fulfilled by nesting with other mitigation lands if the lands do not meet all the criteria and performance standards described in this condition.

Potential mitigation lands containing more than one of the significantly affected species would be credited for both species, i.e., one parcel could be used to fulfill the mitigation obligations for more than one special-status plant species providing the parcel met all the selection criteria.

5) Compensation Lands Acquisition Requirements. The project owner shall comply with the following requirements relating to acquisition of the compensation lands after the CPM, has approved the proposed compensation lands:

   a. Preliminary Report. The project owner, or an approved third party, shall provide a recent preliminary title report, biological analysis, and other necessary or requested documents for the proposed compensation land to the CPM. All documents conveying or conserving compensation lands and all conditions of title are subject to review and approval by the CPM.

   b. Title/Conveyance. The project owner shall acquire and transfer fee title to the compensation lands, a conservation easement over the lands, or both fee title and conservation easement, as required by the CPM. Any transfer of a conservation easement or fee title must be to a non-profit organization qualified to hold title to and manage compensation lands (pursuant to California Government Code section 65965), or to CDFG or other public agency approved by the CPM. If an approved non-profit organization holds fee title to the compensation lands, a conservation easement shall be recorded in favor of the deed holder approved by the CPM. The CPM may require that another entity approved by the CPM be named a third party beneficiary of the conservation easement. The project owner shall obtain approval of the CPM of the terms of any transfer of fee title or conservation easement to the compensation lands.

   c. Initial Protection and Habitat Improvement. The project owner shall fund activities that the CPM requires for the initial protection and habitat improvement of the compensation lands, if habitat improvement is necessary. These activities will vary depending on the condition and location of the land acquired, but may include: initial enhancement (e.g., signs, fencing, protection from off-road vehicles); restoration actions needed to maintain the viability of the occurrences (e.g., removal of invasive species, barricading and decommissioning off-road vehicle trails, protection from herbivores, managing public access, enforcement); and monitoring and reporting on implementation, effectiveness and compliance with the conservation goals and objectives of the mitigation. For determining the amount of security, the cost of these activities would use the estimated cost per acre for Desert Tortoise mitigation as a best available proxy. The actual costs will vary depending on the measures that are required for the compensation lands and shall be determined by a PAR or similar analysis. A non-profit organization or another public agency may hold

and expend the habitat improvement funds if it is qualified to manage the compensation lands (pursuant to California Government Code section 65965), and if it meets the approval of the CPM.

d. Property Analysis Record. Upon identification of the compensation lands, the project owner shall conduct a Property Analysis Record (PAR) or PAR-like analysis to establish the appropriate amount of the long-term maintenance and management fund to pay the in-perpetuity management of the compensation lands. The PAR or PAR-like analysis must be approved by the CPM before it can be used to establish funding levels or management activities for the compensation lands.

e. Long-term Maintenance and Management Funding. The project owner shall deposit into an account managed by a land trust or other non-profit organization to fund a capital long-term maintenance and management fee (endowment) in the amount determined through the Property Analysis Record (PAR) or PAR-like analysis conducted for the compensation lands. The CPM may designate another non-profit organization to hold the long-term maintenance and management fee if the organization is qualified to manage the compensation lands in perpetuity.

f. Interest, Principal, and Pooling of Funds. The project owner shall ensure that an agreement is in place with the long-term maintenance and management fund (endowment) holder/manager to ensure the following requirements are met:

    i. Interest. Interest generated from the initial capital long-term maintenance and management fund shall be available for reinvestment into the principal and for the long-term operation, management, and protection of the approved compensation lands, including reasonable administrative overhead, biological monitoring, improvements to carrying capacity, law enforcement measures, and any other action that is approved by the CPM and is designed to protect or improve the habitat values of the compensation lands.

    ii. Withdrawal of Principal. The long-term maintenance and management fund principal shall not be drawn upon unless such withdrawal is deemed necessary by the CPM or by the approved third-party long-term maintenance and management fund manager, to ensure the continued viability of the target species on the compensation lands.

    iii. Pooling Long-Term Maintenance and Management Funds. An entity approved to hold long-term maintenance and management funds for the project may pool those funds with similar funds that it holds from other projects for long-term maintenance and

management of compensation lands for special-status plants. However, for reporting purposes, the long-term maintenance and management funds for this project must be tracked and reported individually to the CPM.

g. Other Expenses. In addition to the costs listed above, the project owner shall be responsible for all other costs related to acquisition of compensation lands and conservation easements, including but not limited to the title and document review costs incurred from other state agency reviews, overhead related to providing compensation lands to an approved third party, escrow fees or costs, environmental contaminants clearance, and other site cleanup measures.

h. Mitigation Security. The project owner shall provide financial assurances to the CPM to guarantee that an adequate level of funding is available to implement any of the mitigation measures required by this condition that are not completed prior to the start of ground-disturbing project activities. Financial assurances shall be provided to the CPM in the form of an irrevocable letter of credit, a pledged savings account or another form of financial security ("Security") approved by the CPM. The estimated acquisition costs and amount of the security shall be calculated based on the estimated cost per acre for Desert Tortoise mitigation as a best available proxy. The actual costs to comply with this condition will vary depending on the actual costs of acquiring compensation habitat, the costs of initially improving the habitat, and the actual costs of long-term management as determined by a PAR report. Prior to submitting the Security to the CPM, the project owner shall obtain the CPM's approval of the form of the Security. The CPM may draw on the Security if the CPM determines the project owner has failed to comply with the requirements specified in this condition. The CPM may use money from the Security solely for implementation of the requirements of this condition. The CPM's use of the Security to implement measures in this condition may not fully satisfy the project owner's obligations under this condition, and the project owner remains responsible for satisfying the obligations under this condition if the Security is insufficient. The unused Security shall be returned to the project owner in whole or in part upon successful completion of the associated requirements in this condition.

2. Compensation through Restoration of At-Risk Occurrences. As an alternative or adjunct to acquisition of compensation lands, the project owner may undertake or fund habitat enhancement or restoration for at-risk occurrences of the target special-status plant species. Examples of suitable restoration projects include but are not limited to the following: a) control of unauthorized vehicle use into an occurrence; b) control of invasive non-native plants that pose an immediate threat to an occurrence; c) fencing to exclude grazing by wild burros or livestock from an occurrence; d) protection from other herbivores (e.g. lagomorphs) if

damaging to the occurrence, or e) restore lost or degraded hydrologic or geomorphic functions critical to the species (e.g., restoring previously diverted stream flows, removing obstructions to the wind sand transport corridor above an occurrence, or increasing groundwater availability for dependent species). Ex-situ mitigation through transplanting or replacement planting is not an acceptable mitigation option due to the high rate of failure.

i. Performance Standards. If the project owner elects to undertake a habitat enhancement project for mitigation, the project must meet the following performance standards: The proposed enhancement project shall achieve rescue of an off-site occurrence that is currently assessed, based on the NatureServe threat ranking system, with one or more of the following: a) long-term decline >30%; b) an immediate threat that affects >30% of the population, or c) has an overall threat impact that is High to Very High. “Rescue” would be considered successful if it achieves an improvement in the occurrence trend to “stable” or “increasing” status, or downgrading of the overall threat rank to slight or low (from “High” to “Very High”).

ii. Mitigation Security. The project owner shall provide financial assurances to the CPM to guarantee that an adequate level of funding is available to implement the restoration project. Financial assurances shall be provided to the CPM in the form of an irrevocable letter of credit, a pledged savings account or another form of financial security (“Security”) approved by the CPM. The amount of the security shall be based on the estimated total cost for the restoration project, including implementation, monitoring, and contingency measures. The implementation and monitoring of the restoration may be undertaken by an appropriate third party, or the project owner may fund an agency to implement the restoration, subject to approval by the CPM. Any restoration undertaken on private lands must be protected in perpetuity under a conservation easement.

iii. Prepare Restoration Plan. If the project owner elects to undertake a restoration project for mitigation, they shall submit a Restoration Plan to the CPM for review and approval. The Restoration Plan shall include each of the following components:

  i. Goals, Objectives, and Performance Standards. Define the goals of the restoration or enhancement project and a measurable course of action developed to achieve those goals. The objective of the proposed habitat enhancement plan shall include restoration of a target special-status plant occurrence that is currently threatened with a long-term decline. The proposed enhancement plan shall achieve an improvement in the occurrence trend to “stable” or “increasing” status, or downgrading of the overall threat rank to slight or low (from “High” to “Very High”).

  ii. Baseline, Historical, and Desired Conditions. Provide a description of the pre-project baseline conditions (prior to the start of

restoration), an estimate of the pre-impact historical conditions (before the site was degraded by weeds or grazing or ORV, etc.), and the desired conditions.

iii. Site Characteristics. Describe other site characteristics relevant to the restoration or enhancement project (e.g., composition of native and pest plants, topography and drainage patterns, soil types, geomorphic and hydrologic processes important to the site or species).

iv. Ecological Factors. Describe other important ecological factors of the species being protected, restored, or enhanced such as total population, reproduction, distribution, pollinators, etc.

v. Methods. Describe the restoration methods that will be used (e.g., invasive exotics control, site protection, seedling protection, propagation techniques, etc.) and the long-term maintenance required. The implementation phase of the enhancement must be completed within five years.

vi. Budget. Provide a detailed budget and time-line, and develop clear, measurable, objective-driven annual success criteria.

vii. Monitoring. Develop clear, measurable monitoring methods that can be used to evaluate the effectiveness of the restoration and the benefit to the affected species. The Plan shall include a minimum of five years of quarterly monitoring, and then annual monitoring for the remainder of the enhancement project, and until the performance standards for rescue of a threatened occurrence are met. At a minimum the progress reports shall include: quantitative measurements of the projects progress in meeting the enhancement project success criteria, detailed description of remedial actions taken or proposed, and contact information for the responsible parties.

viii. Reporting Program. The Plan shall ensure accountability with a reporting program that includes progress toward goals and success criteria. Include names of responsible parties.

ix. Contingency Plan. Describe the contingency plan for failure to meet annual goals.

x. Long-term Protection. Include proof of long-term protection for the restoration site. For private lands this would include conservations easements or other deed restrictions; projects on public lands must be protected under a Wilderness designation, ACEC, DWMA, National Park or State Park lands.

3. Preservation of the Germplasm of Affected Special-Status Plants. This is not an alternative to mitigation by acquisition or restoration, but is a required contingency measure for all significantly affected special-status plants as a contingency in the event of mitigation failure. Mitigation by acquisition or restoration shall also include seed or propagule collection from the affected special-status plants population onsite prior to

construction to conserve the germplasm and provide a seed source for restoration efforts. The seed shall be collected under the supervision or guidance of a reputable seed storage facility such as the Rancho Santa Ana Botanical Garden Seed Conservation Program, San Diego Natural History Museum, or the Missouri Botanical Garden. The costs associated with the long-term storage of the seed shall be the responsibility of the Project owner. Any efforts to propagate and reintroduce special-status plants from seeds in the wild shall be carried out under the direct supervision of specialists such as those listed above and as part of a Restoration Plan approved by the CPM.

4. Criteria for Adjusting Mitigation Ratio for Torrey's joint-fir. Due to the uniquely high potential for finding many additional Torrey's joint-fir occurrences (see Special-status Plant Impacts subsection for explanation), the project owner may conduct pre-construction surveys before June 1, 2013, focused on Torrey's joint-fir. Surveys must be conducted onsite as well as offsite. If the discovery of new occurrences in fall 2012 or spring 2013 results in a downgrading of the CNDDB Element Rank from an S1 to S2, the species will be mitigated as an S2 species (see subparagraph #1). If the new occurrences result in a downgrading from S1 to S3 ("vulnerable but not under immediate threat of extinction"), AND the proportion of the statewide distribution affected by the project is less than 10 percent, then mitigation for Torrey's joint-fir shall no longer be required.

Verification: No fewer than 90 days prior to the start of project ground-disturbing activities, the project owner shall submit to the CPM for review and approval a conceptual proposal for mitigation by one or both of the two methods described in this condition (acquisition and restoration) that meets the criteria and performance standards described above, and according to the mitigation ratios described above.

The project owner shall provide the CPM, no less than 30 days prior to the start of any project related ground-disturbing activities, written verification that an approved financial security in accordance with this condition of certification has been established.

No later than June 15 of the first summer following the Final Decision, the project owner shall provide the CPM documentation that seed or other propagules have been collected for all the affected species and submitted to either Rancho Santa Ana Botanical Garden Seed Conservation Program, San Diego Natural History Museum, or the Missouri Botanical Garden.

No later than 30 days following the discovery of any new occurrences of Torrey's joint-fir, the project owner shall submit raw GPS data, metadata, and CNDDB field forms to the CPM. The project owner shall immediately provide written notification to the CPM, CDFG and/or USFWS and BLM if it detects a state- or federal-listed plant species.

Prior to acquisition of the property, the project owner shall submit a formal acquisition proposal to the CPM describing the parcels intended for purchase, or final restoration plan, according to the minimum requirements for a plan described above.

The project owner, or an approved third party, shall complete and provide written verification of the proposed compensation lands acquisition no later than 18 months following the start of project ground disturbing activities. Within 180 days of the land or easement purchase, as determined by the date on the title, the project owner, or an approved third party, shall provide the CPM, with a management plan for the compensation lands and associated funds. The CPM shall review and approve the management plan.

No fewer than 30 days after acquisition of the property the Project owner shall deposit the funds required for long term management, as described above, and provide proof of the deposit to the CPM.

The Project owner or an approved third party shall complete the acquisition and all required transfers of the compensation lands, and provide written verification to the CPM of such completion no later than 12 months after the start of Project ground-disturbing activities. If NFWF or another approved third party is being used for the acquisition, the Project owner shall ensure that funds needed to accomplish the acquisition are transferred in timely manner to facilitate the planned acquisition and to ensure the land can be acquired and transferred prior to the 18-month deadline. If habitat enhancement is proposed, no later than six months following the start of ground-disturbing activities, the Project owner shall obtain CPM approval of the final Habitat Enhancement/Restoration Plan, prepared in accordance with Section D, and submit to the CPM or a third party approved by the CPM Security adequate for long-term implementation and monitoring of the Habitat Enhancement/Restoration Plan.

Restoration activities shall be initiated no later than 12 months following the start of construction. The implementation phase of the enhancement project shall be completed within five years of initiation. Until completion of the five-year implementation portion of the enhancement action, a report shall be prepared and submitted as part of the Annual Compliance Report. This report shall provide, at a minimum: a summary of activities for the preceding year and a summary of activities for the following year; quantitative measurements of the Project's progress in meeting the enhancement project success criteria; detailed description of remedial actions taken or proposed; and contact information for the responsible parties.

BOTANIST QUALIFICATIONS AND DUTIES

BIO-21 The project owner's approved Designated Biologist shall oversee the selection and hiring of qualified botanist(s) to implement the tasks in **BIO-18** (Weed Management Plan), **BIO-19** (Special-status Plant Avoidance and Minimization Measures), **BIO-20** (Special-status Plant Compensatory Mitigation), and **BIO-23** (Groundwater-dependent Vegetation Monitoring) specified below that must be accomplished by a qualified botanist. All other tasks described in these measures not contained in the list below may be accomplished by the Designated Biologist. The Designated Biologist shall submit to the CPM for approval the resume, at least three references, and contact information for the qualified botanist(s) to fulfill the tasks below. The resume(s) shall demonstrate, to the satisfaction of the CPM the appropriate education and experience to accomplish the assigned botanical resource tasks.

Botanist(s) must meet the following minimum qualifications:

1) Demonstrated knowledge of: a) general plant taxonomy and natural community ecology; b) familiarity with the plants of the area, including special status species; and c) familiarity with natural communities of the project area;

2) At least five years experience conducting floristic field surveys;

3) At least five years experience working in the California Desert region;

4) Familiarity with the appropriate state and federal statutes related to plants and protocols or guidelines for conducting botanical inventories; and

5) At least five years experience analyzing the impacts of development on native plant species and natural communities.

Tasks requiring a qualified botanist shall include the following:

1) Advise the project owner's construction and operation managers, and the Designated Biologist on the implementation of botanical resource conditions of certification;

2) Conduct and/or train, supervise and coordinate botanical resources compliance efforts in close proximity to special-status plant occurrences as described in **BIO-18** (Weed Management Plan) and **BIO-19** (Special-status Plant Avoidance and Minimization Measures);

3) Mark special-status plant occurrences in close proximity to the project and inspect these areas at appropriate intervals for compliance with conditions of certification affecting or relating to special-status plants as described in **BIO-19**;

4) Prepare the Weed Management Plan as described in **BIO-18** and conduct the surveying and annual monitoring required in the plan;

5) Consult and/or prepare the Special-status Plant Compensatory Mitigation plans for restoration and/or proposals for acquiring compensation lands, and conduct annual monitoring required in the plans; and

6) Conduct and/or train and supervise the Designated Biologist in the implementation of **BIO-23** (Groundwater-dependent Vegetation Monitoring).

Verification: At least 60 days prior to construction-related ground disturbance, the project owner shall submit the resume to the CPM for a botanist to conduct the tasks described above under tasks #1 and #2. Once approved, the project owner shall provide written verification to the CPM that the qualified botanist is available to implement the required mitigation measures during construction. No construction-

related ground disturbance, site mobilization, grading, boring, trenching, chemical spraying, or weed management within 100 feet of a special-status plant occurrence shall commence until an approved botanist has surveyed and marked the special-status plant occurrences adjacent to the project as Environmentally Sensitive Areas as described in **BIO-19** (Special-status Plant Avoidance and Minimization Measures).

STATE WATERS COMPENSATORY MITIGATION AND IMPACT AVOIDANCE & MINIMIZATION MEASURES

BIO-22 To satisfy requirements of California Fish and Game Code sections 1600 and 1607, the project owner shall implement measures contained herein for: 1) compensating unavoidable impacts to all Waters of the State located within the project footprint, and 2) for avoiding and minimizing accidental, incidental and indirect impacts to waters located outside the project footprint. For purposes of this condition, "project footprint" means all lands contained within the boundaries of the project components, including access roads, utility and transmission alignments, staging areas, and temporary construction areas. Avoidance and minimization measures for work within or adjacent to waters shall be implemented during construction, operation, and decommissioning, including site mobilization.

1. Complete and Submit Section 1600 Notification Form and Fees. Coordinate with CDFG to submit a formal 1600 application and associated fees. Submit a final revised state waters delineation report to include additional features identified during the field verification of the state waters delineation.

2. Compensatory Mitigation. The project owner shall acquire and preserve under a permanent conservation easement a parcel or parcels of land that contain jurisdictional state waters in an amount equal to the area of state waters delineated within the project footprint and mitigated at a ratio of 2:1 (two acres for every acre of state waters onsite) for permanent impacts to habitat functions and values. This ratio assumes that impacts to the hydrologic and geomorphic functions will be minimized by not diverting streams around the site in artificial channels. If the channels are diverted around the site, the mitigation ratio shall increase to a ratio of 3:1. The project owner shall provide associated funding for the long-term stewardship of the acquired lands, as specified below.

    a. Selection Criteria. Compensation lands for impacts to state waters shall meet the following criteria:

        i. Located in California and within the Pahrump Valley Hydrologic Unit. If the project owner demonstrates that suitable compensation lands are not available within Pahrump Valley, lands may be acquired in California Valley, or the California portions of Sandy (Mesquite) Valley and Stewart Valley or other adjacent watersheds.

        ii. Contain waters in a general physiographic setting similar to the affected waters (i.e., alluvial fan washes) or that provide similar

habitat function and values. Proposed mitigation sites shall be described in terms of habitat function and values, in the context of the habitat function and values that were impacted at the project site, in a proposal submitted to the CEC and subject to approval by the CPM in consultation with CDFG;

iii. Contain waters of a similar or better quality than the affected waters. Subject to review and approval of the CPM in consultation with CDFG, lands degraded by unauthorized off-road vehicles (ORV) may be considered if the project owner can demonstrate that the unauthorized ORV can be excluded and controlled with road decommissioning and signage;

iv. Contain waters that are hydrologically unimpaired upstream by dams or diversions. Subject to review and approval of the CPM in consultation with CDFG, impaired waters may be considered if it can be demonstrated that the hydrologic functions can be restored and are accompanied by a restoration proposal;

v. Do not contain hazardous wastes that cannot be removed; and

vi. Contain water and mineral rights as part of the acquisition, unless the CPM, in consultation with CDFG, agrees in writing to the acceptability of the land.

b. Integrating Special-Status Plant Mitigation with Other Mitigation Lands. Any portion of the acquired Desert Tortoise or other required compensation lands meets the criteria above for state waters may be used to fulfill that portion of the obligation for state waters mitigation.

c. Security for Implementation of Mitigation: The project owner shall provide financial assurances to the CPM to guarantee that an adequate level of funding is available to implement the acquisitions and enhancement of state waters as described in this condition. These funds shall be used solely for implementation of the measures associated with the project. Financial assurance can be provided to the CPM in the form of an irrevocable letter of credit, a pledged savings account or Security prior to initiating ground-disturbing project activities. Prior to submittal to the CPM, the mitigation security shall be approved by the CPM, in consultation with CDFG. The final amount due shall be determined by updated appraisals and the PAR analysis conducted pursuant to **BIO-12** (Desert Tortoise Compensatory Mitigation).

d. Prepare Management Plan for Stewardship of Acquired Lands: The project owner shall submit a draft State Waters Mitigation Management Plan subject to review and approval by the CPM and CDFG. The goal of the plan is to protect the integrity of the washes and their habitat functions and values from unauthorized ORV and other threats, or to restore degraded functions and values as described in #2 (a) above.

Acquired lands must be protected in perpetuity under a conservation easement as described in **BIO-12** (Desert Tortoise Compensatory Mitigation).

e. Compensation Lands Acquisition Requirements. The project owner shall comply with the requirements relating to acquisition of the compensation lands described in **BIO-12** (Desert Tortoise Compensatory Mitigation).

3. Avoidance and Minimization Measures. The measures described below shall be implemented during construction, operation, and closure for any project-related activity that may directly or indirectly affect offsite waters adjacent to the project boundary, and to minimize impacts to the hydrologic and geomorphic functions of waters onsite, including water quality. Such activities include ground or vegetation disturbing activities, weed and vegetation management activities, and pre-construction mobilization. The project owner shall provide a discussion of work in or adjacent to Waters of the State, and the avoidance and minimization measures employed to protect offsite waters from accidental or indirect effects in the Annual Compliance Reports.

   a) Guidelines for Stream Crossings. The project owner shall minimize disturbance to surface drainage patterns and sediment transport in watercourses downstream of the project. Arizona crossings shall be employed for improvements to project access roads wherever such crossings do not present a safety hazard and where the roadbed elevation allows the construction of such crossings. Crossings shall be constructed to accommodate the full natural width of the channel (bank-to-bank) for single-thread channels, and the full width of the floodplain for braided distributary channels. Streams that have been graded for temporary construction access shall be restored to original contours and surface drainage patterns and shall be stabilized according to specifications in **SOIL-1**.

   b) Diffuser Design. For any diverted watercourse, the project owner shall maintain pre-development surface drainage patterns downstream of the project, in location and approximate volume of flows. Flows shall not be discharged indiscriminately as sheet flow across the entire length of the diffusers, irrespective of the natural surface drainage patterns, but shall instead be designed to discharge within existing watercourse boundaries downstream, or within the active floodplain of braided distributary stream types.

   c) Documentation at the Site and Project Entry. The project owner shall provide a copy of this condition from the Energy Commission Decision to all contractors, subcontractors, and the owner's project supervisors and Designated Biologist. Copies shall be readily available at work sites at all times during periods of active work and must be presented to any CDFG personnel upon demand. The CPM reserves the right to

issue a stop work order or allow CDFG to issue a stop work order after giving notice to the project owner and the CPM, if the CPM in consultation with CDFG, determines that the project owner has breached any of the terms or conditions or for other reasons, including but not limited to the following:

i) The information provided by the project regarding impacts to waters of the state is incomplete or inaccurate;

ii) New information becomes available that was not known in preparing the terms and conditions; or

iii) The project or project activities as described in the Staff Assessment have changed.

d) Best Management Practices. During construction, operation, closure, and pre-construction mobilization, the following Best Management Practices (BMPs) shall be implemented to avoid accidental impact during construction or indirect effects to state waters:

i) During the pre-construction planning stage identify gravel storage areas, staging areas, access roads, parking, turnarounds, and equipment refueling & maintenance areas to minimize impacts to any delineated state waters outside of the permitted work area. Staging, storage, equipment maintenance and re-fueling shall be located a minimum of 30 feet from the uphill side of streams and their active floodplain to protect water quality downstream. The boundaries of those work areas shall be clearly marked on all final site plan and construction drawings.

ii) Prior to the start of construction, establish the stream zones offsite or outside the permitted work area that are adjacent to work activities as Environmentally Sensitive Areas (ESAs). No earth-moving activities, vegetation removal, vehicles, heavy equipment, material storage, equipment maintenance or re-fueling, or other construction activities shall be permitted within the ESAs. Work shall not begin until the boundary of the ESAs are delineated on the ground with orange safety netting where they occur adjacent to work activities (e.g., along the project boundary) under supervision of the Biological Monitor. The ESAs shall be depicted on all final maps and specifications.

iii) Construction activities shall be timed with awareness of precipitation forecasts, and shall be started only if the local weather forecast predicts no probability of rain for a period of 72 hours. Construction activities shall cease and water quality, erosion and sediment control measures shall be implemented prior to storm events to prevent erosion and sedimentation, and contamination of stormwater runoff. Activities outside of the sensitive areas

described above are not confined to this time period, but at no time shall heavy equipment operate during wet weather.

iv) The project owner shall minimize road building, construction activities and vegetation clearing on streams within the site wherever possible by limiting the width of the work area. Access to the site shall be on existing access roads.

v) In the event of wet weather, the project owner shall not allow water containing mud, silt, or other pollutants from grading, aggregate washing, or other activities to enter streams outside the permitted work area, or be placed in locations that may be subjected to storm runoff. Prior to the start of work, including any equipment move-on or materials storage, install silt-fencing, straw bales, sediment catch basins, straw or coir logs or rolls, or other sediment barriers to keep erodible soils and other pollutants from entering state waters outside the permitted work area. Extra sediment, pollutant, and erosion control materials shall be stockpiled onsite to address any unanticipated rain events, problems and emergencies.

vi) No broken concrete, debris, soil, silt, sand, gravel, rubbish, cement or concrete wash water, oil or petroleum products, or other contaminants shall be allowed to enter into, or placed where it may be washed by rainfall or runoff into waters of the state outside the permitted work area. The contractor shall immediately contain and clean up any petroleum or other chemical spills with absorbent materials such as sawdust or cat litter. For other hazardous materials, follow cleanup instructions on the package.

e) Changes of Conditions. A formal notification shall be provided to the CPM and CDFG if a change of conditions is identified. As used here, change of condition refers to the process, procedures, and methods of operation of a project; the biological and physical characteristics of a project area; or the laws or regulations pertinent to the project as defined below. A copy of the change of conditions notification shall be included in the annual reports or until it is deemed unnecessary by the CPM, in consultation with CDFG. A change in biological conditions includes, but is not limited to, the following: the presence of biological resources within or adjacent to the project area, whether native or non-native, not previously known to occur in the area; or the presence of biological resources within or adjacent to the project area, whether native or non-native, the status of which has changed to endangered, rare, or threatened, as defined in section 15380 of Title 14 of the California Code of Regulations. A change in physical conditions includes, but is not limited to, the following: a change in the morphology of a river, stream, channel or lake, such as the lowering of a bed or scouring of a bank, or substantial changes in stream form and configuration caused by storm events; the movement of a river or stream channel to a different location; a reduction of or other change in

vegetation on the bed, channel, or bank of a drainage; or changes to the hydrologic regime such as fluctuations in the timing or volume of water flows in a river or stream.

f) Legal Conditions: a change in legal conditions includes, but is not limited to, a change in Regulations, Statutory Law, a Judicial or Court decision, or the listing of a species, the status of which has changed to endangered, rare, or threatened, as defined in section 15380 of Title 14 of the California Code of Regulations.

Verification: No less than 60 days prior to beginning project ground-disturbing activities, the project owner shall provide to the CPM design drawings of drainage diffusers or other discharge points depicting how these structures restore pre-development drainage patterns (location and volume of flows) to any watercourses located downstream of the project boundaries. At the same time the project owner shall provide design drawings for temporary and permanent stream crossings.

No less than 30 days prior to the start of construction-related ground disturbance activities, the project owner shall provide written verification (i.e., through incorporation into the BRMIMP) to the CPM that the above BMPs will be implemented. No later than 60 days prior to beginning ground-disturbing activities, a formal 1600 application and fees shall be submitted to CDFG, and the project owner shall provide the CPM a copy of the 1600application and verification of payment of CDFG 1600 fees. A copy of the final state waters delineation shall be incorporated into the BMIMP.

The project owner shall provide the CPM, no less than 30 days prior to the start of any project related ground-disturbing activities, written verification that an approved security for compensatory mitigation in accordance with this condition of certification has been established. The financial security will be used to purchase compensatory habitat for impacts to state waters and must be accomplished no later than 18 months from the start of any project-related construction activities. A copy of the final recorded deed showing transfer of mitigation land or documentation of other approved mitigation transaction as approved by the CPM.

No less than 90 days prior to the acquisition of the compensation lands, the project owner shall submit a formal acquisition proposal, including PAR analysis, to the CPM and CDFG. The draft State Waters Mitigation Management Plan shall be provided to the CDFG and CPM no less than 60 days after acquisition of the compensation lands.

GROUNDWATER-DEPENDENT VEGETATION MONITORING PLAN

BIO-23 The project owner shall prepare and implement a draft and final Groundwater-dependent Vegetation Monitoring Plan (Vegetation Monitoring Plan) that, in conjunction with the Groundwater Monitoring, Mitigation, and Reporting Plan (**WATER SUPPLY-4**), will protect groundwater-dependent ecosystems (GDEs) within the influence of the project pumping wells from the impacts of project-related groundwater drawdown. The plans require monitoring to track the impacts of pumping to groundwater levels as they develop during the life of the project, and define triggers for adaptive management to be implemented if data indicate impending adverse effects.

The project owner shall submit a draft Vegetation Monitoring Plan to the CPM for review and approval by the CPM, in consultation with the BLM Nevada and BLM California State Lead for Soil, Water, Air and Riparian Programs, the BLM Southern Nevada District and Barstow District Hydrologist and Botanist, and Inyo County Water Department. The Vegetation Monitoring Plan shall meet the performance standards, monitoring objectives, and guidelines for content of the plan and monitoring methods specified in this condition.

If water level monitoring, as described in **WATER SUPPLY-4**, identifies a projected 0.5 foot or greater water level decline at the property boundary due to project pumping, the project owner shall cease pumping and reduce or modify pumping to restore water levels to pre-threshold levels unless evidence, subject to review and approval by the CPM, in consultation with the parties listed above, demonstrates the drawdown trigger was exceeded due to factors other than the project pumping *and* the project did not contribute to the drawdown. Alternatively, the project may provide evidence through vegetation monitoring and soil coring described in this condition, and through updated predictive hydrologic trend analysis, that a greater drawdown will meet all performance standards contained in this condition for avoiding significant adverse impacts to groundwater-dependent vegetation.

1. Trigger for Adaptive Management. If water levels in either of the Power Block 1 or Power Block 2 Onsite Monitoring Wells identify a projected 0.5 foot or greater water level decline at the property boundary due to project pumping during construction or operation, as described in **WATER SUPPLY-4**, the project owner shall stop project pumping until the project owner provides evidence, subject to approval by the CPM, can demonstrate:

   a) the pumping can be reduced or modified to maintain groundwater levels above the 0.5 ft. drawdown threshold at the project boundary; or

   b) the drawdown trigger was exceeded due to factors other than the project pumping and the project did not contribute to the drawdown; or

   c) through vegetation monitoring and soil coring described in this condition, and predictive water level trend analysis described in **WATER SUPPLY-4**, subsection C.2, that a greater groundwater drawdown will not result in significant adverse impacts to the groundwater dependent vegetation.

2. Peer Review. The draft Vegetation Monitoring Plan shall undergo a peer review by three or more recognized experts in the development of sampling and monitoring plans for plant populations; responses of desert phreatophytes (groundwater-dependent plants) to drought stress or groundwater depletion; and biostatistics. The peer reviewers shall be selected and organized by the CPM, in consultation with the BLM Nevada and BLM California state leads for Soil, Water, Air and Riparian Programs, and the BLM Southern Nevada District and BLM Barstow District

Hydrologist and Botanist, and Inyo County Water Department. The cost of the peer review shall be paid by the project owner. The peer review panel described above is required only for the review of the draft Vegetation Monitoring Plan; all other approvals shall be made by the CPM, in consultation with BLM and Inyo County as described in this condition.

3. Monitoring Objectives and Performance Standards. The goal of the monitoring is to avoid impacts to the mesquite habitats and other nearby GDEs from project groundwater pumping before it results in any plant mortality or any drawdown-related stress from which the GDEs cannot recover fully within one season following detection, and based on the techniques for field measurements and establishing normal seasonal variation and variability between populations described in this condition under "Field Techniques". The objectives of the Vegetation Monitoring Plan shall be to monitor the project effects of groundwater pumping on GDEs at a level of detail necessary for: a) protecting GDEs from significant adverse effects; b) distinguishing project effects from the effects of background trends or normal seasonal variation; and c) distinguishing project effects from natural variability between populations or monitoring plots. Distinguishing project water level effects from background effects or the effects of nearby wells shall be accomplished through the monitoring plan described in **WATER SUPPLY-4**.

4. Definitions. "Sampling", as used in this condition, is the process of selecting a part of something with the intent of showing the quality or nature of the whole. "Baseline monitoring" is the assessment of existing (pre-pumping) conditions to provide a standard, or baseline against which future change is measured. "Normal seasonal variation" in vegetation attributes shall be established by comparing attributes in vegetation between the peak growing season and the hottest and driest time of year. "Variability within the population" shall be established by measuring differences in the vegetation attributes between plots. "Groundwater-dependent vegetation" shall include any plant communities dominated or obligate or facultative "phreatophytes" (groundwater-dependent plant). GDEs include these plant communities and aquatic habitats that are groundwater-supported, such as seeps and springs. A "significant adverse effect to the GDEs" shall be defined as the level of drought stress from which a groundwater-dependent species or habitat cannot fully recover in one season following detection.

5. Minimum Standards for Revising Drawdown Trigger. As described in **WATER SUPPLY-4** subsection C.5, and in this condition under "Trigger for Adaptive Management", the water level-based trigger for adaptive action may be revised in 0.5-foot increments if the project owner can demonstrate that a groundwater drawdown greater than 0.5 feet will not result in significant adverse impacts to the groundwater-dependent vegetation. Modification of the drawdown trigger requires consideration of the following evidence: a) observed water level changes in monitoring wells; b) quantitative field measures of groundwater-dependent vegetation

response to lowering water tables as described in this condition; c) observations of rooting depths from soil cores, as described in this condition; d) updated predictive hydrologic trend analyses from well data collected during project operation, as described in **WATER SUPPLY-4**; and e) hydrogeologic variability between populations or monitoring plots. BLM and Inyo County shall be consulted regarding the resetting of the adaptive action trigger.

Alternately, the pumping can be reduced or modified to maintain groundwater levels above the 0.5 ft. drawdown threshold at the project boundary. Using methods described in **WATER SUPPLY-4** for statistical trend analysis of monitoring well data, the project must provide evidence, subject to approval by the CPM in consultation with BLM and Inyo County, of the maximum pumping rate that will not exceed the maximum drawdown indicated by the data for the life of the project.

6. Prepare an Updated Inventory and Map of Groundwater-dependent Species and Ecosystems (GDEs). The map of GDEs prepared for this project (CH2 2011c, Data Response Set 1A, Figure D48-1), shall be amended to include seeps and springs identified by BLM or through ground surveys and any plant community dominated by obligate or facultative phreatophytes. The map shall be accompanied by a list of all obligate and facultative phreatophytes contained in each GDE. Phreatophytes observed in the project botanical resource study area include (but are not limited to): honey mesquite (*Prosopis glandulosa*); four-wing saltbush (*Atriplex canescens*); allscale (*A. polycarpa*); spiny saltbush (*A. spinescens*); bush seep-weed (*Suaeda moquinii*); desert baccharis (*Baccharis sergiloides*); alkali goldenbush (*Isocoma acradenia*); the non-native salt cedar (*Tamarix* spp.).

7. Permanent Monitoring Plots. The vegetation monitoring shall be conducted within GDEs located: a) east of the project and nearest to the project boundary, as depicted in HHSEGS Data Response Set 1A, Figure D48-1 (CH2 2011c), and b) within the BLM Stump Spring ACEC and between the ACEC and the project pumping wells. No GDEs occur within the project boundary and monitoring plots shall not be located in upland plant communities that are not groundwater-dependent.

8. Baseline and Long-term Data Collection. Baseline data shall be collected at all vegetation monitoring sites beginning as soon as feasible upon project approval to facilitate the determination of background trends (decline) from other sources, including climate conditions. Data on existing or baseline conditions shall be updated each year until a drawdown is detected at the project boundary to establish any background trends. Future change is compared against the baseline, and adjusted for any background decline, such as a regional drop in water levels or vegetation decline from climate conditions established in the baseline trend. Data collection shall continue for the life of the project unless the CPM determines, in consultation with BLM Nevada and BLM California state

leads for Soil, Water, Air and Riparian Programs, BLM Southern Nevada District and BLM Barstow District Hydrologist and Botanist, and Inyo County Water Department, that if no project-related drawdown is detected at the project boundary and not expected based on refined hydrologic trend analysis, or pumping ceases and groundwater levels have returned to baseline levels, the project may stop or reduce its monitoring obligation.

9. Timing. Vegetation monitoring shall be conducted twice annually during the same two week time period during the peak growing period and during the hottest and driest time of year locally. Timing of well monitoring shall be conducted as described in **WATER SUPPLY-4**.

10. Monitoring Controls. The "controls" shall consist of the data collected at plots during the baseline (pre-pumping) data collection period and compared against future change following the start of pumping. Because of the potential for variability in GDE characteristics and depth to groundwater among the different monitoring plot locations, the study design shall treat the monitoring plot and corresponding control (i.e., baseline data from the same plot) as a pair, rather than comparing the mean of all treatment plots to the mean of all control plots. Appropriate statistical methods shall be used to analyze the differences between the control and monitoring plots (for example, a one-tailed paired-sample statistical test (Manly 2008)[13].

11. Field Techniques for Measuring Vegetation Response to Drought Stress. Vegetation monitoring shall employ only sensitive, reliable, and objective field measures of drought stress that can detect the earliest warning signs of an adverse effect. These include: 1) xylem (stem) water potential; 2) gas exchange rate, and 3) transpiration rate. Ecophysiological thresholds shall be established only after field calibrating the measurements to establish normal seasonal variation, and variability between plots or populations. The Vegetation Monitoring Plan must demonstrate knowledge of the biology of the species and their morphological responses to stress. Photo monitoring shall not be considered an acceptable monitoring method but may be useful to aid in the presentation of monitoring results. Field techniques that rely on visual estimates shall not be used. The draft Plan shall describe how the data will be recorded in the field, processed and stored.

12. Minimum Standards for Sampling Design. The sample size and sampling design shall be sufficient to achieve adequate statistical power of 90 percent or better, with a Type I error rate (false-change error rate) of 10 percent or less. The minimum detectable change, or biologically significant change in vegetative measurements of drought stress, shall be established by conducting measurements in the field as described under "Field techniques" in this condition, and calibrated or adjusted for normal seasonal variation and variability between plots.

[13] Manly 2008 – Manly, B., *Statistics for Environmental Science and Management* (2nd ed), CRC Press/Chapman and Hall, 292 pp.

Following collection of the first year baseline data, statistical analysis shall be conducted to refine the power analysis and evaluate the adequacy of the sampling design. If the analysis of baseline data (at the near-project plots and reference plots) indicates that the sampling design is insufficient to achieve adequate statistical power, the design shall be modified (for example, by adding additional monitoring sites or reducing the deviation among sampling units) to attain the desired level of precision. The sampling design shall be informed by *Measuring and Monitoring Plant Populations* (Elzinga et al. 1998)[14] and *Sampling Vegetation Attributes* (Coulloudon et al. 1999)[15]. The draft Vegetation Monitoring Plan shall also describe how groundwater elevation monitoring data collected pursuant to **WATER SUPPLY-4** would be used to interpret the vegetation data.

13. Soil Core Sampling. Subject to approval by BLM or other appropriate local, state, or federal permit requirements, soil core samples may be collected from the GDEs on BLM lands offsite to establish the rooting depth of the mesquite and other phreatophytes. The coring method must provide a continuous core that will provide visual examination of roots and root nodules, soil profile, and soil moisture.

14. Parties Responsible for Monitoring. All data collection shall be conducted or supervised by a qualified botanist (**BIO-21**). The Designated Biologist may conduct monitoring under the training and supervision of a qualified botanist. Monitoring data shall be quality-checked annually by the CPM, in consultation with BLM Nevada and BLM California, and the Inyo County Water Department.

15. Access to Monitoring Data. Copies of monitoring reports and data shall be available to the CPM and BLM at all times. The CPM reserves the right to issue a stop pumping order after giving notice to the project owner if the CPM determines the monitoring data provided is incomplete or inaccurate.

16. Semi-Annual Monitoring Report. Monitoring Reports shall be submitted to the CPM, BLM Nevada and BLM California state leads for Soil, Water, Air and Riparian Programs, the BLM Southern Nevada District and BLM Barstow District Hydrologist and Botanist, and Inyo County Water Department twice annually and shall include: names and contact information for the responsible parties and monitoring personnel; description of sampling and monitoring techniques used for each attribute; results of the vegetation and groundwater level monitoring; comparison of predicted versus actual water table declines; trends and other analyses based on the statistical tests and methods described in this condition and in the final Vegetation Monitoring Plan; photos; and

[14]Elzinga, C.L., D.W. Salzer, and J.W. Willoughby. 1998*. Measuring and monitoring plant populations.* BLM Technical Reference 1730-1, Denver, CO. 477 pages.

[15]Coulloudon et al. 1999.*Sampling Vegetation Attributes*. BLM Technical Reference 1734-4.National Business Center, Denver, CO. 158 p.

conclusions and recommendations. The first Annual Monitoring Report shall also include an appropriate statistical analysis of baseline monitoring data to assess whether the sampling design was adequate to attain sampling precision as described above, and how the study design was adjusted to ensure performance standards were met.

Verification: No less than 90 days prior to start of any project-related groundwater pumping, the project owner shall provide a draft Groundwater-dependent Vegetation Monitoring Plan to the CPM for peer review. The project owner shall revise the final draft based on the recommendations of the peer review within 45 days, and submit the final draft to the CPM for review and approval, in consultation with BLM Nevada and BLM California state leads for Soil, Water, Air and Riparian Programs, and the BLM Southern Nevada District and BLM Barstow District Hydrologist and Botanist, and Inyo County Water Department.

Collection of baseline monitoring data shall begin the first spring or fall following the Final Decision.

The Vegetation Monitoring Plan semi-annual monitoring reports shall be provided to the CPM, BLM Nevada and BLM California state leads for Soil, Water, Air and Riparian Programs, and the BLM Southern Nevada District and BLM Barstow District Hydrologist and Botanist, and Inyo County Water Department no more than 90 days following the collection of spring and fall monitoring data and every spring and fall thereafter for the life of the project.

BIO-24 **DELETED (SEE BIO-23)**

IN-LIEU FEE AND ADVANCED MITIGATION OPTION

BIO-25 The project owner may choose to satisfy certain compensatory mitigation obligations identified for desert tortoise, burrowing owls, special status plants, and jurisdictional waters by paying an in lieu fee to the Department of Fish and Game pursuant to Fish and Game code sections 2069 and 2099, or the Advanced Mitigation option available through the California Department of Fish and Game's Advanced Mitigation Program established by Senate Bill X8 34. If the project owner chooses to satisfy its mitigation obligations through this program, the advance mitigation lands shall meet the criteria as stated in all applicable compensation conditions of certification in the Commission Decision.

Verification: If electing to use this option, the project owner shall notify the CPM that it has chosen to take advantage of the options available through the Department of Fish and Game's program. If approved by the CPM and CDFG, the project owner shall provide written verification that adequate funds have been provided to CDFG to meet the mitigation requirements identified in the Commission Decision and that the advanced mitigation lands meet selection criteria as stated in all applicable compensation conditions of certification in the Commission Decision. As with the other compensatory mitigation, this compensatory mitigation must be completed within 18 months of the start of any project-related ground disturbing activity.

If the project owner chooses the Advance Mitigation option, the owner shall submit to the CPM a copy of the final recorded deed showing transfer of mitigation land or other mitigation transaction documentation as approved by the CPM, within 60 days of CDFG finalizing land transactions.

FACILITY CLOSURE, REVEGETATION, AND RECLAMATION PLAN

BIO-26 The project owner shall develop and implement a Closure, Revegetation and Reclamation Plan (Plan) for the reclamation/revegetation of the project site and other facilities at the time that the facility is decommissioned, or otherwise ceases to be operational, and shall establish site-specific criteria for evaluating and monitoring compliance with the approved reclamation plan. The plan will guide site restoration and closure activities, including methods proposed for revegetation of disturbed areas immediately following construction and rehabilitation and revegetation upon closure of the facility. The plan must address all revegetation, reclamation, and other required facility closure activities pursuant to the Inyo County Renewable Energy Ordinance (Title 21) provisions. In the case of unexpected closure, the plan should assume restoration activities could possibly take place prior to the anticipated lifespan of the plant. The plan shall include but is not limited to the following elements:

1. Plan Purpose: The plan shall explicitly identify the objective of the revegetation plan to be re-creation of the types of habitats lost during construction and operation of the proposed solar energy facility. The final revegetation plan shall include introduction of mid- to late-successional species to ensure revegetation/reclamation success.

2. Standards/Monitoring: Performance standards for success thresholds, weed cover, performance monitoring methods and schedule, and maintenance monitoring.

3. Baseline Surveys – Methods to perform baseline vegetation surveys for planning restoration efforts, with a level sufficient to collect data necessary to prepare the Plan**.**

4. Seed Handling: Methods for seed collection, testing and application.

5. Soil Preparation: If determined necessary by baseline surveys conducted pursuant to part 3 (above). Soil descriptions, compaction measurements, mulch application, soil storage, seed farming, mycorrhizal inoculation, biological crust collection, or other soil preparations may be included as part of the Plan.

6. Weed Management. Discussion of scope, duration, success criteria, and monitoring of weed management activities shall be included in the Plan.

Verification: At least one year prior to planned closure and decommissioning, the project owner shall submit to the CPM for review and approval, in consultation with the Inyo County Planning Department, a draft plan. The project owner shall incorporate all required revisions submit a final plan to the CPM no less than 90 days prior to the start

of ground disturbing activities associated with project closure and decommissioning activities.

Any modifications to the plan shall be made only after consultation and approval of the CPM, in consultation with the Inyo County Planning Department. The project owner shall notify the CPM no less than 90 days before implementing any proposed modifications to the plan.

Within 30 days after completion of project construction for each phase of development, the project owner shall provide to the CPM a written report identifying which items of the Closure, Revegetation and Reclamation Plan have been completed, a summary of all modifications to mitigation measures made during the project's construction phase, and which items are still outstanding.

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APPENDIX BIO1 - BIOLOGICAL RESOURCES RISK ASSESSMENT OF AVIAN EXPOSURE TO CONCENTRATED SOLAR RADIATION

Testimony Of
Rick Tyler, Geoff Lesh PE, Alvin Greenberg Ph.D., William E. Hass MS

SUMMARY OF CONCLUSIONS

The risk assessment examines the potential effect of avian exposure to concentrated solar radiation. Staff examines the nature and probability of adverse effects to birds, when exposed to concentrated solar electromagnetic radiation, including infrared, visible and ultraviolet light.

Staff's analysis of avian exposure to concentrated solar radiation indicates that a threshold of safe exposure does not exist above a solar flux density of 4 kilowatts per square meter or kW/m^2 for a one-minute exposure. The analysis also indicates that both the Hidden Hills and Rio Mesa facilities pose significant risk to avian populations that may encounter the air space in the facilities where concentrated flux density is above the safe levels, potentially resulting in avian morbidity and mortality. The available data regarding avian impacts is very limited; however, such data does provide at least some perspective regarding potential for impact.

There are significant questions regarding extrapolation from the available information regarding avian impacts. The most vexing is the complete absence of data that would allow estimation of avian morbidity. Staff's assessment provides estimates of exposure and dose that can lead to injury and late fatality. In addition, there are major unknowns in estimation of differences in avian populations from one site to the next. These limitations in the available data require exercise of considerable judgment in extrapolation of data from one site to another. However, the errors introduced by the lack of site specific data are likely to be small in comparison to the absence of morbidity estimates and effects of dramatically increased potential exposure duration resulting from the increased volume of the air space affected by concentrated solar flux at commercial-sized facilities like Hidden Hills as compared to pilot-scale facilities.

Staff reviewed the following list of submittals provided by Bright Source regarding potential for impacts on avian resources as a result of potential exposure to concentrated solar flux. While providing descriptions of the heat flux field strengths around the solar receiver steam generator tower, the references are unpublished, lack peer review, are of very limited duration, and are from facilities that are much smaller than the proposed facility with regard to observed adverse avian effects of concentrated solar radiation.

Bright Source contends based on this information that the proposed Hidden Hills Project poses no significant risk to birds that would be exposed to the concentrated flux field associated with the project. They also contend that $50kW/m^2$ is a safe level of exposure for a duration of 30 seconds and that exposures to lower flux densities are without

consequence. Staff disagrees with these conclusions, and provides its own independent analysis, with references, of the potential for impacts on avian resources associated with the proposed Hidden Hills Project.

1. BS 2012a – Bright Source (tn 63357). Rio Mesa Solar Electric Generating Facility CEC Biological Resources Workshop Presentation, dated January 6, 2012. Submitted to CEC Docket Unit on January 12, 2012.
2. BS 2012c – Bright Source/T. Stewart (tn 63365). Rio Mesa Avian Survey Counterproposal, dated January 12, 2012. Submitted to CEC Docket Unit on January 13, 2012.
3. ESH 2012a – Ellison Schneider & Harris, LLP/C. Ellison (tn 63475). Bright Source Comments on Issues Identification Report, dated January 30, 2012. Submitted to CEC Dockets Unit on January 30, 2012.
4. CBD 2012a – Center for Biological Diversity/L. Belenky (tn 63521). Comments on Issues Identification Report, dated January 31, 2012. Submitted to CEC / Dockets Unit on February 2, 2012.
5. FWS 2012a - Fish and Wildlife Services (tn 63565) Rio Mesa Golden Eagle Survey Clarification, dated January 31, 2012. Submitted to CEC Dockets Unit on February 6, 2012.
6. ESH 2012b – Ellison Schneider & Harris, LLP (tn 63956) Applicant's Notice Pursuant to 20 C.C.R. § 1716(f) For California Energy Commission's Staff Data Request Set 1A, dated March 2, 2012. Submitted to CEC Dockets Unit on March 2, 2012.
7. URS 2012a – URS/A. Leiba (tn 64060) Applicant's Data Response to Data Request Set 1A, dated March 8, 2012. Submitted to CEC Dockets Unit on March 8, 2012.
8. BS 2012m – Bright Source (tn 64467) Biological Workshop Presentation, dated March 13, 2012. Submitted to CEC Dockets Unit on March 28, 2012.
9. EHS 2012c – Ellison Schneider & Harris/C. Ellison (tn 64093) Applicant's Opening Brief for March 19, 2012. Status Conference, dated March 9, 2012. Submitted to CEC Dockets Unit on March 9, 2012.
10. CBD 2012c – Center for Biological Diversity/L. Belenky (tn 64173) Center for Biological Diversity Data Request, dated March 15, 2012. Submitted to CEC Dockets Unit on March 16, 2012.
11. URS 2012c – URS/A. Leiba (tn 64722) Response to Center for Biological Diversity Data Request, dated April 12, 2012. Submitted to CEC Dockets Unit on April 12, 2012.
12. URS 2012e – URS/A. Leiba (tn 64814) Supplemental Response, dated April 16, 2012. Submitted to CEC Dockets on April 16, 2012.
13. MDM 2012a – Michael D. McCrary, etal. (tn 64807) Avian Mortality at a Solar Energy Power Plant, accepted January 24,1986. Submitted to CEC Dockets Unit on April 17, 2012.
14. BS 2012r – Bright Source (tn 65431) Applicant's Supplemental Response to Data Requests, Set 1B, 143 and 144, dated May 23, 2012. Submitted to CEC Dockets Unit on May 23, 2012.
15. ESH 2012c – Ellison Schneider & Harris, LLP (tn 65696) Applicant's Notice – Staff's Data Requests Set 2A, dated June 8, 2012. Submitted to CEC Dockets Unit on June 8, 2012.
16. ESH 2012e – Ellison Schneider & Harris, LLP (tn 65745) Applicant's Supplemental Notice for CEC Staff's Data Requests Set 2A, dated June 13, 2012. Submitted to CEC Dockets Unit on June 13, 2012.
17. BS 2012u – Bright Source/ T. Stewart (tn 66280) Applicant's Response to Data Requests, Set 2A, #159 dated July 20, 2012. Submitted to CEC Dockets Unit on July 20, 2012.

18. BS 2012v – BrightSource (tn 68364) Applicant Submitted Power Point Presentation (Flux Impacts on Avian Species) for August 28, 2012 Joint Workshop on Rio Mesa SEGF and Hidden Hills SEGS , dated August 28, 2012. Submitted to CEC Dockets Unit on November 5, 2012.
19. BS 2012w – BrightSource (tn 68360) Applicant Submitted Slide on Dr. Pleguezuelos' Conclusions at GEMASolar Plant in Andulusia, Spain, for August 28, 2012 Joint Workshop on Rio Mesa SEGF and Hidden Hills SEGS. Submitted to CEC Dockets Unit on November 5, 2012.
20. BS 2012u – Bright Source/ T. Stewart (tn 66280) Applicant's Response to Data Requests, Set 2A, #159 dated July 20, 2012. Submitted to CEC Dockets Unit on July 20, 2012.
21. BS 2012v – BrightSource (tn 68364) Applicant Submitted Power Point Presentation (Flux Impacts on Avian Species) for August 28, 2012 Joint Workshop on Rio Mesa SEGF and Hidden Hills SEGS , dated August 28, 2012. Submitted to CEC Dockets Unit on November 5, 2012.
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23. BS 2012x – BrightSource (tn 68294) Applicant Supplemental Avian Study Information – 1: Assessment of Potential Impacts to Birds from Solar Thermal Power Plant, Dimona Israel; 2: Environmental Impact of the GEMASOLAR Thermosolar Plant on the Bird Community in the Monclova Surrounding Area (Fuentes de Andalucía, Seville, Spain, Juan M Pleguezuelos, Granada, 08-23-2012); 3: Impact of the GEMASOLAR Solar Power Plant (La Monclova, Fuentes de Andalucía, Province of Seville) on the Bird Population, Report 4 (September 2010): Nesting avifauna in the study area during the plant construction phase (March – July 2009-2010); 4: Impact of the GEMASOLAR Solar Power Plant (La Monclova, Fuentes de Andalucía, Province of Seville) on the Bird Population,
24. CH2 2012qq- CH2MHill/j. Carrier (tn: 68630) Data Response, Set 3. 11/21/2012
25. SJ 2012a- Dr. Johnsen Ph.D (tn 68785) Dr. Johnsen's Presentation at December 5, 2012 Joint Rio Mesa SEGF and Hidden Hills SEGF Workshop Submitted to CEC Docket Unit On December 5, 2012.

SETTING

Concentrating solar thermal power plants, like Hidden Hills and Rio Mesa, collect ambient solar radiation and concentrate it onto a solar receiver to generate steam for the steam turbine generator. The concentration of the solar radiation creates a range of solar radiation flux densities between the solar receiver steam generator located atop the power tower and the reflecting mirrors arrayed on the ground. At ground level, nominal solar radiation, or solar energy per unit area, is about 1 kilowatt per square meter (kW/m^2). At the solar receiver steam generator, the reflected concentrated solar radiation is about 600 kW/m^2.

However, because the heliostat mirror arrays do not form a continuous reflective surface across the solar field due to gaps from roads or non-uniform spacing due to terrain or maintenance spacing, the solar flux density does not increase linearly with increasing elevation up to the maximum at the receiver. Gaps in the mirror array result in discontinuities in flux overlaps at elevations closer to the mirrors.

The applicant provided flux density modeling results of the proposed Rio Mesa solar flux fields in response to Staff Data Request 159. Staff relied upon these modeling results for this analysis, but has not been provided the necessary information to independently verify the modeling results. Consequently, staff's analysis remains subject to additional information and analysis of the flux fields. Nevertheless, as expected, values are low near the surface of the mirrors and increase in a non-linear manner in close proximity to the receiver. When the mirrors are concentrating sunlight onto the receiver, the shape of the higher flux regions between the receiver and mirror is an inverted cone, with a small section at the receiver that broadens as you descend towards the solar field. When the mirrors are directed off the receiver in standby mode, the shape of the higher flux regions are like two cones, one facing downward towards the mirrors and one upward away from the focal point (BS 2012u, Fig. 5).

Note that our sun emits a broad spectrum of radiation, including radio waves, visible light, and x-rays. The earth's atmospheric layers filter much of the radiation, diminishing and/or eliminating certain wavelengths particularly in the ultraviolet (UV) spectrum. And the solar field heliostat mirrors further diminish the reflected solar radiation of the shorter (e.g., UV) wave lengths.

It may not be obvious to the reader what the nature of these various flux intensities is, or at what point they could become dangerous. It is instructive because typically people are unaware of the level of flux exposure they are undergoing, aside from being under a sunny clear sky (a level of 1 kW/m^2), whether it is near a fireplace, radiant heater, or other warm device. Thus, to give some perspective to the lower range of values discussed herein, the following **Appendix BIO1 Table 1** (Drysdale 1998, p. 61) shows the effects of thermal radiation (flux) on various organic materials. Reported experiments have shown that several polymeric materials can be heated to beyond 300°C by radiant flux levels ranging from 11 to 15 kW/m^2. Similarly, experiments have shown that wood can be heated to 350 °C by 12 kW/m^2 and to 600°C by 28 kW/m^2 (Drysdale 1998, p. 221, Table 6.5). Staffs notes that these effects are for still air, and surface temperatures would be reduced somewhat in moving air.

Appendix BIO1 Table 1 Effects of thermal radiation

Radiant Heat flux (kW/m^2)	Observed effect
0.67	Summer sunshine in UK[a]
1	Maximum for indefinite skin exposure
6.4	Pain after 8 s skin exposure[b]
10.4	Pain after 3 s skin exposure[a]
12.5	Volatiles from wood may be ignited by pilot after prolonged exposure
16	Blistering of skin after 5 s[b]
29	Wood ignites spontaneously after prolonged exposure[a]
52	Fibreboard ignites spontaneously in 5 s[a]

[a]D. I. Lawson (1954) [b]S.H. Tan (1967)
The data quoted for human exposure are essentially in agreement with information given by Purser (1995) and Mudan and Croce (1995)

Table source: Drysdale 1998, An introduction to Fire Dynamics, 2nd Ed., by Dougal Drysdale, Publ. John Wiley and Sons, 1998, Table 2.8, P. 61

HIDDEN HILLS

The Hidden Hills Solar Electric Generating System (HHSEGS) would be located on Old Spanish Highway, near the community of Charleston View on approximately 3,277 acres (5.12 square miles) of privately owned land in Inyo County, California, adjacent to the Nevada border. The project site is approximately 8 miles south of Pahrump, Nevada, and approximately 45 miles west of Las Vegas, Nevada.

HHSEGS would consist of two 250 MW solar plants. Each solar plant would use heliostats which are elevated mirrors mounted on a pylon to focus the sun's rays on one solar receiver steam generator (SRSG) or receiver atop a 750-foot tall solar power tower near the center of each solar field. In each solar plant, one Rankine-cycle steam turbine would receive steam from the SRSG (or solar boiler) to generate electricity. The solar field and power generation equipment would start each morning after sunrise and would shut down when insolation[1] drops below the level required keeping the turbine online, or during upsets and emergencies.

Each of the heliostat assemblies would be composed of two mirrors, each approximately 12 feet high by 8.5 feet wide with a total reflecting surface of approximately 204 square feet (19 square meters – m^2). Each heliostat assembly would be mounted on a single pylon, along with a computer-programmed aiming control system that directs the motion of the heliostat to track the movement of the sun. The 85,000 heliostats have an effective total reflective area of approximately 1.7 million m^2. These heliostats concentrate solar radiation on the solar receiver boiler and superheater sections (the SRSG is four -sided, with boiler tube walls on the outside to be heated by the concentrated solar radiation).

The receiver absorbs the concentrated radiation from the heliostats and transfers the resultant heat into water and steam in steel tubes at the receiver surface. The efficiency of the Rankine-cycle (steam cycle) is about 43 percent under optimum conditions (summer mid-day). This equates to a solar energy transfer of about 610 million watts (610 MW) between the heliostats and the receiver. While the concentration to an energy density of 600 kW/m^2 is roughly analogous to focusing a 3 inch magnifying glass down to a 1/8 inch point, the power tower does not focus the reflected sun to a point, but rather overlays thousand of heliostat reflections onto the boiler tube walls of the receiver.

The total concentrated solar energy of 610 MWhr is approximately equal to burning 17,000 gallons of gasoline per hour. The solar flux density is intense enough that if the water and steam in the boiler were to stop flowing and the heliostats remained focused on the receiver, it would be destroyed in a short period of time.

[1] **Insolation** is a measure of solar radiation energy received on a given surface area and recorded during a given time. It is also called solar irradiation and expressed as hourly irradiation if recorded during an hour, daily irradiation if recorded during a day.

RIO MESA

The Rio Mesa Solar Electric Generating Facility (RMSEGF) is very similar to the Hidden Hills facility and consists of two 250-megawatt (MW) (nominal) solar concentration thermal power plants situated on the Palo Verde Mesa in Riverside County, California, 13 miles southwest of Blythe, and is located partially on private land and partially on public land administered by BLM. Design aspects of the RMSEGF are essentially the same as for the HHSEGS.

ANALYTICAL APPROACH

Staff's analysis includes the following analytical steps in estimating the avian mortality and morbidly from exposure to concentrated solar radiation:

a. Hazard Assessment -- the determination of whether a particular environmental exposure is or is not causally linked to particular health effects on the receptors

b. Dose-Response Assessment -- the determination of the relation between the magnitude of exposure and the probability of occurrence of the health effects in question

c. Exposure Assessment -- the determination of the extent of receptor exposure before or after application of regulatory controls

d. Risk Characterization -- the description of the nature and often the magnitude of receptor risk.

e. Analysis of Uncertainty -- Uncertainty represents a discussion of the gaps in knowledge about factors such as adverse effects or exposure levels which may be reduced with additional study. Generally, risk assessments carry several categories of uncertainty, and each merits consideration. Measurement uncertainty refers to the usual error that accompanies scientific measurements -- standard statistical techniques can often be used to express measurement uncertainty. An amount of uncertainty is often inherent in environmental sampling. There are likewise uncertainties associated with the use of scientific models, e.g., dose-response models, models of the physical environment, the assumed values of material properties that may vary in nature or not be well characterized, the probability of occurrence of particular circumstances, etc.

Birds are exposed to this concentrated solar radiation when they enter the flux field and receive the incident radiant energy that is reflected from the array of heliostats on the ground. The radiant energy that exists in the flux field is converted to heat when it is absorbed on any solid opaque surface that receives the transmission of the radiant energy through an otherwise transparent medium (air).

The absorption efficiency of radiant flux is governed by the emissivity of the surface of the object that receives it. Emissivity can range from 0 to 1 with 0 representing perfect reflection of all the incident radiation and 1 representing complete absorption and conversion to heat. It is also governed by the angle of incidence between the radiant flux and the surface that receives it. A mirror is an example of a surface with a low emissivity (typically below 0.05) absorbing and converting to heat less than 5 percent of the incident light. Black pavement is an example of a surface with high emissivity (about 0.95) absorbing 95 percent of the incident light. This is the reason that blacktop becomes so hot when exposed to sunlight.

In actual circumstances the rise in temperature of a surface exposed to radiant flux is often diminished by the transfer of heat to the surrounding air from that surface. This is typically referred to as convective heat transfer. The amount of heat removed by convection is governed by the speed and turbulence of the air passing over the surface and the temperature difference between the air and the heated surface. In the case of birds, the speed of flight through the air is equivalent to a velocity of air over the surface.

The convective heat transfer between bird feathers and the ambient air is analogous to the convective heat transfer between the heated boiler tubes in the receiver and the water and steam flowing in the receivers at the Hidden Hills and Rio Mesa power plants. In the absence of this continuous convective heat removal by the water and steam inside the boiler tubes (i.e. if the tubes were too empty) the temperature of the boiler tubes would rise rapidly to a new higher equilibrium temperature much higher than the normal 540 ^{o}C operating temperature. The surface of the receiver would be damaged unless the incident radiation is removed by putting the heliostats in a standby mode whereby radiant flux is no longer directed on to the receiver.

The potential for injury to birds that fly through a concentrated solar flux field results from heating of the outer surface feathers and subsequent conduction of heat into the exposed feathers causing breakdown of their molecular structure. Conduction is the transfer of heat into a solid object due to the temperature difference between the object and its surroundings. While exposure could also cause a rise in body temperature it is likely that severe damage to the outer feathers would occur much more quickly as a result of the insulating effect of the plumage covering the bird's body.

In this analysis, staff has attempted to estimate levels of exposure to concentrated radiant flux that are safe and would result in little or no damage to exposed birds. It can then be concluded that exposures above such safe levels would result in irreversible and potentially significant impact to exposed birds that enter the flux field.

HAZARD ASSESSMENT

While the highest flux density occurs at the surface of the receiver, high concentration solar flux densities also occur in other parts of the air space above the heliostats, ranging continuously from 1 up to 600 times the background solar radiation of about 1 kW per square meter (1.0 kW/m^2). The applicant's response to Data Request 159 (BS 2012u) provides maps of flux densities throughout the air space above the Rio Mesa Solar fields. Similar flux density fields will exist at the proposed Hidden Hills facility.

When high solar flux densities impinge on objects, for example, a bird's flight feathers (primary, secondary, and tail feathers), the solar radiant flux is converted to heat, which can cause damage resulting in injury or death depending on the exposure level and duration of exposure (i.e. dose). For example, for exposed (bare) human skin, at an exposure level of 5 kW/m^2, first-degree burns would occur within 20 seconds of continuous exposure; second-degree burns would occur within 30 seconds; and third-degree burns would occur within 50 seconds with a 1 percent fatality rate. Because feathers are effectively dead structural protein similar to hair without nerves and other physiological activity, bare human skin is more sensitive than avian feathers to the effects of thermal radiation but does serve as a useful comparison.

Exposures of birds to concentrated solar flux did actually occur at the Solar One facility near Daggett California (McCrary et. al. 1986). Birds were found dead on the site that had clear evidence of thermally induced damage to flight feathers caused by exposure to concentrated solar flux. The birds had near complete removal of both barbules and barbs of flight feathers leaving only the rachis (the main central shaft of the flight feather) remaining. This suggests that the flight feathers had reached temperatures in excess of 300 ^oC and demonstrates the potential for damage to flight feathers resulting from exposure to concentrated solar flux. The barbules, which comprise the major resistance to air flow through surface of the feather, are essential to the creation of lift by wing flapping. The barbules are very small (less than 1/1000 of an inch thick) and have very low mass. Thus, damage to barbules from exposure to concentrated flux will be virtually instantaneous, and damage to barbs, feathers and birds very likely.

DOSE RESPONSE ASSESSMENT

This assessment provides an analysis of the potential damage to flight feathers of the bird associated with exposure to concentrated solar flux. Staff has determined that damage to surface feathers is one of the most sensitive types of adverse effects that can occur in avian species from such exposure. Staff's dose response assessment provides analysis of the relationship of potential feather damage associated with increasing levels of concentrated radiant flux exposure. Staff's analysis identifies levels of concentrated solar flux exposure that are just below the levels that could cause irreversible damage to flight feathers as the criteria to establish safe avian exposure levels.

Bird feathers are composed predominantly of keratin which is a naturally occurring polymeric protein chain. These polymer chains of keratins also form secondary structures creating hard natural fibers (for example hair and wool) and hard fibrous sheets (for example feathers, claws, nails, and hooves). The keratin in feathers is the beta form of keratin, or β-keratin. It has a macromolecular secondary form resulting from folding and cross linking at the edges of the poly peptide polymer primary chains. The β-keratin in feathers also typically contains small amounts of both loosely bound water and more tightly bound water that exists in the molecular structures of the secondary proteins (Conn et al 1987 pages 84-99) (Mazur and Harrow 1968 pages 61-72) (Greenwold and Sawer 2010 page1).

The structural properties (strength, stiffness, elasticity etc.) of the keratin that makes up feathers is central to the feathers function in flight (Bachmann et. al. 2007) (Bachmann an Wagner 2011) (Videler 2005 pages 46 -55). Intact keratin structure is also essential to maintenance of the feather's aerodynamic shape and surface smoothness. Both structural and molecular changes occur when keratin is exposed to temperatures above about 160 ^{o}C (Takahashi et. al. 2004) (Senoz.et.al. 2011) (Istrate et. al. 2011). Alpha and Beta keratin from wool, hair, and feathers have remarkably similar thermal decomposition characteristics (Brebu et. al. 2011).

At ambient, atmospheric pressure, feathers lose unbound water before the feather surface temperature can rise above 100 ^{o}C. Unbound water can also be lost through evaporation at temperatures below 100 ^{o}C with low relative humidity. Heating above 100 ^{o}C in the absence of water is often referred to as heating in the dry state. Keratin is more resistant to thermal degradation when heated in a dry state than in a wet state (Takahashi et. all 2004). Because unbound water cannot exist in the keratin at temperatures above 100 ^{o}C at ambient atmospheric pressure, exposures to concentrated radiant solar flux at ambient conditions will result in dry heating.

Loss of water that is unbound (not molecularly bound) is reversible. Typically the presence of unbound water would result in a transient period before temperatures inside the feather would rise upon heating above 100 ^{o}C due to latent heat required to vaporize the unbound water. However, in the environment of the project site in summer the elevated ambient temperatures and low humidity would suggest very low moisture content in the feathers of indigenous birds, particularly for the flight feathers.

At about 160 ^{o}C, bonds in the molecular structure of secondary proteins are broken leading to loss of structural integrity of the β-keratin molecular structure and a permanently weakened feather. The keratin begins to melt at about 250 ^{o}C. At temperatures of 250 to 450 ^{o}C, bonds in the primary polymer protein chains are broken into smaller molecular compounds through pyrolysis (Senoz et. al. 2011) (Brebu et. al. 2011). When temperatures reach 450 to 500 ^{o}C, keratin will almost completely break down and carbon will be the primary constituent of what remains.

Once bonds on the ends of the protein chains are broken, damage to the keratin is not reversible and thus the structural properties of the secondary proteins and ultimately the exposed feathers are adversely affected. This breaking of the chemical bonds that secure the secondary molecular structure of keratin, which leads to structural changes without affecting the primary protein chains is referred to as denaturing (Istrate 2011) (Takahashi et. al. 2004). This is very similar to the boiling of an egg where the protein structures in the albumin (egg whites) are permanently changed but the basic protein chains are not disrupted. Ultimately the level of damage to the flight feathers will be a function of both the magnitude of exposure and its duration. The dose will thus have units of kilowatt-seconds per square meter or kW-s/m^2.

Based on the results of staff's thermodynamic equilibrium analysis discussed below, exposure to solar flux greater than 4kW/m^2 can result in temperatures above 160 ^{o}C with 60 seconds of exposure. Exposure of 4kW/m^2 can be considered a no observed adverse effect level (NOAEL). Exposures above this level can compromise the keratin

molecular structure of a bird's flight feathers, therefore potentially causing irreversibly weakening of feathers leading to an irreversible adverse impact on the feathers. While molting may ultimately replace some damaged feathers, it will in most cases not occur for some time after that damage occurs. Feathers, in which the quill was heated enough to damage the follicle from which the feather grows, might not get replaced during molt.

EXPOSURE ASSESSMENT

To estimate exposure staff modeled the change in surface temperature of flight feathers of a bird during flight when the bird's feathers are exposed on their underside to a concentrated flux in a solar heliostat field. The intensity of exposure depends on the path the bird traverses from the point where it enters a space with concentrated flux until it exits that space. The figures in the applicant's response to Data Request 159 (BS 2012u) are contour plot depictions of concentrated flux density isopleths indicating the locations of flux density levels of 5, 10, 25, 50, 100, and 150 kW/m^2.

To evaluate the potential for damage, it is necessary to convert the radiant flux to a resultant increase in the temperature at the surface of the exposed feathers. During flight, concentrated solar radiation is reflected from the heliostats on to the bottom surface of the feather, causing heating of the surface. The rate of heating depends upon the intensity, or flux, and how fast the surface is simultaneously being cooled. By summing the heat being gained from the incoming flux together with the heat losses occurring through convection and radiation, the resulting feather surface temperature can be estimated.

Potential cooling of the exposed feather surface results from the ongoing heat loss from the bottom surface of the wing feather by multiple mechanisms. The most important of these is convection of heat to the air stream passing under the wing bottom surface (at the bird's air speed). Additional losses include re-radiation of heat (energy) from the hot surface, and by conduction of heat through the feather to its backside, where it can be lost through convection to the air stream passing over the top side of the feather, but only for those areas of the backside that are exposed to topside airflow. Staff has assumed that most flux-exposed feathers will have much of their backside surfaces covered by either other feathers or body skin. Therefore, for purposes of conducting a worst-case risk analysis, staff has ignored the potential heat loss mechanisms of back-side convection and back-side re-radiation (i.e. heat loss from the top of the wing). Staff modeled convective loss from the wing using a heat transfer coefficient from a flat or cambered plate assuming laminar flow over the plate (McArthur 2008, Mueller 1999, Pelletier and Muller 2000, Tucker 1987, Tucker and Parrot 1969). Approximation of a wing using a flat or cambered plate model is the accepted method of modeling fluid flow over wings and is, therefore, also the best method for modeling heat transfer to and from a wing, particularly on the underside where there is no issue of flow separation from the wing surface (Ward 1999), (Withers 1981), Holman 1976), (Incroera 2007), Cengel 2007), (MERM 2001).

These loss mechanisms depend upon the difference between the surface temperature of the feather and the temperature of the ambient air, and they increase in effectiveness

as the temperature difference increases. Thus, as the feather surface temperature heats from solar radiation exposure, the heat losses increase until they collectively match in their heat loss rate, the heat gain rate caused by the concentrated solar radiation. At that point the surface temperature stabilizes, and becomes what is called "steady-state." Due to the extremely small size and low mass density of the keratin micro structures that make up the surface of the feather, at realistic bird flight speeds in the gradually changing solar flux densities of a solar field, surface temperatures reach to within a few degrees of this steady-state temperature virtually instantaneously. During realistic flight conditions in the power plant's solar field, flux densities change continuously with location, so any sudden change is an unrealistic simplification of actual conditions experienced in flying through the air space having concentrated flux densities.

Because changes in flux density occur gradually during flight, there are no large "step changes", so temperature rise-times for re-equilibration to changing flux levels can be ignored. After conducting dynamic analyses and examination of several plausible flight paths and comparing those results to the simple assumption of instantaneous equilibrium, staff used the assumption of instantaneous equilibrium to establish safe exposure criteria as this assumption created little error in the result. Assuming instantaneous equilibrium eliminates the dependence on flight path in analyzing potential avian exposures to concentrated solar radiation. **Appendix BIO1 Tables 1** and **2** below provide estimates of equilibrium temperatures for a range of plausible exposure intensities and exposure conditions, a flight speed of 18 miles-per-hour (about 8 meters-per-second), an ambient temperature of 45 ^{o}C, and at incidence angles of 0 degrees and 71 degrees off-perpendicular to the feather surfaces.

Appendix BIO1 Figures 1 through **4** below show the results of dynamic modeling of a range of plausible flight paths. The simplification of using instantaneous equilibrium, allows staff to reduce multiple variables (flux level, emissivity, angle of incidence, flight speed, path through solar field) down to a simpler set of only two variables (flux level and exposure time). Equilibrium surface temperatures are also largely dependent on the cord length of the bird wing (i.e. the distance from the front of the wing to the trailing edge). **Appendix BIO 1 Figure 5** provides an analysis of flux levels causing 160 ^{o}C surface temperatures for different cord lengths and flight speeds. The vast majority of bird species fly within a range of 6 to 16 meters-per-second (Videler 2005 Pages 154 and 155) (Alerstam et. al.)). During flap gliding flight, birds fly at the lower end of the range. Therefore, staff used a flight speed of 8 meters-per-second or 18 miles-per-hour.

Dynamic modeling was conducted by choosing several plausible straight-line flight paths through the solar field, utilizing the isopleth solar field diagrams provided by the applicant. This was be done by re-calculating the feather surface temperature at one-hundredth of a second intervals along a presumed flight path by adjusting for the incoming radiant flux and convective and radiative loses that would be occurring at each interval using the assumed ambient air temperature, flight speed, and incidence angle, etc.

Staff used linear interpolation to estimate flux intensities between isopleths, then plotted temperature on a continuous basis during the flight path through the field. Points where

exposure resulted in estimated surface temperatures above 160 ^{o}C, and 300 ^{o}C were noted. **Appendix BIO1 Tables 2** and **3** provide estimates and comparisons of maximum surface temperatures reached based on varying flux densities, and flight paths to assumed steady-state exposure to flux levels.

Appendix BIO1 Table 2 Feather Surface Temperatures vs Flux Intensity

Flux Intensity (kW/m^2)	Steady State Temp (deg C)	Flight Condition		
		Directly at Tower Temp (deg C)	Tangent to 100yds off Tower (deg C)	Flying upward near tower (deg C)
1	80	70	68	60
5	170	160	160	140
10	260	240	240	160
25	430	360	410	220
50	610	600	na	410
100	810	740	na	Na
150	950	930	na	Na

All at 18mph, View factor = 1 (Angle of incidence = 0 deg)

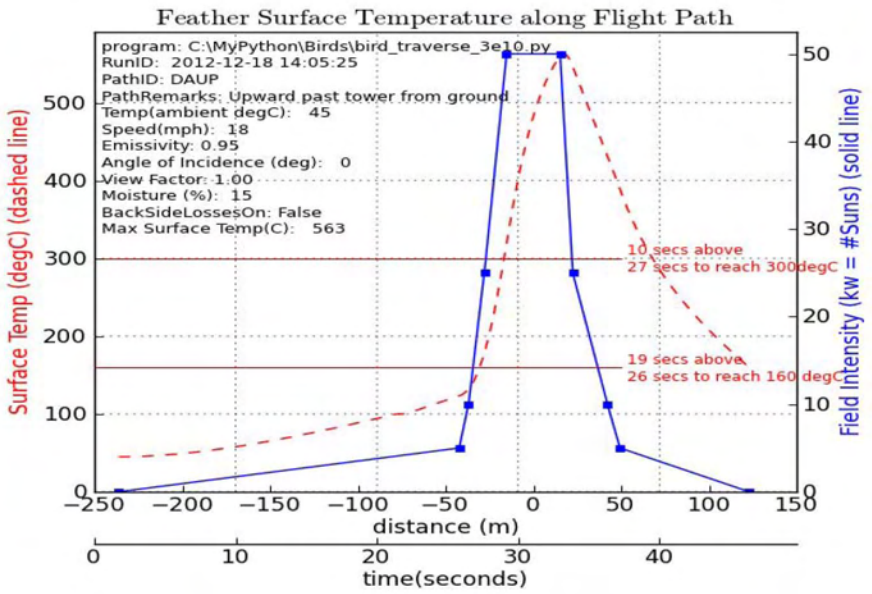
Appendix BIO1 Table 3 Feather Surface Temperatures vs Flux Intensity

Flux Intensity (kW/m^2)	Steady State Temp (deg C)	Flight Condition	
		Directly at Tower Temp (deg C)	Tangent to 100yds off Tower (deg C)
1	60	54	55
5	90	87	88
10	130	120	120
25	220	160	200
50	340	330	na
100	500	380	na
150	600	500	na

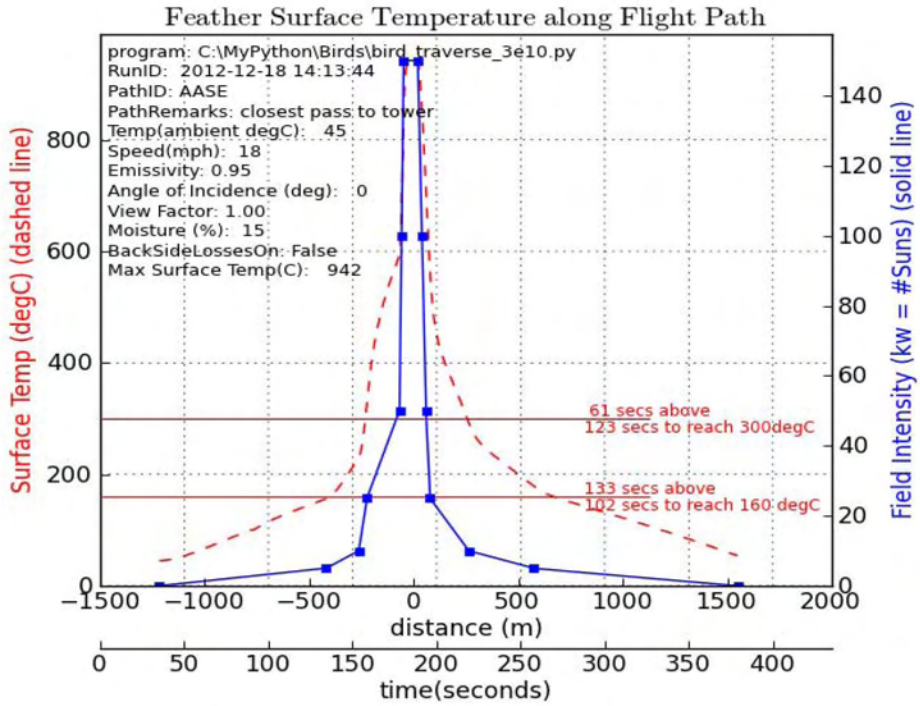
All at 18mph, View factor = 0.33 (Angle of incidence = 71 deg)

Staff modeled absorption of flux by the feather to occur in the initial half-thickness of material, at and just beneath the surface of the feather. The resultant heating is the cause of the temperature rise in the feather material and of the subsequent damage to the fragile keratin structures and molecules that provide the structural integrity of feathers.

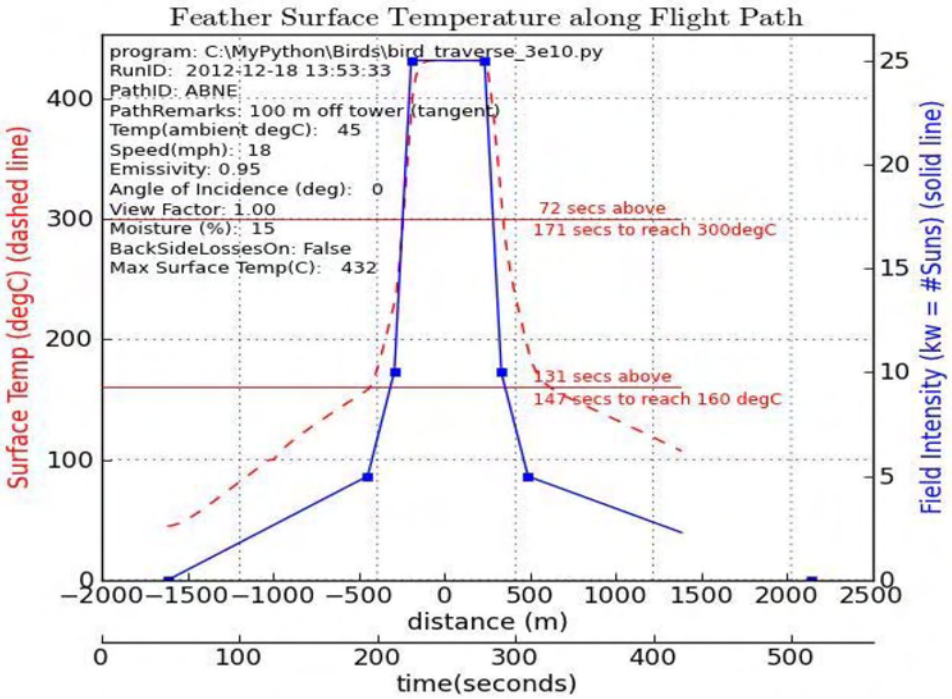
Appendix BIO1 Figure 1 Path is from ground up past tower receiver while operating at full load



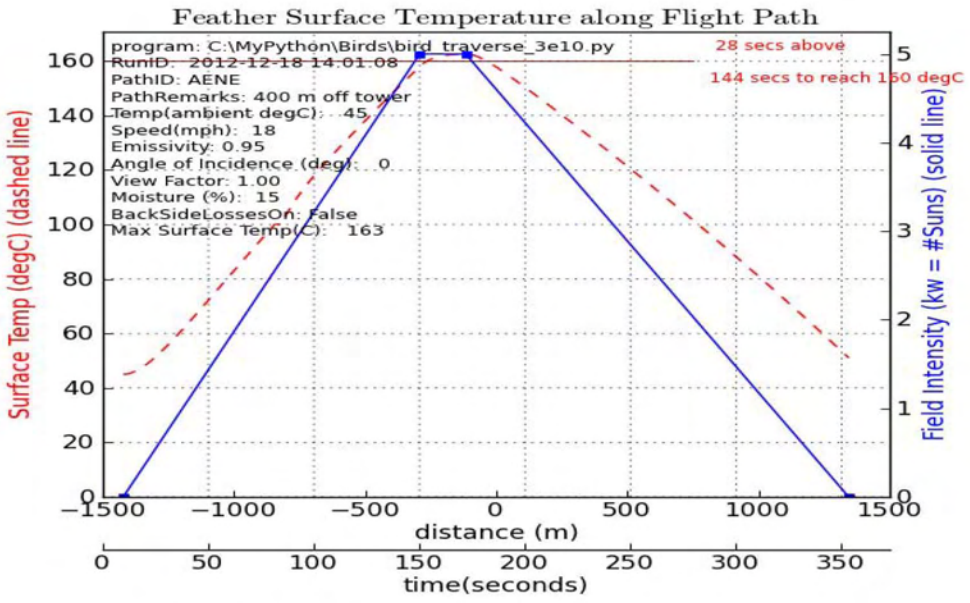
Appendix BIO1 Figure 2 Path is straight line from edge of solar field going close by **tower to opposite edge of field**



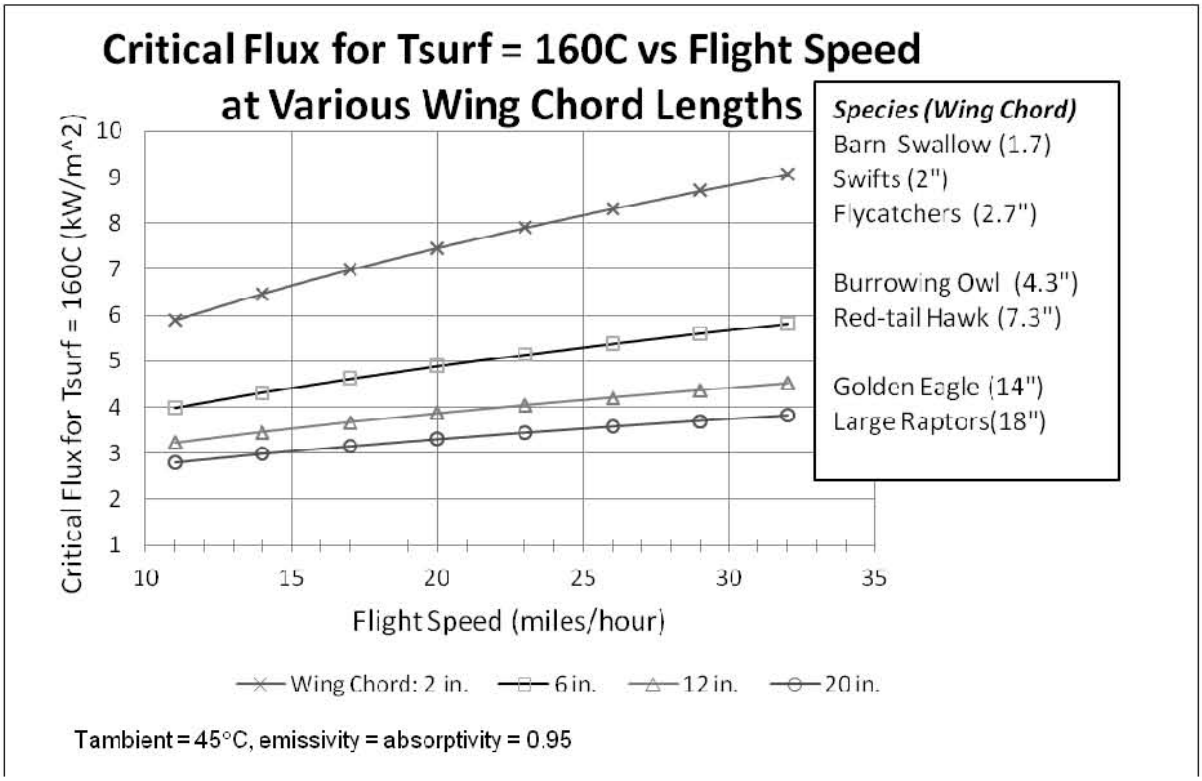
Appendix BIO1 Figure 3 Flight path is straight line tangent to circle with radius of 100 meters around tower



Appendix BIO1 Figure 4 Flight path is tangent to circle with radius of 400 meters



Appendix BIO1 Figure 5 Critical Flux Levels for Tsurf = 160°C vs Wing Chord



Appendix BIO2 provides documentation of the equations, calculations, and source codes for programs used to produce staff's results.

CHARACTERIZATION OF RISK

In flying completely across areas of the facility with flux densities above 5kW/m^2, maximum distances would be between 900 to 1000 meters. At a flight speed of 4.5 meters per second (about 10 miles per hour), the flight would take about 200 seconds and at 18 meters per second (about 40 miles per hour) it would take about 50 seconds to traverse 900 meters. During such flight, the bird would receive exposures ranging from 5 kW/m^2 up to possibly 500 kW/m^2 of varying duration depending on the flight path taken. This exposure including heat loss mechanisms and duration is integrated along the flight path to obtain a time / temperature profile. Integrating flux level and duration along the flight path provides an exposure dose.

As stated previously, when the exposure and duration are sufficient to cause the feather to reach temperatures above 160 ^{o}C, the bird would suffer some level of irreversible damage to feathers that are critical to its ability to fly. This damage can lead to secondary effects such as collision with towers, heliostats and the ground if damage is sufficient to impair normal flight, or even the ability to become and remain air-borne.

Feather damage that results in impairment of flight capability could also decrease the bird's overall probability of survival and life expectancy. For birds of prey, the ability to carry small animals that are caught could be severely compromised leading to potential malnutrition or even starvation of the bird or its young. The carrying of prey significantly increases load-carrying demands placed on the wings and critical flight feathers. For other birds, damaged feathers will impair their ability to forage or to flee predators.

In conducting any risk assessment where fatality is used as the metric to evaluate risk to an exposed population the analyst should always be cognizant that the existence of fatality implies the high likelihood of a significantly higher number of injuries (i.e. morbidity). The ratio of morbidity to mortality can range from less than 5 to one to over 100 to one for different hazards and levels of injury deemed significant. For example, for every death from an explosion, one should expect about 5 serious injuries (K.T. Bogen, E.D. Jones 2005) (Stellman 1998, Table 39.10). For hazards that result in direct trauma to the exposed receptor there is a general relationship of level of damage and level of energy or power to which the receptor is exposed (Frank P. Lees 1980). McCrary did not, nor would it have been practical, to survey a region of sufficient size surrounding the project to account for scavenging of injured birds or latent fatality offsite. Thus staff cannot, based on available data, define morbidity due to exposure to concentrated solar radiation from actual survey data. Staff believes that the hazard to birds from this facility is most analogous to explosive hazards as both have high energy or power levels at a central point with energy levels decreasing exponentially with distance radially from the center. Based on this analogy the level of seriously injured birds for every death is likely to be between 5 and 10.

Thus, the potential damage caused by avian exposure to concentrated solar flux can range from minor impairment (and potentially leading to death) to near immediate fatality depending on the dose received. Low doses of 5 kW/m^2 to 15 kW/m^2 for short exposure periods may not cause effects that are observable to the naked eye but could nonetheless result in significant flight impairment. For example if a significant portion of the feather barbules (the fragile micro structure between barbs) (See Reddy and Yang 2007) were lost the feather's structural integrity would be impaired. Because loss of barbules would significantly compromise integrity of a large portion of the feathers surface area, the differential pressure between the top and bottom of the feather necessary to produce lift and thrust (Videler 2005 Page 55) will also be compromised (Werner and Patone 1998). Such impairment could reduce the bird's level and climbing flight speeds. Longer but still short term exposures to the 10 to 25 kW/m^2 flux densities could cause nearly complete loss of barbules or even complete feather vanes on one or both sides of the rachis and result in loss of flight capability and inability to remain airborne. Staff has identified $4kW/m^2$ as a safe level for short exposures (less than 60 seconds). This level of exposure should not result in any damage to flight feathers.

Using the only available data on avian mortality, provided by (McCrary et. al. 1986), staff estimates that the proposed Hidden Hills and Rio Mesa facilities could each result in avian mortality in excess of 22 times that of the Solar One facility previously studied based on linear extrapolation from total relative mirror surface area of the two facilities. This extrapolation is based on mirror area as collision with mirrors played a major role in the total avian fatalities documented at the Solar One facility. It should be noted that the

McCrary study provides no data to assess avian morbidity. It should be recognized that estimates of avian mortality that ignore excess morbidity will necessarily underestimate ultimate fatality that will be associated with that excess morbidity (i.e. latent fatality). It should also be noted that damage to flight feathers could be cumulative if flights through concentrated flux are repeated. Such factors would be expected to contribute to substantial underestimation of avian impacts.

In addition to these concerns extrapolation from a 10 MW pilot plant to a 250 MW facility with many thousands of heliostats and a much taller receiver tower "may produce non-linear increases in the rate of avian mortality when compared to Solar One…" according to McCrary. Also, the volume of the air space with solar flux densities greater than 4 kW/m^2 (i.e. the hazardous air space) would increase with increasing power output rating or solar field size, increasing the likelihood of avian exposure. The effect of a larger volume of the proposed projects would have a greater effect on bird mortality and morbidity given that exposure duration at high intensities would be much greater.

To evaluate the potential for non-linear effect of scale-up in facility size from a pilot scale to a commercial scale, staff estimated the relative volume of air space and relative dose for both a facility the size of Solar One and Hidden Hills/Rio Mesa (see **Appendix BIO1 Figures 5** and **6**) below. Staff chose a range of plausible straight-line flight paths past a Rio Mesa-like facility re-scaled to the reduced size of the Solar One heliostat field having a heliostat field of approximately one-fourth the diameter of Rio Mesa. Three paths were taken from this Solar One model: one having a closest approach distance to the tower at the radius of the 5 kW/m^2 isopleth, another at one-half of that closest approach distance, and a third at one-fourth of that closest approach distance, providing three hypothetical flight paths at distances of 120 feet, 60 feet and 30 feet from the assumed center of the receiver tower. Exposure doses were calculated using these three flight paths at Solar One. Staff then calculated the comparative doses associated with the analogous three hypothetical flight paths, again at distances of 120 feet, 60 feet and 30 feet from the center of the receiver tower at the Rio Mesa facility. **Appendix BIO1 Tables 4** and **5** below provide the results of this comparative analysis.

The volume of the flux field at the Hidden Hills / Rio Mesa size facility with concentrated flux above 5 kW/m^2 is about 20 times larger than the similar flux field volume of the Solar One size facility. The magnitude of the doses resulting from flights at the same distances from the receiver towers described above is between 5 and 6 times larger at the Rio Mesa-size than at the Solar One-sized facility. The product of increased dose and volume is about 100 times larger at Hidden Hills / Rio Mesa as compared to Solar One. This analysis confirms the validity of McCrary's concern regarding the potential for non-linear increase in scaling of adverse effects on avian populations associated with exposure to concentrated solar flux from scale up of a small 10 MW pilot plant like Solar One to a 250 MW or greater facility like Hidden Hills / Rio Mesa.

Table 4 Comparison of Dose Resulting From Flight Paths at Equal Distance from the Center of Each Receiver Tower (view factor 1.0)

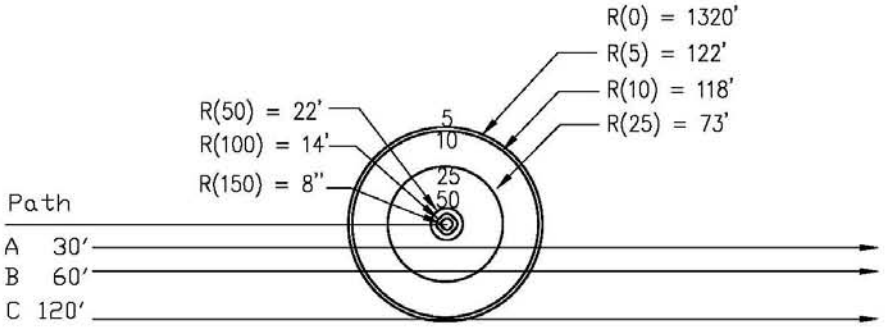
ViewFactor= 1.0 Speed = 18 mph	Path closest approach to tower (feet)	Max flux (kW/m^2)	Exposure time (secs)	Total Dose ($kW\text{-}secs/m^2$)	Dose above Threshold ($kW\text{-}secs/m^2$)
Rio Mesa	30	100	372	2000	1400
	60	50	372	1800	1200
	120	25	372	1500	900
Solar One	30	25	100	400	250
	60	25	100	370	220
	120	5	100	240	80
Solar One Standby Points[1]	NA	1500	0.3	440	440

[1.] assumes flight speed of 18mph through 8ft flight path

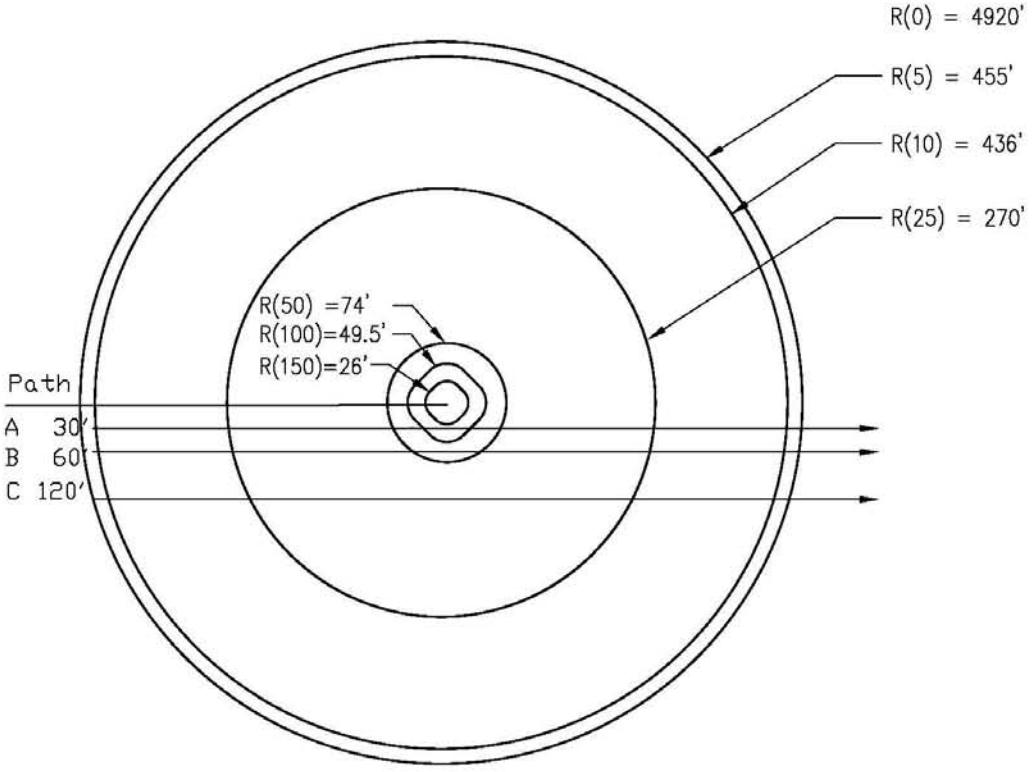
Table 5 Comparison of Dose Resulting From Flight Paths at Equal Distance from the Center of Each Receiver Tower (view factor 0.33)

View Factor=0.33 Speed = 18 mph	Path closest approach to tower (feet)	Max flux (kW/m^2)	Exposure time (secs)	Total Dose ($kW\text{-}secs/m^2$)	Dose above Threshold ($kW\text{-}secs/m^2$)
Rio Mesa	30	100	372	650	380
	60	50	372	580	300
	120	25	372	480	210
Solar One	30	25	100	130	60
	60	25	100	120	50
	120	5	100	80	0

COMPARATIVE FLIGHT PATHS FOR SOLAR ONE & RIO MESA/HIDDEN HILLS



Appendix B C1 Figure 5 SOLAR ONE - FLUX ARRAY AT TOWER



Appendix B C1 Figure 6 RIO MESA / HIDDEN HILLS - FLUX ARRAY AT TOWER

ANALYSIS OF UNCERTAINTY

There are significant uncertainties associated with staff's analysis of risk to avian plumage potentially resulting from exposure to concentrated solar flux. Evaluation of the relative sensitivity to various inputs to the thermodynamic equilibrium calculation indicates that the orientation of the bird in the flux field causes the greatest effect on the resultant radiant exposure. This is the result of the strong effect of the angle of incidence on effective flux density. This is reflected in the view factor of the incident rays on the surface (i.e., the angle of the rays to the object's surface). The view factor used in staff's model can vary from about 0.25 to 1 depending on the bird's orientation in the radiant field. This can result in a fourfold change in effective exposure level between level flight and flight that causes the feathers to be perpendicular to the incident solar radiation.

The choice of chord length of the potentially exposed bird wing has the next largest effect on the estimated feather surface temperature. Cord lengths for potentially exposed birds range from about 2 to about 20 inches with the longest cord lengths resulting in the most impact. Choice of chord length can change the analysis outcome by about a factor of three.

The choice of flight speed of the bird is also an important variable in estimation of the resultant surface temperature reached. A decrease in flight speed from 40 miles per hour to 20 miles per hour would increase resultant relative surface temperature rise by about 50 percent. This is the result of decreased convective heat transfer from the feather surface to the ambient air at lower flight speeds.

The emissivity (the fraction of the incident radiation that is absorbed or not reflected from the surface) of the feather would also affect the resultant temperature. However, staff used an emissivity of 0.95 as a plausible worst case eliminating the potential variability associated with differences in emissivity of different feathers. It should also be noted that the micro structure of the feathers may allow radiant energy to penetrate deeply into the feather below the boundary of the outer surface. For example the radiant energy could first contact the barbules that are well within the feather. This could substantially reduce the effect of convection and substantially increase the rate of temperature rise on these surfaces. If this does in fact occur, staff's analysis could substantially underestimate the effect of flight feather damage associated with exposure to concentrated flux.

It is also conceivable that conduction of heat down the quill of the feather could result in damage to the follicle resulting in complete loss of the feather and loss of ability to re-grow a new feather during subsequent molting cycles.

Another uncertainty is the effect of exposure of the feather surface to UV radiation with concurrent exposure to high temperatures. Staff was not able to include the potential effect of increased keratin molecular bond scission that could be associated with concurrent exposures. Such exposure could result in adverse effects on keratin integrity at lower surface temperatures than would otherwise be required, accelerating the rate of damage.

Exposure to summer ambient conditions mid-day results in exposure to solar flux of 1 kW/m^2, and is thus the base line beyond which excess damage can occur. Preexisting exposure of 1 kW/m^2 with or without the existence of the proposed facilities places a lower limit on exposure. An exposure to 5 kW/m^2 is the lowest exposure that results in a surface temperature of 160 ^oC which can be considered a lowest observed adverse effect level (LOAEL). Use of an uncertainty factor greater than 5 and a LOAEL of 5 kW/m^2 would render the exposure criteria moot as it would require exposure to remain below the preexisting background of 1kW/m^2. Exposures below 4 kW/m^2 did not result in surface temperatures of above 160^o C and can be considered a NOAEL. Use of an uncertainty factor of 2 and a LOAEL of 5 kW/m^2 results in an estimated safe exposure level of 2.5 kW/m^2. Based on this analysis, staff estimates that a one-time exposure to a solar flux density between 2.5 kW/m^2 and 4 kW/m^2, for a duration not exceeding 1 minute or so, would cause little if any damage to flight feathers and can be considered safe.

CONCLUSIONS

Staff's analysis of avian exposure to concentrated solar radiation indicates that a threshold of safe exposure does not exist above a solar flux density of about 4 kW/m^2. The analysis also indicates that both the Hidden Hills and Rio Mesa facilities pose potentially significant risk to avian populations that may encounter the air space in the facilities where concentrated flux density is above staff's estimated safe levels, resulting in avian morbidity and mortality. The available data regarding avian impacts is very limited; however, such data does provide at least some perspective regarding potential for impact.

There are significant questions regarding extrapolation from the available information regarding avian impacts. The most vexing is the complete absence of data that would allow estimation of avian morbidity (i.e. reliable dose response data). Staff's assessment provides estimates of exposure and dose that can lead to injury and late fatality. In addition, there are major unknowns in estimation of differences in avian populations from one site to the next. These limitations in the available data require exercise of considerable judgment in extrapolation of data from one site to another. However, the errors introduced by the lack of site specific data are likely to be small in comparison to the absence of morbidity estimates and effects of dramatically increased potential exposure duration resulting from the increased volume of the air space affected by concentrated solar flux of the proposed project.

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APPENDIX BIO2 - PROCEDURAL MODEL AND CALCULATIONS USED TO ESTIMATE AVIAN EXPOSURE TO CONCENTRATED SOLAR RADIATION

FOR HIDDEN HILLS BIOLOGY RESOURCES APPENDIX BIO1

Introduction

A surface exposed to and thus absorbing incident concentrated solar flux will convert the absorbed flux to heat and rise in temperature until it reaches a thermal equilibrium with its surroundings, including the incident flux. The heat loss mechanisms of convection and radiation will increase their rate of removing heat from the surface until they together match the rate of incoming heat from the incoming solar flux, then the temperature will stabilize. The stable temperature at which this thermal equilibrium occurs is determined by the level of incoming solar flux and parameters that affect the loss mechanisms such as flight speed, ambient temperature, and the view factor. Thus it is possible to, within a reasonable degree of accuracy (with some dependence on materials and circumstances), to relate an incoming solar flux level to the steady-state temperature to which a material surface may rise.

To determine this relationship between solar flux and temperature, staff modeled the temperature response of exposed feather surfaces to concentrated solar flux using a dynamic iterative method that allows for the examination of the various mechanisms of cooling that begin to operate when the material is heated. This method allows for the variation of material properties and allows examination of changing external conditions (e.g. flux levels with position). Transient responses of the material being heated (i.e. the time needed for the material to respond to those changes of external conditions) can also be examined to see how quickly the surface temperature rises and falls.

The surface temperature model is driven by the incoming thermal radiation (flux) to the surface. The absorbed flux causes the absorbing material (the feather in this case) to rise in temperature. The rising temperature causes the material to heat to a temperature above its surroundings, and so the material starts to lose heat back to its surroundings through convection and re-radiation. These three mechanisms are well understood and characterized and can be found in nearly any college level textbook on heat transfer and fluid mechanics (Holman 1976) (Incropera 2007) (Cengel 2007) (MERM 2001).

The model assumes that the material being heated maintains its integrity throughout the modeled flight path regardless of temperatures predicted so that potential temperature rise and response to changing input flux can be observed. The observation of steady-state as well as transient responses help to verify that the model is responding according to well established and verified expected thermal behaviors.

In the real world, most organic materials will begin to decompose (pyrolize) at some elevated temperature (about 160 °C for keratin, the material of feathers), and the material's properties (mass, thickness, stiffness, composition, toughness, brittleness, density, dimensions, etc.) will begin to change. Shrinkage and melting of filamentary structures is expected to occur by approximately 300 °C. Upon reaching a temperature of 400 °C the remaining material would be mostly carbon and have little if any remaining structural integrity. Therefore, for the purpose of risk assessment to evaluate potential damage to feathers, accurately predicting temperatures very much over 300 ^{o}C is not meaningful. By then the keratin will have pyrolized and out-gassed most of its volatile components leaving behind a mostly carbonaceous material. For more information and references on this see **APPENDIX BIO1**. References listed throughout this document refer to the list of references published at the end of **APPENDIX BIO1.**

The following is an outline of the logical steps through which the computerized model proceeds to predict the temperature response of a feather-covered surface (i.e. bird's wing) as it flies along some chosen path above and across a solar concentrated flux field. Some assumptions regarding the material properties and the actual scenario must be made, and attempts have been made to choose reasonable and realistic values and cases for use in conducting a risk assessment of avian exposure to concentrated flux.

Outline of Steps Followed in Bird Flight Model (with references where applicable)

1) Set path conditions

   a) Pick a straight-line path through the applicant-provided flux map (provided in **Response to Data Request, Set 2A, #159**). Note: The diagram used for cross-field paths and to get location and flux density values along that path is included in the top half of the applicant's Figure 3, page 9 of the data response. Most paths were directed northeast, passing at some selected distance of nearest approach to the tower on its northwest side.

   b) Measure the distances to each of the flux contours across the heliostat field

      i) Assume flux = 0 at edge of field, linearly interpolated elsewhere between flux levels indicated on the diagram. (Note: Where paths penetrated inside an indicated contour, but did not penetrate the next higher contour before passing the tower, flux levels were not taken to increase beyond the last penetrated contour. This assumption would tend to underestimate the actual maximum flux level along the path.)

      ii) Make a linear interpolation table of distance and path / flux level. This table is comprised of two vectors (nSunsVect and distData) included for each path shown in the **pathData()** section of the computer program code. The paths modeled are mostly straight lines crossing the solar field coming within some selected nearest approach distance to the solar receiver tower. One reported path involves a short path upward from the ground near the tower at an angle of approximately 45 degrees, to simulate a bird leaving the ground, and flying up through the flux pattern to a level above the tower.

2) Set environmental and flight conditions

   a) Ambient temperature Tambient = 45°C (113 °F). This is a temperature that is near the expected maximum, but which would still be expected to occur several times during the summer months. Ultimately, a shift in the assumed ambient temperature affects the flux-exposed equilibrium temperature by an amount similar to the temperature shift for temperature of interest (less than 300 °C). Thus, an ambient temperature shift of 4 °C, would affect the flux level to reach 160 °C on a surface by about 0.2 kW/m^2.

   b) Flight speed V = 18 mph is used in the risk assessment. This is a speed, within the lower-middle range of speeds (Alerstam 2007) that would be expected of birds at these solar sites.

   c) Angle of incidence of flux to feather surface (angle from perpendicular incidence) "offVert". Values used were (a) 71 degrees as a likely angle to the underside of a horizontal surface (e.g. bird wing) estimated from applicants flux maps, and (b) 0 degrees as there would always be some portion of the surface of any three-dimensional object (e.g. bird) exposed to the flux at this angle.
   The term "vew factor" is equal to the trigonometric cosine of the incidence angle, (i.e. cosine(offVert angle)) is used to indicate the heating "effectiveness" of incident flux on a surface.

   d) Wing chord length (distance from leading to trailing edge of a wing) "L" (6 inches was chosen as representative), is a factor used in determination of the fluid mechanics-related Reynolds number, and thus is a factor in whether airflow over the wing surface is laminar or turbulent, which in turn affects rate of convective cooling of the surface. The L = 6" assumption yields a Reynolds number of approximately 70,000, well within the range spanning bird flight (Videler 2005, p. 17). With the commonly used for air flow over a wing "external flow over a flat plate" analogy model (Ward 1999), the resulting Reynolds number for the underside of the wing remains well below the accepted critical value of 500,000 where air flow would be expected to become turbulent. For all considered cases of bird flight, the air flow passing the underside of the wing is considered to be laminar (Withers 1981). This choice drives the equations used for determining the appropriate convective heat transfer coefficient (Holman 1976) (Incropera 2007) (Cengel 2007) (MERM 2001).

3) Assume feather's physical properties

   a) Thickness = 600 microns (assumed)

   b) Optical emissivity = 0.95 (assumes a dark colored bird) (Ward 1999) Staff assumes for this risk assessment that the absorbance coefficient for solar flux will be the same as the emissivity of the surface for re-radiation of infrared radiation. This assumption is based on reported data on values reported for black plumage, the effects of dirt on surfaces, and the properties of the feathers structure (Quintiere 1974, Osorio 2002, Bass 1995).

c) Optical transmissivity = 0 (assumes incident flux does not pass through without being blocked and absorbed)

d) Optical absorption depth = 0.5 (Assume incident flux is absorbed in first half of thickness)

e) Mass density of solid keratin = 1.3e3 kg/m^3 Ref: (Munn 2009)

f) Void density (to account for the open keratin structure of feathers) (assumed to be 50% of volume). Note that the density characteristics affect transient effects (the timing) of the heating effects, but not the steady-state temperatures used for this risk assessment.

g) Mass density per unit area of plumage = half that of solid keratin to account for void volume of feather structure (See note above on effect of void density).

h) Thermal conductivity of keratin = 0.05 W/m-K Ref: (Dawson 1999), (Baxter 1946),(Martinez 2012)

i) Thermal conductivity of plumage = 0.074 W/m-K Ref: (Walsberg 1988)

j) Moisture level delays heating by adding water mass to the plumage that must be heated to 100 °C. Heating beyond 100 °C, is further delayed as the water consumes and carries away heat during its evaporation. This effect is minor (on the order of 2-3 seconds) for the flight paths modeled.

4) Set initial conditions:

a) Tsurf = Tambient (Assume initial surface temperature is at the ambient air temperature.)

b) Qin = 0 (Solar radiation arriving at the top of the wing surface directly from the sun, is not considered in this analysis).

c) t = 0

5) Start clock (intervals of dt). Repeat the following steps for each clock tick interval, until all way across the heliostat field. Output and graph are stored in viewable files. See Hidden Hills **Appendix BIO1 Figures 1** thorough **4** and **Appendix BIO1 Tables 2** and **5** for examples:

a) Calculate new time (t) from clock ticks by adding dt (the time interval)

b) Calculate position along path
X = V * t where t = elapsed time, V = flight speed

c) Calculate flux Level from position by interpolation between flux contours (from applicant)

d) Calculate solar energy received in from Flux Level, emissivity, view factor, transmissivity

Qin = 1000 * (SunsIn+1) * emissivity * viewFactor * (1 - transmissivity)
Ref: MERM 2001, p. 37-2, eqtn. 37.8

e) Calculate hot-side convective energy losses
Qv = h * (Tsurf - Tambient) Ref: MERM 2001, p. 36-3, eqtn. 36.14

f) Calculate hot-side re-radiative losses energy losses
Qrad = SBsigma * emissivity * ($Tsurf^4$ - $Tambient^4$) Ref: MERM 2001 p. 37-4, eqtn 37.14

g) If backside of plumage is uncovered (i.e. feather is solely protruding without being covered on front or back side by either plumage or flesh), calculate conductive-convective combination losses as:
Qcomb = (Tsurf-Tamb) / (thkPlumage * (1-abDepth) / kPlumage + 1/h) going through the feather with heat going out to the air flowing over the backside of the feather (Holman 1976 p. 29); (this option not used for the conservative general case of this analysis)

if backside of feather is covered by other feathers or the bird's body, set Qcomb = 0. (option used in this analysis)

h) Calculate energy change during interval as Qnet = Qin – Qv – Qcomb – Qrad

i) Calculate change in surface temperature during interval
dT = Qnet * dt / (CpPlumage * mDryfeather + CpWater * mWater)
ref: MERM 2001, p. 34.15
Note: Possible moisture in the feather is accounted for by making the incoming flux warm its mass as well as the feather's, until 100 °C. At 100 °C, temperature rise is stalled until the water has been vaporized from the liquid state, then is assumed to be released to the atmosphere. A moisture level of constituting 15 percent of the mass of the dry feather is assumed.

j) Calculate new surface temperature Tsurf = Tsurf + dT

k) Repeat the loop until path has traversed the solar field.

BIRD FLIGHT MODEL MATERIAL PROPERTIES ASSUMPTIONS WITH REFERENCES

FOR HIDDEN HILLS BIOLOGY RESOURCES APPENDIX BIO1

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Selected code extractions showing values used, and source references

```
# bird plumage characteristics

    Tskin = 41                  #  degC assumed body temperature of bird

    transmissivity = 0.0        # of bird plumage
```

```
    emissivity = 0.95             # of bird feather  ref: Ward 1999, Wolf 2000

    kPlumage = .074               #  W/m-K plumage thermal conductivity   ref: Walsberg 1988

    rhoPlumage = 1.3e3 *.5        #  density in kg/m^3 (keratin density is assumed halved by void
                                                                    density)

    thkPlumage =    60e-5         #  meters

    CpPlumage =     1.53e3        #  J/kg-K

    abDepth = .5                  # fraction of plumage thickness that
                                      absorbs the Qin flux

    Tsurf =  Tamb                 # start here for initial temp

    mDryFeather = rhoPlumage * thkPlumage   # feather mass in kg/m^2

    mWater = waterFraction * mDryFeather    # water mass per unit area
                                             (kg/m^2 )  adds mass to feathers

    m = mDryFeather + mWater      #water absorbs heat until 100C

    #initialized constants and parameters

    viewFactor = math.cos(offVert * math.pi/180.)

    L = L / 39.4        # Convert from inches to meters

    Pr = 0.705          # Prantl number (dimensionless) air       ref: MERM App 35.D

    V =  Vmph / 2.237   # convert flight speed from mph to meters/sec

    airVis = 1.78e-5    # air kinematic viscosity at 49°C         ref: MERM App 35.D

    kAir = .028         # air thermal conductivity W/(m-degK)     ref: MERM App 35.D

    Qthresh = 4000.     # in watts/m^2 (staff-determined)

    Reynolds = V * L / airVis     # Ref: MERM 2001, p. 36-4 eq. 36.18

    Nu = 0.664 * Reynolds**0.5 * Pr**(.33333333)    #Nusselt number  Ref: MERM 2001, p. 36-4 eq.
36.18

    h = kAir * Nu / L             # convective heat transfer coeff   Ref: MERM 2001, p. 36-3
eq.36.14

    SBSigma = 5.6704e-8           #  W/(m^2 * K^4) Stephan-Boltzman constant Ref: MERM 2001, p.
37-2
```

The following source code listing contains the computer model used for the risk assessment. It is written in the Python Open Source Programming Language, Version 2.7.2. An interpreter for executing the code is available at http://www.python.org/ . This program code was designed and written by staff for this particular project-specific risk assessment, and should not be considered a general purpose heat transfer modeling code. Lines and portions of lines that begin with a '#' mark are comment lines for use in

understanding the code. The code is included here for completeness in discussing staff's analytical method and assumptions. No user manual has been written.

Printed in mono-spaced font for readability of computer code.

Source Code

```
# heat rise of bird surface temperature
# bird_traverse_3e10.py  10/28/2012  Geoff Lesh
# added: option for backside losses
def pathData():

    global distVect, nSunsVect, towerLocation, waterFraction, offVert, runID, emissivity,Tamb, ,\
           pathID, pathRemarks

    #findPathID = 'modelRMOff30'
    #findPathID = 'modelRMOff120'
#

    ##if findPathID == 'modelRMOff30':
    #scale =  12/39.4  #meters real world per feet scale
    #pathID = 'modelRMOff30'
    #pathRemarks = 'Modeled RM Off Tower 30 ft'
    #towerDist = 0
    #nSunsVect = (0,   5,      10,     25,     50,     100,100,50,25,10,5,0)
    #distData=   [ -4920,-454,-435,-268,-68,-39,     39,68,268,435,454,4920] # units in feet



    ##if findPathID == 'modelRMOff60':
    #scale =  12/39.4  #meters real world per feet scale
    #pathID = 'modelRMOff60'
    #pathRemarks = 'Modeled RM Off Tower 60 ft'
    #towerDist = 0
    #nSunsVect = (0, 5, 10, 25, 50, 50, 25, 10, 5, 0)
    #distData=   [ -4920,-451,-432,-263,-43,43,263,432,451,4920] # units in feet


    ##if findPathID == 'modelRMOff120':
    #scale =  12/39.4  #meters real world per feet scale
    #pathID = 'modelRMOff120'
    #pathRemarks = 'Modeled RM Off Tower 120 ft'
    #towerDist = 0
    #nSunsVect = (0,   5,      10,     25,     25,10,5,0)
    #distData=   [ -4919,-439,-419,-242,242,419,439,4919] # units in feet


    ##if findPathID == 'modelS1Off30':
    #scale =  12/39.4  #meters real world per feet scale
    #pathID = 'modelS1Off30'
    #pathRemarks = 'Modeled S1 Off Tower 30 ft'
    #towerDist = 0
    #nSunsVect = (0,   5,      10,     25,     25,10,5,0)
    #distData=   [ -1320,-118,-114,-67,67,114,118,1320] # units in feet

    ##if findPathID == 'modelS1Off60':
     #scale =  12/39.4  #meters real world per feet scale
     #pathID = 'modelS1Off60'
     #pathRemarks = 'Modeled S1 Off Tower 60 ft'
     #towerDist = 0
     #nSunsVect = (0,  5,      10,     25,     25,10,5,0)
```

```
     #distData=   [ -1319,-106,-102,-42,42,102,106,1319] # units in feet

    ##if findPathID == 'modelS1Off120':
    #scale =  12/39.4  #meters real world per feet scale
    #pathID = 'modelS1Off120'
    #pathRemarks = 'Modeled S1 Off Tower 120 ft'
    #towerDist = 0
    #nSunsVect = (0.,  5.,     5.,0.)
    #distData=   [ -1315,-22,22,1315] # units in feet

    #scale=1500./7.7   # meters real world per cm on scale This is general scale for path not
having their own scale

    ###flying upward  Note: this path has its own scale!
    #scale=300 / 16.7  #meters Real world per cm on map: map data is in same cm.
    #pathID =  'DAUP'
    #pathRemarks = 'Upward past tower from ground'
    #towerDist = 13.15
    #nSunsVect = (0,5,10,25,50,50,25,10,5,0)
    #distData=   [0,10.8,11.1,11.6,12.3,14,14.4,15.5,15.9,20]  #cm of scale #

    #pathID = 'Constant 1KW'
        #scale=1500./7.7   # meters real world per cm on scale This is general scale for path not
having their own scale
    #pathRemarks = 'Constant 1KW'
    #towerDist = 24.3
    #nSunsVect = (0,1,1,0)
    #distData=   [16.95,17.0, 31.2, 31.25]  #cm of scale #

    #pathID = 'Constant 5KW'
    #pathRemarks = 'Constant 5KW'
    #scale=1500./7.7   # meters real world per cm on scale This is general scale for path not
having their own scale
    #towerDist = 24.3
    #nSunsVect = (0,5,5,0)
    #distData=   [16.95,17.0, 31.2, 31.25]  #cm of scale #

    #pathID = 'Constant 8KW'
    #pathRemarks = 'Constant 8KW'
    #scale=1500./7.7   # meters real world per cm on scale This is general scale for path not
having their own scale
    #towerDist = 24.3
    #nSunsVect = (0,8,8,0)
    #distData=   [16.95,17.0, 31.2, 31.25]  #cm of scale #


    #pathID = 'Constant 10KW'
    #pathRemarks = 'Constant 10KW'
    #scale=1500./7.7   # meters real world per cm on scale This is general scale for path not
having their own scale
    #towerDist = 24.3
    #nSunsVect = (0,10,10,0)
    #distData=   [16.95,17.0, 31.2, 31.25]  #cm of scale #


    #pathID = 'Constant 25W'
    #pathRemarks = 'Constant 25KW'
    #scale=1500./7.7   # meters real world per cm on scale This is general scale for path not
having their own scale
    #towerDist = 24.3
    #nSunsVect = (0,25,25,0)
    #distData=   [16.95,17.0, 31.2, 31.25]  #cm of scale #
```

```
    #pathID = 'Constant 50KW'
    #pathRemarks = 'Constant 50KW'
    #scale=1500./7.7   # meters real world per cm on scale This is general scale for path not
having their own scale
    #towerDist = 24.3
    #nSunsVect = (0,50,50,0)
    #distData=   [16.95,17.0, 31.2, 31.25]  #cm of scale #

    #pathID = 'Constant 100KW'
    #pathRemarks = 'Constant 100KW'
    #scale=1500./7.7   # meters real world per cm on scale This is general scale for path not
having their own scale
    #towerDist = 24.3
    #nSunsVect = (0,100,100,0)
    #distData=   [16.95,17.0, 31.2, 31.25]  #cm of scale #

    #pathID = 'Constant 150KW'
    #pathRemarks = 'Constant 150KW'
    #scale=1500./7.7   # meters real world per cm on scale This is general scale for path not
having their own scale
    #towerDist = 24.3
    #nSunsVect = (0,150,150,0)
    #distData=   [16.95,17.0, 31.2, 31.25]  #cm of scale #


    #pathID = 'AASE'
    #scale=1500./7.7   # meters real world per cm on scale
    #pathRemarks = 'closest pass to tower'
    #towerDist = 21.55
    #distData=   [15.3, 19.4, 20.2, 20.4, 21.2, 21.25, 21.3, 21.65, 21.75, 21.85, 21.95, 22.9,
24.5, 29.5]  #cm of scale # path A1 next to tower
    #nSunsVect = (0,5,10,25,50,100,150,150,100,50,25,10,5,0)
# path A1 next to tower

    #pathID = 'ABNE'
    #pathRemarks = '100 m off tower (tangent)'
    #scale=1500./7.7   # meters real world per cm on scale This is general scale for path not
having their own scale
    #towerDist = 20.0
    #nSunsVect = (0,5,10,25,25,10,5,0)                                          # path ABNE 100
m off tower
    #distData=   [11.7, 17.7, 18.5, 19.0, 21.2, 21.7, 22.5, 31.0]  #cm of scale #        path
ABNE 100 m off tower

    pathID = 'ACNE' #
    pathRemarks = '200 m off tower'
    scale=1500./7.7   # meters real world per cm on scale This is general scale for path not
having their own scale
    towerDist = 20.1
    nSunsVect = (0,5,10,10,5,0)                                       # path acNE 200 m off tower
    distData=   [12.2,18.2,19.4,19.7,22.7,29.9]  #cm of scale #        path acNE 200 m off tower

    #pathID = 'ADNE'
    #pathRemarks = '300 m off tower'
    #scale=1500./7.7   # meters real world per cm on scale This is general scale for path not
having their own scale
    #towerDist = 21.0
    #nSunsVect = (0,5,10,10,5,0)                                        # path ADNE 300 m off
tower
    #distData=   [13.7,19.3,22.3,23.,23.5,31.0]  #cm of scale #        path ADNE 300 m off tower

    #pathID = 'AENE'
    #pathRemarks = '400 m off tower'
```

```
    #scale=1500./7.7   # meters real world per cm on scale This is general scale for path not
having their own scale
    #towerDist = 24.3
    #nSunsVect = (0,5,5,0)                                      # path AENE 400 m off tower
    #distData=   [17., 22.8, 23.7, 31.2]  #cm of scale #        path AENE 400 m off tower

    if 1:
        distOffSet=distData[0]   # gets subtracted from initial and all values of distData
        towerLocation= (towerDist - distOffSet) * scale
        checkdata = len(distData)== len(nSunsVect)
        print 'Checkdata:  %s'%checkdata
        if not checkdata:
            print 'distData size: %s'%len(distData)
            print 'nSunsVect size: %s'%len(nSunsVect)
            raise Exception( 'Data vector lengths do not match.  Quitting. See output file.'  )
            #sys.exit()
        else:
            for i in zip(distData,nSunsVect):
                print i
            distVect  = tuple( scale * (i - distOffSet) for i in distData)  # in meters
            #distVect = tuple( scale * (i - towerDist) for i in distData)   # in meters centered
at tower

def userData():
    global Tamb, Tskin, dt, emissivity, offVert, L, V, nSteps, waterFraction,
maxDistance,waterFraction, offVert, RunID, emissivity,Tamb, V ,\
          pathID, Vmph, maxTime, transmissivity,backSideLossesOn
    nSteps= 44000
    dt = .01              # seconds, recheck frequency = clock tick
    Tamb = 49.            # degC
    waterFraction = .15   # mass of water

    offVert = 0.          # degrees  angle of incidence  Usually 0 or 71
    L = 6.                # inches wing length front to back
    Vmph = 18.            # mph bird flight speed
    maxDistance = 3000    # meters
    maxTime =  800        # seconds
    backSideLossesOn = False  # True turns on heatloss through backside as Qcomb + QradBackside

def setConstants():  # initialize

    #initialize   constants  and data vectors
    viewFactor = math.cos(offVert * math.pi/180.)
    L = L / 39.4        # Convert from inches to meters
    Pr = 0.705          # Prandtl number for air (dimensionless)
    heatVapWater = 2257 # kJ/kg Heat of vaporization of water
    V =  Vmph / 2.237   # convert from mph to meters/sec
    airVis = 1.78e-5    # Air kinematic viscosity (m^2/s)
    kAir = .028         # air thermal conductivity (W/(m-degK))
    Qthresh = 4000.     # watts/m^2
    Reynolds = V * L / airVis     # Reynolds number  (dimensionless)
    Nu = 0.664 * Reynolds**0.5 * Pr**(.33333333)    #Nusselt number (dimensionless)
    h = kAir * Nu / L             # convective heat transfer coeff (W/m^2 - K)
    SBSigma = 5.6704e-8           # Stephan-Boltzman constant (W/(m^2-K^4))
    CpWater = 4.1813e3            # heat capacity of liquid water (J/kg-K)
    HvWater = 2257e3              # entalpy of vaporization for water (J/kg)

    # bird plumage characteristics
    Tskin = 41                    #  bird body temperature degC
    transmissivity = 0.0          #  of bird feather (dimensionless)
    emissivity = 0.95             #  of bird feather (dimensionless)
    kPlumage = .074               #  (W/m-K) plumage thermal conductivity
    rhoPlumage = 1.3e3 *.5        #  density in kg/m^3
```

```
    thkPlumage =    60e-5         #  meters          ref:
    CpPlumage =     1.53e3        #  J/kg-K          ref:
    abDepth = .5                  # fraction of plumage thickness absorbing the flux (assumed)
    Tsurf =  Tamb                 # start here for initial temp
    mDryFeather = rhoPlumage * thkPlumage   # feather mass in kg/m^2
    mWater = waterFraction * mDryFeather    # water mass per unit area (kg/m^2 )adds mass to
plumage


        t=0               # initialize start time
        timeTo160 = -99
        timeAbove160 = 0
        timeTo300 = -99
        timeAbove300 = 0
        #maxTsurf = 0
        lHit160 =  False
        lHit300 = False
        if mWater > 0:
            lFeatherIsDry = False
        else:
            lFeatherIsDry = True
        doseTotal = 0
        doseBefore160 = 0
        doseAbove160 = 0
        doseAbove300 = 0
        doseAboveThresh = 0

def qDotIn(d):
    global i, distVect, nSunsVect
    intensity = np.interp(d,distVect,nSunsVect)
    return intensity

def mainLoop():
    # input data
    ## could add 1 sun to backside then add convection and conduction

    for i in range(1,nSteps):  # i is clock ticks
        t = i*dt   #new time
        d = t*V    #new distance


        Qrad = SBSigma * emissivity * ((Tsurf+273)**4 - (Tamb+273)**4)# (Watts/m^2)re-Rad of
                                                                      energy absorption

        Qv =   h * (Tsurf - Tamb)                    # 'Front' surface convection in Watts/m^2
        #Qc =   kPlumage * (Tsurf - Tskin)           # in Watts conduction to body (not used with
                                                       Qcomb)

        if backSideLossesOn:
            Qin = 1000 * (SunsIn+1) * emissivity * viewFactor * (1 - transmissivity) # in Watts
            Qcomb = (Tsurf-Tamb) / (thkPlumage * (1-abDepth)/kPlumage + 1/h) # combined
'backside' conduction + convection in Watts/m^2
            Tbackside = Qcomb/h + Tamb # temperature of back side of feather
            QradBackSide = SBSigma * emissivity * ((Tbackside + 273)**4 - (Tamb + 273)**4)  # in
Watts/m^2  Rad of energy absorption
            Qnet = Qin - Qv  - Qrad - Qcomb - QradBackSide                                  # net
heat gain during clock tick (W/m^2)

        elif not backSideLossesOn:
            Qin = 1000 * SunsIn * emissivity * viewFactor * (1 - transmissivity)           # in
Watts
            Qnet = Qin - Qv - Qrad                                                          # net
heat gain during clock tick (W/m^2)
```

```
            Tbackside = Tsurf
            Qcomb = 0

        if Tsurf >= 100. and not lFeatherIsDry:    #evaporate any remaining water and subtract
its mass
            dmWater = Qnet / HvWater               # potential water that could be evaporated off
            if dmWater <= mWater:                  # all remaining heat to be used to remove
water so temp won't rise (i.e. too much water)
                Qnet -= dmWater * HvWater          #Qnet is zeroed
                mWater -= dmWater                  # adjust for water removed

            else:
                Qnet -= mWater * HvWater           # remaining water is evaporated with energy
left over (limited to mWater not dmWater)
                mWater = 0
                lFeatherIsDry = True               # feather is now dry

        dTemp = Qnet * dt / ( CpPlumage * mDryFeather* abDepth + CpWater * mWater * abDepth )
#change in temp of feather surface (front side) during clock tick (assumes all mass participates)
            #fixme

        Tsurf += dTemp  #new temp

        doseTotal += Qin * dt

        if Tsurf > 160:
            doseAbove160 += Qin * dt
        if Tsurf > 300:
            doseAbove300 += Qin * dt
        if Qin > Qthresh:
            doseAboveThresh += Qin * dt

        #t +=  dt  #new time
        tSecsVect.append(t)
        TsurfVect.append(Tsurf)
        pathDistVect.append(d)
        IntensityVect.append(SunsIn)


        if lHit160 and Tsurf >= 160:
            timeAbove160 +=dt

        if lHit300 and Tsurf >= 300:
            timeAbove300 +=dt


        if Tsurf>=160 and not lHit160:
            lHit160=True
            timeTo160 = t

        if not lHit160:
            doseBefore160 += Qin * dt

        if Tsurf >= 300 and not lHit300:
            lHit300 = True
            timeTo300 = t


        print '%6.1f  , %6.1f,    %6.1f,   %9.1f,   %9.1f,  %9.1f, %9.1f, %9.1f, %9.1f, %9.1f'\
              %(t, d, SunsIn, Tsurf, Tbackside, Qin, Qnet, Qv, Qcomb, Qrad)

    maxSurfTemp =  max(TsurfVect)
    textLines=[]
```

```
    textLines.append(['RunID: %s'%runID])
    textLines.append(['PathID: %s'%pathID])
    textLines.append(['PathRemarks: %s'%pathRemarks])
    textLines.append(['Temp(ambient degC): %4.0f'%Tamb])
    textLines.append(['Speed(mph): %3.0f'%Vmph])
    textLines.append(['Emissivity: %4.2f'%emissivity])
    textLines.append(['Angle of Incidence (deg): %3.0f'%offVert])
    textLines.append(['View Factor: %4.2f'%viewFactor])
    textLines.append(['Moisture (%%): %3.0f'%(waterFraction * 100)])

    textLines.append(['PlumageThk (mils): %8.1f'%(thkPlumage * 39400)])  #converting from meters
to mils
    textLines.append(['BackSideLossesOn: %s'%(backSideLossesOn)])  #converting from meters to
mils
    textLines.append(['Max Surface Temp(C): %5.0f'% maxSurfTemp])

    print
    for  line in textLines: #
        print line[0]

    print
    print    'Time to  Time above  Time to  Time above (secs)'
    print    '   160C        160C     300C        300C'
    print    ' %5.0f       %5.0f    %5.0f       %5.0f'%(timeTo160, timeAbove160, timeTo300,
timeAbove300)
    print
    print 'h (convection coeff)(W/m^2-K): %7.1f'%h
    print 'Reynolds number:              %9.1f'%(Reynolds)
    print 'Max Surface Temp reached:         %5.0f'% maxSurfTemp
    print 'Flight Speed (ft/min):          %7.1f (%7.1f mph)'% (Vmph*5280/60., Vmph)
    print 'Total flight time (secs):       %7.0f'%(t)
    print 'Dose_total (kW-secs/m^2):       %7.1f'% (doseTotal/60000.*60)
    print 'DoseBefore160 (kW-secs/m^2):    %7.1f'% (doseBefore160/60000.*60)
    print 'DoseAbove160 (kW-secs/m^2):     %7.1f'% (doseAbove160/60000.*60)
    print 'DoseAbove300 (kW-secs/m^2):     %7.1f'% (doseAbove300/60000.*60)
    print 'DoseAboveThresh (kW-secs/m^2):  %7.1f'% (doseAboveThresh/60000.*60)


def makePlot():
    global pathDistVect, IntensityVect, TsurfVect, tSecsVect, towerLocation,
distVect,waterFraction, offVert, runID,emissivity,Tamb, V ,\
           pathID,Vmph,pathRemarks, viewFactor, timeTo160, timeAbove160, timeTo300,
timeAbove300,maxSurfTemp, fname, textLines


    newIntensity = [a for a in IntensityVect]
    pathDistVectMod = [a- towerLocation for a in  pathDistVect]
    distVectMod = [a- towerLocation for a in  distVect]  # these are the markers for the field
map countour measurements
    #tSecsVectMod =  [a- towerLocation/V for a in  tSecsVect]
    maxIntensity = max(newIntensity)
    plt = matplotlib.pyplot

    host = host_subplot(111, axes_class=AA.Axes)
    plt.subplots_adjust(right=0.75)
    plt.subplots_adjust(bottom= 0.180)

    par1 = host.twinx()
    par2 = host.twiny()

    offset = 60
    new_fixed_axis = par2.get_grid_helper().new_fixed_axis
    par2.axis["bottom"] = new_fixed_axis(loc="bottom",
```

```
                                        axes=par2,
                                        offset=(0, -35))

    par2.axis["bottom"].toggle(all =  True)
    par2.axis["top"].toggle(all =  False)


    host.set_ylim(0, maxSurfTemp*1.05)
    par1.set_ylim(0,1.05*maxIntensity)
    host.set_xlabel("distance (m)")
    host.set_ylabel("Surface Temp (degC) (dashed line)")
    par2.grid(True)
    par1.set_ylabel("Field Intensity (kw = #Suns) (solid line)")
    par2.set_xlabel("time(seconds)")

    p1, = host.plot(pathDistVectMod, TsurfVect,'r--')
    p2, = par1.plot(pathDistVectMod,newIntensity)# , label="kW (= Suns)")
    p3, = par2.plot(tSecsVect, TsurfVect, alpha=0)# ,label="time")
    p4, = par1.plot(distVectMod, nSunsVect, 's', markersize=4,
markerfacecolor='blue',markeredgecolor='blue')
    if timeTo160 > 0:
        jjl=host.axhspan(160,160,0.0,0.75,color='r', linewidth=.5)
        jj2=par2.text(tSecsVect[int(len(tSecsVect)*.83)],156,'%4.0f secs to reach 160
degC'%timeTo160,color='r', horizontalalignment='left',
                verticalalignment='top', fontsize = 'x-small')#,transform = host.transAxes)
        jj2=par2.text(tSecsVect[int(len(tSecsVect)*.83)],164,'%4.0f secs
above'%timeAbove160,color='r', horizontalalignment='left',
                verticalalignment='bottom', fontsize = 'x-small')#,transform = host.transAxes)


    if timeTo300 > 0: #p = plt.axhspan(0.25, 0.75, facecolor='0.5', alpha=0.5)
        Tval=300
        jjl=host.axhspan(Tval,Tval,0.0,0.75,color='r', linewidth=.5)
        jj2=par2.text(tSecsVect[int(len(tSecsVect)*.83)],Tval-4,'%4.0f secs to reach
300degC'%timeTo300,color='r', \
                    horizontalalignment='left',
            verticalalignment='top', fontsize = 'x-small')#,transform = host.transAxes)
        jj2=par2.text(tSecsVect[int(len(tSecsVect)*.83)],Tval+4,'%4.0f secs
above'%timeAbove300,color='r', horizontalalignment='left',
            verticalalignment='bottom', fontsize = 'x-small')#,transform = host.transAxes)

    #par1.set_ylim(0, 4)
    #par2.set_ylim(1, 65)


    host.axis["left"].label.set_color(p1.get_color())
    par1.axis["right"].label.set_color(p2.get_color())

    par2Span=(host.axis()[1]-host.axis()[0])/V
    par2.set_xlim(0,par2Span)

   ##plt.title(r'$\mathrm{Histogram\ of\ IQ:}\ \mu=100,\ \sigma=15$')
    plt.title(r'$\mathrm{Feather\ Surface\ Temperature\ along\ Flight\ Path\ }$')



    for  line in enumerate(textLines): #
        ##incr x, incr y
        host.text(0.01, .98-line[0]*.036,line[1][0], \
            horizontalalignment='left',
            verticalalignment='top',
            fontsize = 9,
            transform = host.transAxes)
```

```
    fullFname=str('c:\\mypython\\birds\\%s.png'%fname)
    myStr='saved to '+ fullFname
    print myStr
    plt.savefig('c:\\mypython\\birds\\%s.png'%fname)
    #plt.show()
    appfile= "c:\\program files\\quicktime\\pictureviewer.exe "

    subprocess.Popen([appfile, fullFname] )
    #plt.show()  #Tk causes prolems? after second plot won't close!

if __name__ == "__main__":

    try:
        import math
        import sys
        import datetime
        import math
        import numpy as np
        import matplotlib
        import matplotlib.pylab
        from mpl_toolkits.axes_grid1 import host_subplot
        import mpl_toolkits.axisartist as AA
        from datetime import datetime
        import subprocess
        runID = '%20s'%str(datetime.now())[:19] #'Dummy' #fixme
        fname=runID.replace(':','')
        fname2=fname.replace('.','')
        fname='Bird'+fname2

        textFileName=str('c:\\mypython\\birds\\%s.txt'%fname)
        print 'output is being redirected to : %s'%textFileName
        sys.stdout = open(textFileName,'w')

        print datetime.now().ctime()
        print 'This text file: %s'%textFileName
        print 'program: sys.argv[0] = %s'%sys.argv[0]



        userData()
        setConstants()
        pathData()
        mainLoop()
        sys.stdout = sys.__stdout__
        print 'Time(s)   Dist(m)    Tsurf(C)     Intensity(suns)'
        for a in zip(tSecsVect,pathDistVect,TsurfVect, IntensityVect):
            print '%6.1f  , %6.1f  , %6.1f  ,   %5.1f'%a # (a[0],a[1],a[2])

        print

        for  line in textLines: #
            print line[0]

        print
        print    'Time to  Time above  Time to  Time above (secs)'
        print    '   160C        160C     300C        300C'
        print ' %5.0f       %5.0f    %5.0f       %5.0f'%(timeTo160, timeAbove160, timeTo300,
timeAbove300)
        print
        print 'Max Surface Temp(C):             %5.0f'% maxSurfTemp
        print 'Reynolds number:               %9.1f'%(Reynolds)
```

```
    print 'h (convection coeff)(W/m^2-K): %7.1f'%h

    print 'Flight Speed (ft/min):           %7.1f (%3.1f mph)'% (Vmph*5280/60., Vmph)
    print 'Total flight time (secs):     %7.0f'%(t)
    print 'Dose_total (kW-secs/m^2):       %7.1f'% (doseTotal/60000.*60)
    print 'doseBefore160 (kW-secs/m^2):    %7.1f'% (doseBefore160/60000.*60)
    print 'DoseAbove160 (kW-secs/m^2):     %7.1f'% (doseAbove160/60000.*60)
    print 'DoseAbove300 (kW-secs/m^2):     %7.1f'% (doseAbove300/60000.*60)
    print 'DoseAboveThresh (kW-secs/m^2):  %7.1f'% (doseAboveThresh/60000.*60)
    print 'BackSideLossesOn: %s'%(backSideLossesOn)

    makePlot()
    print 'This text file: %s'%textFileName

    print 'program: sys.argv[0] = %s'%sys.argv[0]

finally:
    sys.stdout = sys.__stdout__  #restore stdout back to normal
    print "done."
```

BIOLOGICAL RESOURCES

	List of Comment Letters	Biological Resources Comments?
1	Inyo County	X
2	Bureau of Land Management	X
3	National Park Service	
4	The Nature Conservancy	X
5	Amargosa Conservancy	X
6	Basin & Range Watch	X
7	Pahrump Paiute Tribe	X
8	Richard Arnold, Pahrump Piahute Tribe	X
9	Big Pine Tribe of Owens Valley	X
10	Intervenor Cindy MacDonald	X
11	Intervenor Center for Biological Diversity	X
12	Intervenor, Old Spanish Trail Association	
13	Applicant, BrightSource Energy, Inc.	X

Comment #	DATE	COMMENT TOPIC	RESPONSE
1	**July 17, 2012**	**Inyo County**	
1.8		Inyo County states objection to the location of mitigation lands in Inyo County.	The Commission acknowledges the limited quantities of privately held lands in Inyo County and appreciates the comments and concerns regarding the proposed mitigation strategy identified in the PSA and FSA. As identified in Condition of Certification BIO-12 the selection criteria for land acquisition for desert tortoise is not restricted to Inyo County but encompasses lands in California that occur within the Eastern Recovery unit or other lands approved by the CPM in consultation with the regulatory agencies. This will allow flexibility should the applicant elect to purchase lands outside of Inyo County.
1.18		Add new Condition to enhance public land for mitigation purposes.	The use of public lands for mitigation purposes is presented on pages 4.2-85 and 4.2-86 of the PSA. The current mitigation approach is required to mitigate the direct loss of habitat to desert tortoise from the development of the proposed project. This section identifies that in order to fully mitigate impacts to desert tortoise mitigation lands must be preserved and managed for the sole benefit of the target species. Land acquisition and preservation removes existing threats to resources on the acquired lands and is considered an important mechanism to achieving the full mitigation standard. However, land acquisition alone is inadequate if the land is not managed and enhanced for the benefit of the species. Condition of Certification BIO-12 requires the acquisition, enhancement, and long term preservation and management for the benefit of desert tortoise and other associated wildlife and vegetation. While staff concurs that further benefits to desert tortoise could be achieved through land management actions, most public lands, with the exception of wilderness areas, are managed for multiple public uses that can accommodate actions inconsistent with established mitigation requirements. Mitigation for non-listed CEQA species, such as non-listed special-status plants, is more flexible,

1.19		Revise BIO-22 to enhance public lands rather than use private lands for compensatory mitigation.	Thank you for your comment. The discussion regarding the use of public lands for compensatory mitigation is described in response to comment 1.18.
1.21		Revise BIO-18 to include the Inyo/Mono Agricultural Commissioner when developing annual fees.	Thank you; BIO-18, subsection 6, was revised as suggested.
1.22		Revise BIO-23 per language provided.	BIO-23 subparagraph "Definitions" was revised as suggested, with several additions.
1.23		Replace subparagraph 3 of BIO-23 with provided language.	The BIO-23 subparagraph on "Thresholds" was revised as suggested, with the exception that a drawdown threshold based on rooting depths of mesquite cannot be established without examining soil cores and monitoring the mesquite response to a declining water table. Mesquite is a deep-rooted species that roots at variable depths depending on the soil profile, soil chemistry, depth to water table, soil oxygen, maximum effective rooting depth relative to existing background groundwater declines, and other factors. There are a few atypical examples of mesquite rooting to depths near 60 meters, but 15 meters is more typical and rooting may be limited to as little as 3m in settings with restrictive soil layers (Stromberg pers. comm.; and others). Because of the geologic and hydrogeologic complexity of the project vicinity, staff expects that rooting depths are quite variable and no single threshold could be applied without resulting in unintended mesquite losses, and no studies have been conducted in the area that could inform such a threshold. Staff did an extensive literature review prior to the PSA, and consulted several recognized experts in groundwater pumping impacts on southwestern phreatophytes (see Stromberg pers. comm.; Wilhoughby pers. comm; Keeler-Wolf pers. comm.; Froend pers. comm.; Showers pers. comm., and others. See also Silva et al. 1989; Martinez et al. 2009; Crampton et al. 2006; Stromberg et al. 1992; Fisher et al. 1973; Heitschmidt et al. 1988; Ansley et al. 1989; Steinberg 2001; Phillips 1963; Virginia et al. 1976; and Bleby et al. 2010). BIO-23 was revised, however, to include a provision for revising the drawdown threshold when evidence is provided, based on soil core investigation and monitoring, that a different threshold is warranted, subject to review and approval by the CPM in consultation with BLM and the Inyo Water Department.

1.24		Revise BIO-23 subparagraph 13 per provided language.	COC BIO-23 included a requirement to map groundwater-dependent vegetation and springs within the 1-foot drawdown contour in Water Supply Figure 23 (see BIO-23 subparagraph 14, PSA p. 4.2-238-239). However, the recommended additional language was accepted, with a few additions, and added to BIO-23 in the FSA.
1.25		Revise the first 2 paragraphs of BIO-24 per provided language.	Thank you; BIO-24 has been revised accordingly.
1.26		Revise the first 2 paragraphs of BIO-24 verification language per provided language.	Thank you; BIO-24 has been revised accordingly.
1.27		Revise BIO-26 verification language as directed.	Condition of certification LAND-2 addresses the financial assurances related to project closure and decommissioning. Please refer to condition of certification LAND-2 (Land Use Section) and BIO-26 for revised language regarding development of draft and final closure plans. The Energy Commission would issue final approvals.
1.73a		Management of wildlife is compliant with Policy 8.1	Thank you for your comment. This information will be provided to the decision makers.

1.83a		Project is noncompliant with Goal WR-3; groundwater drawdown may impact vegetation in the region.	Staff accepted many of the Water Department's suggested edits to BIO-23, with the exception of the comment uner 1.23. Staff discussed the differences, and to the satisfaction of the Inyo County Water Department. With the revisions, conditions of certification are compliant with Inyo County General Plan Goal WR-3, and will ensure the project protects and restores environmental resources in Inyo County from significant adverse effects of groundwater withdrawal.
1.83a		Project is noncompliant with Policy BIO-1.2/Preservation of Riparian Habitat and Wetlands	With the FSA revisions to BIO-23 and BIO-24 suggested by Inyo County (and others), the project is compliant with Inyo County General Plan Policy BIO-1.2 for Preservation of Riparian Habitats and Wetlands, and will ensure the project protects and restores environmental resources in Inyo County from significant adverse effects of groundwater withdrawal.
1.84b		Groundwater drawdown may significantly impact the Stump Springs ACEC and other dependent vegetation (Policy BIO-1.2)	Staff accepted the new or revised conditions of certification with the following exceptions: see responses to comment 22 and comment 23. Staff discussed the differences with Inyo County's water department, and concluded that with the revisions to COC BIO-23 and COC BIO-24 the conditions of certification are now compliant with Inyo County General Plan Policy BIO-1.2. The revisions to BIO-23 and BIO-24 will ensure that the project preserves and protects important riparian areas and wetlands identified by the County (Stump Springs ACEC).
1.85		If offset mitigation for sensitive species is infeasible, then the project impacts may be significant and immitigable.	The PSA and FSA contain several compensatory mitigation requirements. The project owner will have the opportunity to mitigate offsite for project impacts via condition BIO-17. Offsite mitigation that fully mitigates effects of solar flux on avian species has not been identified by staff or applicant, and staff believes the project may not achieve federal LORS compliance. The Committee has the responsibility of ultimately determining the significance of the LORS violation.
1.91a		Condition BIO-23 needs clarification of methodology and declaration of thresholds.	BIO-23 was revised to provide greater clarification and more sensitive field measures of drought-stress, based on consultation with Stromberg (pers. comm.) and others.
1.91b		Applicant should be allowed to resume pumping if a factor other than pumping can be shown to contribute to groundwater drawdown.	BIO-24 was revised with a provision that if adequate evidence was provided, based on monitoring data, that the project was neither the cause nor a contributor to a drawdown, the project could resume pumping, subject to the CPM approval, in consultation with BLM Nevada and BLM California soil and water state leads, and botanists, and the Inyo County Water Department.
1.91c		The use of reference plots in monitoring groundwater dependent vegetation must be enhanced.	The use of reference plots was revised in BIO-23; background trends can be established from baseline data collected at the near-project plots and a trend determined by updating the baseline annually until the groundwater monitoring wells show a project-related drawdown at the project boundary.

1.91d		The project owner should prepare an inventory of groundwater dependent habitat.	The applicant submitted a detailed mapping of groundwater-dependent vegetation in Data Response Figure 48-1 (CH2 2011g.). BIO-23 was revised according to the suggested edits, with a few additions. Staff disagrees, however, that -- in the absence of site-specific studies -- that a single quantitative threshold can be uniformly applied across the study area for any given resource due to the geologic and hydrogeologic complexity, and past and present groundwater use. Consequently, staff chose a more conservative approach and established a threshold based on the smallest detectable and statistically significant drawdown. BIO-24 was revised, however, with a provision that if adequate evidence was provided, based on future monitoring data, that the project was neither the cause nor a contributor to a drawdown, the project could resume pumping, or reduce or modify pumping to sustainable levels, subject to the CPM approval, in consultation with BLM Nevada and BLM California soil and water state leads, and botanists, and the Inyo County Water Department.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
2	**July 16, 2012**	**Bureau of Land Management**	
2.1		The cumulative effects analysis should take into account all proposed development within the groundwater basin…	Staff contacted BLM Nevada and BLM California for a list of cumulative renewable energy projects, and other projects affecting the local groundwater aquifer; these cumulative impacts were quantified quantitatively in the Water Supply section of the PSA and FSA. A qualitative cumulative effects analysis of other past and present groundwater impacts, including historical impacts from agricultural pumping, were analyzed thoroughly in the "Cumulative Impacts" section (a separate chapter, see PSA pp. 4.2-168-171.
2.2		Requests additional clarification of BIO-23, and how a 20% decline in vegetation vigor would be determined.	Stromberg and Wilhoughby (pers. comm.) felt a 20 percent decline in biomass and crown density (vigor indicators) was a good threshold *assuming* the water table would recover immediately after pumping stopped. Hydrogeologists from CDFG (Custis pers. comm.), Inyo County, and others indicated a high probability that the water table would not recover immediately. Consequently, monitoring guidelines were revised to utilize more sensitive field measures, i.e., earlier warning signs, including xylem (stem) water potential, gas exchange rate, and transpiration rate. However, the threshold was revised, based on consultation with Inyo County hydrologists and others to require pumping to stop if the groundwater trigger alone is exceeded: See the specific threshold language in BIO-23 and BIO-24.
2.2		BLM objects to 2-parameter threshold and recommends trigger based on drawdown or vegetation impacts.	Similar comments were received from Inyo County Water Department and others. BIO-23 and BIO-24 thresholds were modified to require pumping stop if the drawdown trigger alone is exceeded, at which point the project must provide evidence, based on monitoring data, that the project was not the cause or that a reduced or modified pumping would not exceed the threshold. Monitoring wells located between the project boundary and project wells will provide the project with ample lead time, or warning of an impending drawdown sufficient to exceed the threshold.

Comment #	DATE	COMMENT TOPIC	RESPONSE
4	**July 21, 2012**	**The Nature Conservancy**	
4.12		TNC objects to the trigger conditions of BIO-23 and BIO-24	Thank you. Similar comments were received from BLM, Inyo County, and others. More sensitive field measurements of drought-stress were added based on consultation with Stromberg (pers. comm.). However, the threshold was revised to require the project stop, reduce, or modify pumping based only on exceedance of the 0.5 ft drawdown at the project boundary. Please see WATER SUPPLY Condition of Certification **WS-6.**
4.12a		Lag time after reaching 20% vegetation decline will allow further degradation of the ecosystem	Stromberg and Wilhoughby (pers. comm.) felt a 20 percent decline in biomass and crown density (vigor indicators; not indicators of plant mortality) was a good threshold *assuming* the water table would recover immediately after pumping stopped. Hydrogeologists from CDFG (Custis pers. comm.), Inyo County, and others indicated a high probability that the water table would not recover immediately. Consequently, the threshold was revised based on more sensitive measures, i.e., earlier warning signs, and to require pumping to stop if the groundwater trigger alone is exceeded. The project can then provide evidence, subject to approval by the CPM in consultation with BLM and Inyo County hydrologists and botanists, and based on monitoring using more sensitive field measurements, that the 0.5 ft. drawdown is not causing an adverse effect. See specific language in **BIO-23** regarding thresholds.
4.13		TNC objects to 2-parameter threshold and recommends basing remedial action on drawdown alone.	Inyo County, BLM, and The Amargosa Conservancy expressed similar concerns about the potential for the 2-parameter threshold to result in unintended adverse effects. The BIO-23 and BIO-24 triggers were revised to address these concerns. See the revised threshold in **BIO-23**.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
5	**July 21, 2012**	**The Amargosa Conservancy**	
5.2a		States that only 1 trigger, a decline in monitoring well levels is necessary before shutting off pumps.	Inyo County, BLM, and The Nature Conservancy expressed similar concerns about the 2-parameter threshold. The trigger in BIO-23 and BIO-24 were revised accordingly. See specific language in **BIO-23** regarding thresholds.

Comment #	DATE	COMMENT TOPIC	RESPONSE
6	**July 23, 2012**	**Basin and Range Watch**	
6.23		Stump Springs could be impacted by invasive weeds	Staff consulted BLM on strategies to address the potential for the spread of weeds into adjacent BLM lands from contaminated vehicles (project employees and contractors) using area roads. Condition of Certification BIO-18 (Weed Management Plan) was revised to address this additional concern, and includes requirements for cleaning vehicles and equipment operating in infested areas, and worker awareness training about weeds, their consequences, common vectors, and how to avoid inadvertent spread of weeds on, for example, contaminated vehicles and equipment. BIO-18 also includes a requirement to compensate the local agricultural commissioners for increased monitoring and abatement costs for weeds introduced on area roads from project employees and contractors commuting from areas with known infestations of A-rated (highly invasive) pest plants (Pahrump and Las Vegas areas).
6.24		Requests Swainson's hawk be added to the species list for the project	Thank you for the supplemental information regarding the observation of Swainson's hawk at Stump Springs. Surveys conducted by the applicant in support of the application for certification including avian point counts and golden eagle surveys did not detect this species at the project site. Nesting habitat for this species is not present on the project site however nesting could occur in areas outside the project footprint. Staff reviewed the photos provided in the comment letter and consulted with ornithology experts familiar with the ecology of this species. Based on this review staff is unconvinced that the bird is a Swainson's hawk. Some of the prominent features of this species were not detected. A concise list of these is provided below. These include: 1. Yellow eyes (gray or blue-gray in juveniles, brown in adults); 2. Lack of apparent chest markings; 3. A slight hint of a belly (lower abdomen) band in the ground-perched individual; 4. Lack of apparent terminal tail band in the individual perched atop the small tree; and 5. Barring of the undersides of the primaries and secondary feathers seem far less heavily streaked than would be expected of a Swainson's hawk.
6.25		Provides photos of a juvenile raptor observed at the site, and requests that Swainson's hawk be added to the project's species list	See response to comment 6.24.

6.26		Provides a reference for solar flux mortality	The applicant has investigated effects of concentrated solar energy on bird carcasses and presented its findings to staff during a workshop on August 28, 2012. Carcasses of three species (chickens, doves, and quail) were exposed to various energy flux level for periods of 10 to 30 seconds. Burned or singed feathers and discolored or dried muscle tissue were observed in the carcasses exposed for 20 to 30 seconds to flux levels above 50 kW/m2. These effects were not observed in carcasses exposed to lower flux levels for the same intervals. No data on longer exposures were available. The applicant notes that feather temperatures in living birds probably would not reach the same temperatures during the same exposure periods due to convective heat dissipation by air motion surrounding them. Staff believes that the levels of feather and tissue damage reported for these exposures at 50 kW/m2 or above would be likely to kill living birds. In addition, staff believes that shorter exposures at these energy flux levels would be likely to cause other tissue or feather damage that could impair flight or vision or cause physiological effects and ultimately cause or contribute to mortality from other causes (e.g., reduce ability to forage, escape from predators, or thermoregulate). Staff also believes that longer exposures to lower energy flux levels are likely to cause feather damage or physiological effects.
6.27		States that HHSEGS may impact birds that use the relic white fir forest on Kingston Peak.	Staff agrees that it is possible for avian species within the project vicinity to be potentially impacted from collision, electrocution or solar flux.
6.28		The PSA fails to analyze flux on individual species	The PSA presented adequate information on solar flux based on the best available information. However, the FSA was revised to provide greater disclosure and specificity for individual birds.
6.29		Requests a study on which birds could be impacted by flux, and requests flux be considered	Please see response to comment 6.28.
6.3O	Requests solar flux impacts be studied during operatio		Condition of certification **BIO-15** requires the project owner to comply with the provisions of an Avian, Bat, and Golden eagle Protection Plan. This includes a monitoring program to evaluate the effects of solar flux on birds from the operation of the facility.
6.31		Mitigation for golden eagle has not yet been developed	The PSA presented a variety of mitigation to reduce impacts to nesting birds and golden eagles. Specific mitigation regarding this species is included in Condition of Certification BIO-15 which requires the development of an Eagle Management Plan which provides prescriptive actions to enhance habitat or reduce threats to this species.

6.32		Bighorn sheep utilize the project site and the project will serve as a barrier.	Bighorn sheep are known from the project region and have been documented to use valley floors to support intermountain movement. As described in the PSA the site has not been classified as an important or designated movement corridor rather as an area likely subject to periodic use by bighorn sheep. The presence of a horn fragment and potential pellets were identified in Section 5.2.6.7.3 of the AFC and support the periodic use of the site by this species. However, there is no indication the site is an important pathway nor will the project pose a complete barrier to movement. Suitable habitat will remain north and south of the project post development.
6.33		A study and monitoring plan for bighorn sheep movement corridors should be implemented	Impacts of the proposed project would not pose a complete barrier to dispersal for this species and the project is not located in a constrained linkage area. Please see response to comment 6.32 for additional information on bighorn sheep.
6.34		Kit fox should be treated as a potential species of special concern	For the purposes of the PSA this species is being treated as sensitive in accordance with the regulations identified in Title 14. Staff disclosed potential; project impacts and PSA presents reasonable minimizations measures to avoid the loss of this species.
6.35		The applicant should be required to test for canine distemper in kit fox, and develop further plans.	Condition of certification **BIO-14** currently requires the applicant to fund disease testing for sick or injured kit fox.
6.36		Mitigation for shadscale scrub should be at a 3:1 ratio.	The Commission recognizes the importance of fully mitigating impacts to desert tortoise in compliance with the requirements of the California Endangered Species Act. However, the Commission believes that the mitigation ratios identified in the PSA are adequate to mitigate project impacts to desert tortoise. Staff considered a wide range of biotic and abiotic factors when developing the mitigation approach for desert tortoise. These included but were not limited to the existing vegetation communities; annual plant composition; percentage and distribution of weeds; presence of soil crusts; level of site disturbance; soil composition; proximity to adjacent lands supporting desert tortoise populations; and proximity to developed lands. Staff took into consideration the number and distribution of desert tortoise on the project site; the landscape level scale of the project; the projects location; the sites importance for connectivity and regional movement and gene flow; and the cumulative effects of other projects. Staff weighed these factors in the development of mitigation ratios in light of the fact that project development ultimately results in a net loss of habitat range wide. To address this loss the Conditions of Certifications identified in the PSA, including **BIO-8, BIO-9, BIO-10, BIO-12,** and **BIO-13**, require a combination of minimization, salvage, and relocation activities; land acquisition, preservation and enhancement; and management activities such as regional raven control. Staff considers these measures to be adequate to fully mitigate impacts of the proposed project to desert tortoise.

6.37		Expresses concern over state law and moving tortoise near the NV border.	Desert tortoise will not be transported across State lines. Currently, any desert tortoise that is translocated to lands east of the site will be placed on a segment of land located in California that is contiguous with natural lands located in Nevada. Staff considers the ecological value of this approach to be feasible provided the desert tortoises are not diseased and the land maintains a reasonable level of protection from future development.
6.38 NEW		Provides several new species of rare plants for the project species list.	Twenty-seven of the species on the list provided by the commentor were not on the applicant's table of special-status potentially occurring on the project (DR 63 1-A, Appendix B, Table B). The surveys for special-status plants were comprehensive and conducted in accordance with California Department of Fish and Game and California Native Plant Society botanical survey guidelines. Because the surveys were floristic, spanned several years, and included spring and fall surveys, and crews were highly qualified, it can be assumed that any additional species not on the original target list, if present, would have been detected. Nevertheless, the applicant indicated they would address these additional species in a data response.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
7		**Pahrump Paiute Tribe**	
7.7 NEW		Concerns about displacement of wildlife (all animals) and mortality associated with displacement. Also concerned about groundwater use and its impact on springs, and the cumulative effects of groundwater use. Request involvement in the development of plans and mitigation	Thank you for the comment regarding the displacement of wildlife. In an effort to minimize project related impacts to wildlife from displacement the PSA identified a series of conditions that provide for the salvage, relocation and preservation of natural lands for the benefit of both plant and wildlife species. Conditions of certifications **BIO-8, BIO-9, BIO-10, BIO-12,** and **BIO-13,** require a combination of minimization, salvage, and relocation activities; land acquisition, preservation and enhancement; and management activities to ensure the land is persevered and managed to foster the long term survival of wildlife. Currently, these plans are reviewed by the State and federal wildlife agencies and approved by the Commission. The Commission believes the plans will receive adequate review by the natural resources agencies and will be available for review by the public once they are completed. Staff shares the Pahrump Paiute Tribe's concerns about groundwater impacts and cumulative impacts to springs. The PSA and FSA (Biological Resources and Water Supply sections) conclude that the project pumping alone, and the cumulative impact of all area projects on groundwater, springs, and mesquite are significant. Conditions of certification **BIO-23**, and **WATER SUPPLY-6** will ensure the project's effects are not significant by requiring monitoring of vegetation and groundwater levels, and if a 0.5 ft. drawdown threshold at the project boundary is exceeded, the project must stop pumping. Pumping cannot resume unless the project provides evidence, subject to review and approval by the CPM in consultation with hydrologists and botanists from BLM and the Inyo Water Department, that the drawdown is not affecting the mesquite, or that a reduced pumping amount is sustainable. Staff welcomes the Tribe's input on the plans and mitigation developed to protect wildlife, groundwater, and the important resources supported by groundwater. See also **WATER SUPPLY-8** in the Water Supply section of the FSA.

Comment #	DATE	COMMENT TOPIC	RESPONSE
8	**July 23, 2012**	**Richard Arnold, Pahrump Paiute Tribe**	
8.8		Local populations of bighorn sheep must be protected and preserved.	Bighorn sheep are known from the project region and have been documented to use valley floors to support intermountain movement. As described in the PSA, the site is not located in an important or designated movement corridor but may support periodic use by bighorn sheep. Staff considers the current conditions of certification identified in the PSA to be adequate to reduce impacts to bighorn sheep.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
9	**July 21, 2012**	**Big Pine Tribe of Owens Valley**	
9.2		Groundwater use may impact desert vegetation and other sensitive plant associations.	Staff recognizes the importance of the mesquite habitats to wildlife, to local biodiversity, to resource agencies and the public, as well as the cultural significance of the species. Concerns about impacts to these groundwater-dependent ecosystems have been expressed by nearly every commenter: BLM California; BLM Nevada; Inyo County; the Pahrump Paiute Tribe; Nevada Department of Wildlife; Basin & Range Watch; The Nature Conservancy; Amargosa Conservancy; Center for Biological Diversity; Nye County Water District; local resident Cindy Macdonald, and others. Staff considered all comments -- scoping comments and PSA comments -- and consulted numerous experts in the development of the conditions of certification **BIO-23** (Groundwater-dependent Vegetation Monitoring). Staff has incorporated many of the recommendations into the analysis and revised conditions in the FSA. Staff is confident that the revised conditions will ensure these important resources are protected. Please also see response to comment 14.5 from the Pahrump Paiute Tribe.
9.3		States that groundwater drawdown impacts to vegetation are significant and the groundwater monitoring plan is insufficient to prevent this.	A similar concern about the threshold in **BIO-23** and **BIO-24** from the PSA was expressed by several commenters. The 20 percent decline in mesquite vigor referred to in the PSA is a measure of drought stress in individual mesquite; not a measure of plant mortality or a decline in the total vegetative cover of mesquite. The experts consulted by staff in the development of that threshold believe it is a non-lethal threshold from which the mesquite could readily recover. However, this was based on the assumption that the groundwater levels would recover to pre-threshold levels within a year or two following cessation of pumping. In recognition of the possibility that groundwater levels may not restore that quickly, staff has identified -- based on consultation with recognized experts -- other more sensitive measures of drought stress, i.e., the earliest warning signs and the most objective quantifiable indicators.

Comment #	DATE	COMMENT TOPIC	RESPONSE
10	**July 21, 2012**	**Intervenor Cindy MacDonald**	
10.1 (PAGE 1-1)		Significance thresholds are not quantified.	The threshold for determining significance are based on the biological resources present or potentially present within the proposed project area in consideration of the proposed projects effects to those resources. Generally, the thresholds for determining significance are based on Appendix G of the CEQA Guidelines (CCR 2006) and performance standards or thresholds identified by the Energy Commission staff. The determination of whether a project has a significant effect on biological resources is based on the best scientific and factual data that could be reviewed for the project.
10.2		What criteria were used to develop significance thresholds, and subsequent evaluation of mitigation efficacy.	Significance thresholds are based on if a fair argument can be made that the project will result in substantial adverse effects to a given resource. See Response to Comment 10.1 for further information regarding significance thresholds.
16.1 (P 3-24)		Are impact studies of dust, emissions, and dust suppressant on desert tortoise available.	The Commission is aware of a number of studies, including the Desert Tortoise Recovery Plan, which acknowledge the detrimental effects of fugitive dust to desert tortoise. As described in the PSA dust would pose a potential impact to species occurring on and adjacent to the project area. Project related effects of dust to desert tortoise and their habitat were considered a significant impact in the PSA and Conditions of Certification were proposed to reduce or minimize these impacts. Condition of Certification BIO-8 contains a variety of requirements to reduce and control fugitive dust. The condition also specifies the use on non-toxic soil binders to reduce the potential for ingestion by desert tortoise. On site monitoring and reporting would also be required to reduce the potential for large dust plumes occurring outside the project area.
16.2 (pg 3-24)		What is the zone of impact to tortoise and other species from project emissions.	The PSA addresses potential impacts to a variety of plant, animal, and vegetation communities that occur on and adjacent to the project site. Project impacts include an analysis to desert tortoise that are directly lost on the project site or indirectly to lands adjacent to the site. Desert tortoise or other species that are in close the proximity to the project site have the potential to incur a higher degree of direct and indirect impacts from disturbance, dust, noise, or weeds. For the proposed project a specific buffer was not identified however surveys for desert tortoise included zone of influence surveys in order to ascertain the distribution of animals in adjacent lands. Similarly, surveys for burrowing owls included all areas within 150 meters of the project boundary. Generally staff considers the project buffer on a species specific basis and considers the type of resource, distribution, and the species or communities tolerance of disturbance to direct and indirect impacts. For desert tortoise staff considered animals detected by the applicant within the 150 meter buffer to warrant consideration in the PSA.

17.2 (pg 3-27)		Are there any types of vegetation potentially affected by nutrient absorption (Nox)	Please see rare plant discussion.
17.9 (pg 3-27)		Could the project potentially reduce pollinators, thereby affecting pollination of food crops	Although Solar flux created by the project has the potential to adversely affect insects it is unlikely to result in any large scale meaningful loss to insect populations in the region. Animal pollinators in North America include bees, butterflies, moths, wasps, beetles, ants, bats, and hummingbirds (Black et al. 2009). In a review of research addressing the reproductive requirements of twenty-six rare or endangered plants species in the western United States, Tepedino et al. (1997) found that in order to set fruit most of the plants required pollination, usually by native bees. Most native bees are relatively low flying and would not likely be adversely affected by the solar flux. The most likely adverse effect would be from habitat degradation, mowing, herbicide application and dust. For agricultural processes honey bees provide the bulk of crop pollination in the United State, yet the number of managed bee hives has declined by 60 percent in the United States since 1950 (Winfree et al. 2007. Nonetheless, recent research(much of it in Yolo County) on crop pollination, has demonstrated that native bees also make a significant contribution to crop pollination-in some cases providing all of the pollination required when enough habitat is available (Greenleaf and Kremen 2006, Klein et al. 2007). Based on this information it is unlikely the project would result in offsite effects to pollinators. Literature cited: Black, H, S., Shepard, M., Vaughan, M., LaBar, C., and Hodges, N. 2009. Yolo County natural Heritage Program (HCP/NCCP) Pollinator Conservation Strategy prepared by the Xerces Society for Invertebrate Conservation Portland Oregon and Sacramento California. Greenleaf, S. S., and C. Kremen. 2006. Wild bees enhance honey bees' pollination of hybrid sunflower. Proceedings of the Royal Society (Series B) 103(37): 13890-13895. Klein, A.M., Vaissiere, J. H. Cane, I Steffan-Dewenter, S. A. Cunningham, C. Kremen and T. Tscharntke. 2007 Importance of pollinators in changing landscapes for world crops. Proceedings of the Royal Society-B Biological Sciences 274 (1608): 303-313. Tepedino, V, J. 1979. The importance of bees and other insect pollinators in maintaining floral species composition. In Great Basin naturalist memoirs no. 3: the endangered species: a symposium; 7-8 Dec 1978. Pp. 39-150 Provo: Brigham Young University. Winfree, R., N. M. Williams, J. Dushoff, and C. Kremen. 2007. Native bees provide insurance against ongoing honey bee losses. Ecology Letters 10: 1105-1113.
10.3 (pg 20-1)		How can the project be screened in a way that won't attract wildlife.	Staff does not consider the use of vegetation to screen the project to pose a significant additional risk to wildlife when compared to the expected operational effects to wildlife. While it is likely that some disturbance tolerant species will nest in the trees used to screen the facility the prohibition on trees recommended by the commenter is not warranted.

10.4		How many trees would be required to screen the project and what is water requirement.	The landscaping plan for the proposed project has not been finalized. This information including the type of trees proposed for screening will be identified prior to the operation of the facility.
10.5		Do special status plants on or adjacent the project site require pollinators?	With the exception of the Torrey's joint-fir (Ephedra torreyana), which is wind-pollinated, all of the remaining 10 species are insect-pollinated. In a review of research addressing the reproductive requirements of twenty-six rare or endangered plants species in the western United States, Tepedino et al. (1997) found that in order to set fruit most of the plants required pollination, usually by native bees. Please see response to comment 17.9 for further information.
10.6		Would pollination still occur in the event the project is permitted and built?	Staff consulted University of California, Davis entomologist and professor Lynn Kimsey regarding potential impacts to pollinators (Kimsey pers. comm.). Dr. Kimsey noted that any of the rare plant pollinators, which would be primarily bees, would fly at elevations below approximately 10 feet above ground level (below the mirrors) unless they were pollinating trees. Because none of the special status plant species are trees, and no trees occur on the site (with the exception of a few scattered low-growing mesquite less than 8 ft high) impacts to special status species' pollinators would not be significant. Additionally, no special-status plant mitigation will occur within the heliostat fields. Plant occurrences within the solar fields are presumed to be significantly affected due to long-term indirect effects from mowing, mirror-washing, dust control, alteration of the surface hydrology, herbicide drift, shading. These impacts will be mitigated offsite through preservation or restoration (see **BIO-19** and **BIO-20**). Dr. Kimsey noted that some dispersing forms, such as dragon flies, painted lady butterflies could be affected, but the impact on painted ladies would not be significant "because they migrate north out of much of the desert areas." Based on the wide variety of pollinators that occur in the desert staff expects that pollination will continue to occur. For additional information please see response to comment 17.9.
3.1 (pg 20-5)		How many fairy shrimp species and occurrences exist in Pahrump Valley	A review of existing literature did not find any comprehensive study describing the species of fairy shrimp expected to occur in the Pahrump Valley. However, approximately 23 species of fairy or brine shrimp are known to occur in California (Bauder et al. 1998) and five species are known from 100 miles from the project site (Eriksen and Bell, 1999). These include, ranging from farthest to closest, the giant fairy shrimp (Branchinecta gigas), Colorado fairy shrimp (Branchinecta coloradensis), San Francisco brine shrimp (Artemia franciscana), versatile fairy shrimp (Branchinecta lindahli), and the alkali fairy shrimp (Branchinecta mackini). Tadpole fairy shrimp (Lepidurus lemmoni) are also known from Nevada and are common in plays across the great basin. None of these species have California or federal status. Based on the photo included by the commenter it is likely the shrimp identified as most similar to a tadpole fairy shrimp. Based on the known distribution and habitat requirements of sensitive fairy shrimp; the PSA found that sensitive species were not likely to occur on or near the proposed project site. Literature Cited:

3.2 (pg. 20-5)		What habitat elements could protected species of fairy shrimp utilize on the project site.	In arid climates, such as that found in the Mojave desert, fairy shrimp inhabit pools that may last from as little as three days to as long as four months, with much more variable levels of dissolved salts than found in pools that found in humid climates (Brown and Carpelan 1971). It is possible that during periods of heavy or prolonged rainfall that small depressions, road ruts or gullies may support conditions that allow for the presence of common fairy shrimp. It is also likely that fairy shrimp occur in the dray lake west of the project site and that portions of the project site are periodically inoculated with cysts carried by mammals or shorebirds. Therefore it is possible small pooled areas could support fairy shrimp during extremely wet years. In response to these and other comments staff conducted biological surveys to investigate the potential for the presence of pooled areas after recent July monsoonal activity. Staff inspected the site after a minimum one-inch rainfall event and did find small pooled areas; however most of these pools had lost standing water within 24 hours. Nonetheless without extensive sampling it is not possible to determine whether fairy shrimp are present on the project site. Staff considered the low number of potential pooled areas and the fact that sensitive fairy shrimp do not occur in the region to not warrant additional studies on the project site. Based on the known distribution and habitat requirements of sensitive fairy shrimp; the PSA found that protected fairy shrimp were not likely to occur on or near the proposed project site.
3.3 (pg. 20-5)		Would installation of the project result in permanent loss of shrimp on the project site.	Construction of the proposed project could result in the loss of fairy or tadpole shrimp should they occur on the project site. However, the PSA concluded that listed or sensitive fairy shrimp are not expected to be present and the site does not support large playas or pooled areas important for the conservation of these species.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
11	**July 23, 2012**	**Intervenor Center for Biological Diversity**	
11.12		The PSA fails to quantify kit fox density on the project site.	The PSA provides adequate information to analyze project level effects to desert kit fox. Neither CEQA (Pub. Resources Code §21000 et seq.), nor the CEQA Guidelines (14 Cal. Code Regs §14000 et seq.), require that protocol level surveys be performed and incorporated into a Draft EIR. Association of Irritated Residents v. County of Madera (2003) 107 Cal.App.4th 1383. As described in the PSA, the "environmental setting" is based on expert review and analysis of existing information provided by the applicant. Desert kit fox is known to occur on the project site and the applicant mapped potential burrows during previous surveys of the project site. Staff also noted the presence of this species on the site and acknowledges that population densities likely vary on an annual basis as a result of prey base, presence of coyotes and existing mortality. For the purposes of the PSA it is not required to account for every animal on the project site. Staff has treated this species as sensitive in accordance with the regulations identified in Title 14 and the PSA presents reasonable minimizations measures to minimize the loss of this species. Further, a complete assessment of all potential dens for this species will be mapped prior to project disturbance.

11.13		Kit fox should be fitted with radio trackers during passive relocation.	Under current CDFG regulations these animals may not be trapped by the project owner. Condition of Certification **BIO-14** provides for the development of a kit fox management plan to monitor the effects of passive relocation and to respond to potential disease outbreaks.
11.14		The project will result in the displacement of kit fox and further spread canine distemper.	The PSA acknowledges the project will displace desert kit fox and result in a net loss of habitat for this species. However, it is unknown and speculative if the project will either result in the manifestation or spread of distemper. However, to monitor the possible consequences of this threat the PSA included Condition of Certification **BIO-14** which requires monitoring, adaptive methods to reduce this threat.
11.15		The PSA fails to quantify kit fox territories or provide avoidance measures.	The PSA provides adequate information to analyze project level effects to desert kit fox and has provided conditions of certification to reduce potential impacts to this species. For further information please see response to comment 11.12.
11.16		The desert tortoise on the project site constitute a unique genetic group, and must have minimization/mitigation measures in place.	The information regarding the unique ecology and genetics of desert tortoise located in the Eastern Mojave Recovery Unit recovery unit was reviewed by staff and is referenced in the PSA. As identified in the USFWS Recovery Plan (USFWS 2011) the recovery unit designation does not afford the species additional legal protection. However, staff considered a variety of factors in the development the adequate conditions of certification that would be required to fully mitigate impacts to desert tortoise. This included the data provided by Murphy et al (2007) regarding the statement "that integral to desert tortoise recovery is maintaining the genetic variability of the species and sufficient ecological heterogeneity within and among populations." The PSA has proposed extensive mitigation requirements including, preconstruction surveys, fencing, translocation and the acquisition of compensatory lands at ratios ranging from 1:1 for shadscale communities to 3:1 for areas supporting relatively intact creosote bush scrub communities. Based on these and other factors staff considers the proposed Conditions of Certification to fully mitigate impacts to desert tortoise and their habitat.
11.17		If desert tortoise are translocated, a monitoring or research study should be implemented per the USFWS's recommendations as augmentation.	The commenter states the USFWS Desert Tortoise Recovery Office's Scientific Advisory Committee states that "translocation is fraught with long-term uncertainties…and therefore, any translocations should be accompanied by specific monitoring or research to study the effectiveness or success of the translocation….." The PSA acknowledges this concern and includes this language in the analysis of potential impacts to desert tortoise from translocation activities. The PSA also provides information from the USFWS and other researchers that suggest translocation may be an effective management tool to minimize impacts to desert tortoise from development projects under certain circumstances. In order to minimize impacts to desert tortoise that are present in the project area the PSA indicates that any translocation activities would be required to comply with the provisions of an agency approved and adopted translocation plan. This plan is a requirement of Condition of Certification BIO-10 which specifies a series of reporting, tracking, monitoring, and disease testing. In addition, this plan is expected to follow the most recent guidelines on translocation. Staff considers the existing conditions of certification to be adequate and considers translocation to be an accepted tool for minimizing project related impacts to desert tortoise on the project site.

11.18		A project alternative should be developed, or higher survey standards applied; impacts to tortoise are not identified due to failure to develop a translocation plan.	The current PSA includes alternatives that have reduce impacts to biological resources. This includes a reasonable range of alternatives as defined in CEQA. As with any alternatives analysis the Commission must consider impacts to the suite of issue areas. Surveys completed by the applicant complied with the USFWS's recommended guidelines for conducting surveys in desert tortoise habitat. The estimates of adult and subadult desert tortoise were presented by the applicant in the AFC and further estimates were calculated by staff to represent the theoretical numbers of juveniles and eggs that may occur on the project site. While the applicant is currently suggesting that the initial numbers used to calculate desert tortoise may overestimate the number of desert tortoise on the project site; staff maintains the original estimates are valid based on the expected use of the site by desert tortoises in adjacent areas. As presented in the PSA these calculations are only theoretical estimates of the expected number of desert tortoise that could be present and are presented using the best available scientific data on this species. Staff disagrees that the submittal of a completed translocation plan is required for the analysis of impacts to desert tortoise. The commenter stated that the conditions of certification in the PSA improperly defer mitigation by requiring the completion of future plans. The commission considers the conditions of certification in the PSA to be legally adequate and the analysis reflects a good faith effort to investigate and disclose environmental impacts of the proposed project (see CEQA Guidelines § 15003 (i) & 15144) and used survey information provided by the applicant. The PSA also identified conditions of certification that require the preparation of a more precise plans after certification of the FSA, which is acceptable under CEQA provided that practical considerations make it difficult to develop the plan at this stage of the planning process and the agency "commits itself to eventually devising mea¬sures that will satisfy specific performance criteria articulated at the time of approval" (Sacramento Old City Association v. City Council (1991) (229 Cal.App.3d 1011, 1028 1029). See also CEQA Guidelines (14 Cal. Code Regs 15123.4 (a) (1) (B)), which provides that mitigation measures may specify performance standards that would mitigate the significant effect of the project and that may be accomplished in more than one specific way. In addition, the desert tortoise translocation plan would also require coordination with the USFWS and would likely be a condition of the Biological Opinion.
11.19		A desert tortoise translocation plan should incorporate USFWS' latest guidance.	Thank you for the comment regarding the Translocation Plan. As specified in Condition of Certification BIO-10 the project owner is required to develop and implement the plan consistent with current USFWS approved guidelines. The intent of the condition is to utilize the most recent guidance available at the time of the licensing. As this Plan will be developed in consultation with the USFWS no revision to the condition has been made.
11.2O		Four recommendations are provided to augment a desert tortoise translocation plan.	Staff considers the development and implementation of the proposed Translocation Plan specified in Condition of Certification BIO-10 to be consistent with current USFWS approved guidelines. Therefore the recommended changes have not been adopted.

11.21		A mitigation ratio of 5:1 is necessary to mitigate impacts to desert tortoise.	The Commission recognizes the importance of fully mitigating impacts to desert tortoise in compliance with California Endangered Species Act requirements. However, the Commission disagrees with the contention that the mitigation ratios identified in the PSA are not adequate to mitigate project impacts to desert tortoise. Staff considered a wide range of biotic and abiotic factors when developing the mitigation approach for desert tortoise. These included but were not limited to the existing vegetation communities; annual plant composition; percentage and distribution of weeds; presence of soil crusts; level of site disturbance; soil composition; proximity to adjacent lands supporting desert tortoise populations; and proximity to developed lands. Staff also took into consideration the number and distribution of desert tortoise on the project site; the landscape level scale of the project; the projects location; the sites importance for connectivity and regional movement and gene flow; and the cumulative effects of other projects. Staff weighed these considerations in the development of mitigation ratios in light of the fact that project development ultimately results in a net loss of habitat range wide. To address this loss the Conditions of Certifications identified in the PSA, including BIO-8, BIO-9, BIO-10, BIO-12, and BIO-13, require a combination of minimization, salvage, and relocation activities; land acquisition, preservation and enhancement; and management activities such as regional raven control. Staff considers these measures to fully mitigate impacts of the proposed project to desert tortoise.
11.22		Bighorn sheep movement corridors must be avoided.	Bighorn sheep are known from the project region and have been documented to use valley floors to support intermountain. As described in the PSA the site has not been classified as an important or designated movement corridor rather as an area likely subject to periodic use by bighorn sheep. The presence of a horn fragment and potential pellets were identified in Section 5.2.6.7.3 of the AFC support use of the site by this species. However, the project site is located several miles away from the adjacent mountains which are used for spring forage; and while bighorn sheep may use any portion of the desert floor for intermountain movement the project will not act as a complete barrier to sheep movement.
11.23		What effect might project construction (specifically heliostats) have on bighorn sheep.	The use of this technology has not been well studied and it is speculative whether the reflectivity from the heliostats will adversely bighorn sheep in the adjacent mountains. Due to the position of the heliostats it is likely that bighorn sheep will not be exposed to damaging levels of solar flux.
11.24		Requests an analysis of effects of groundwater drawdown on bighorn sheep water sources.	The PSA adequately addressed potential impacts to bighorn sheep from the potential reduction in groundwater levels.

11.25		Rare plants must be avoided or other conservation sites must be selected.	After analysis of the spring 2012 survey results, staff concluded that impacts to four species were significant --- and mitigable. Avoidance within the solar fields is not an acceptable mitigation option due to the likelihood of long-term decline from indirect effects. There are adequate opportunities for offsite mitigation through preservation and restoration, however. This was analyzed by examining field forms and database reports of site quality and threats, and through a GIS analysis of ownership and management threats and opportunities. **BIO-20** (Special-status Plant Compensatory Mitigation) requires offsite mitigation for impacts to four of the 11 species through preservation or restoration. The condition includes specifications for site selection criteria, mitigation ratios, and performance standards. **BIO-19** (Special-Status Plant Avoidance & Minimization Measures) contains BMPs for protecting the nine rare plant occurrences in very close proximity to the project. The threat of indirect impacts from weeds is addressed in **BIO-18** (Weed Management Plan), and BIO-8 and BIO-18 include measures for fire prevention (accidental fire can have catastrophic ecological consequences in the desert). Staff considered avoidance along the eastern boundary but concluded that because the avoided area would be situated along a strip between the project and the stateline and a different habitat type (dunes versus the gravelly creosote bush scrub where rare plants are thriving), it lacked the connectivity and sustainability that preservation of other offsite occurrences could provide; occurrences better situated to protect the california range of those species. To address the net loss of the project site occurrences, the project could restore any of the at-risk occurrences (according to specific criteria contained in **BIO-20**) or mitigate through acquisition and preservation under a conservation easement at a ratio of three occurrences for each S1-rank species, and two occurrences for every S2-rank species. Mitigation would occur locally, largely, as that is where most of the offsite occurrences were found, i.e., in Pahrump Valley, Mesquite Valley, California Valley, Stewart and Chicago valleys.
11.26		Transplantation of rare plants should be accompanied by a monitoring plan, and made publically available.	Staff considers transplantation an unacceptable strategy for mitigation because of the high rate of failure of such plantings across the state, and because the strategy is untested for the affected species. **BIO-20** requires mitigation in the form of offsite preservation and restoration, and includes performance standards, monitoring and reporting requirements for restoration projects, and selection criteria for preservation (acquisition). All plans, which are subject to review and approval of the CPM (in consultation with Energy Commission botanists) will be made publicly available on the Compliance page of the project website. The adequacy of the conditions can be assessed through the detailed specifications and performance standards. The **FSA** includes a detailed description of the methods staff used to assess significance and the potential for offsite mitigation.
11.27		Seed collection and curation should be added to existing protective measures.	Staff agrees that seed collection and curation should be added as a contingency measure and BIO-20 has been revised accordingly.

11.28		Burrowing owl data on territories is unclear. A management plan for burrowing owl must be made publically available.	The applicant provided supplemental information regarding burrowing owl surveys including a Draft Burrowing Owl Mitigation Plan in Data Response 2e. This plan is available on the project website and will be reviewed by staff prior to its adoption as a component of Condition of Certification **BIO-17**. Staff reviewed these reports and concluded that it was not possible for the applicant to conclude that the site does not support breeding owls. Although avian point counts were conducted near areas where burrowing owl sign was observed, and no owls were detected during these surveys, the observations were not completed in accordance to CDFG and Burrowing Owl Consortium standards. Information provided by the applicant in Data Response 2e did indicate that CDFG suggested that since the site has been documented to support burrowing owls additional surveys to establish their breeding was not waranted. The PSA documents this information and concludes that in accordance with the previous observations burrowing owls are present on the project site at least seasonally and compensatory mitigation is required for the loss of foraging habitat. Although the applicant suggested that between two and five territories may occur on the project site the PSA concluded that because territories often overlap and are usually much larger in arid climates the project should provide compensatory mitigation for a mini mum of two territories.
11.29		How will golden eagle forage habitat be mitigated.	The PSA acknowledges that the construction of the proposed project will result in the net loss of foraging habitat for golden eagles. To off-set the loss of habitat the project owner is required to obtain compensatory mitigation lands for desert tortoise. This requires the acquisition, enhancement, and long term management of existing lands. The intent of the measure is to reduce threats to those lands and increase the potential prey base for eagles. Condition of Certification **BIO-15** also requires the project owner to develop and implement a management plan for golden eagles. This will include specific enhancement actions, mechanisms to reduce threats to golden eagles, and long term monitoring for collision, electrocution, or mortality from solar flux.
11.3O		Golden eagles' behavior can be impacted by project construction/operation, and must be mitigated.	The PSA addressed project level impacts to golden eagles and provided Conditions of Certification to reduce those threats where possible. For additional information please see response to comment 11.29.
11.31		The PSA fails to analyze impacts of solar flux on golden eagles.	The PSA presented an analysis of operational effects to birds including the risk of collision, electrocution, and solar flux. Although the analysis does not specifically address each species of bird the content focuses on the breadth of species which may occur in the project area. However, in to address the comment the FSA will include revised language on direct, indirect, and operational impacts to golden eagles.
11.32		The PSA failed to address transmission line impacts to golden eagles.	Please see response to comment 11.31.

11.33		The CEC must consider alternatives that would minimize impacts to golden eagle.	CEQA states that an EIR shall describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives (CEQA Guidelines 15126.6(a)).The PSA presents a reasonable range of alternatives that would have varying effects to golden eagles and other biological resources. This included one alternative located in an area of degraded farm land. However, for many species, including the golden eagle, their wide distribution and use of open plant communities limits the ability to avoid impacts to this species.
11.34		Impacts to groundwater dependent vegetation in the Amargosa Valley must be evaluated; currently mitigation and analysis is incomplete.	The **FSA** and PSA include an inventory of the groundwater-dependent resources throughout the Amargosa Basin and Death valley Regional Groundwater Flow System. The analysis of potential impacts to groundwater in a wider context is available in the Water Supply section of the FSA. The analysis of impacts to Amargosa Valley is not as extensive as the analysis for the local groundwater-dependent resources because Water Resources staff concluded there would not be a significant impact to groundwater in areas distant from the project.
11.35		Mitigation for the desert tortoise must occur within the Eastern Mojave Recovery Unit.	Condition of Certification **BIO-12** requires the project owner to acquire compensatory mitigation lands for desert tortoise in the Eastern Mojave Recovery Unit or other location approved by the CPM in consultation with the CDFG and USFWS. This flexibility was provided in order to allow the regulatory agencies and the applicant to select lands that are deemed important to contribute to desert tortoise connectivity and because there may be a shortage of available mitigation lands within Inyo County. Provided the lands meet the requirements of the CDFG and USFWS staff considers this a viable mitigation option at this time. Staff also considers the nesting of mitigation to be appropriate should the lands support the target species and its habitat.
11.36		A potential mitigation site should be monitored prior to acquisition to determine species density.	The preservation of offsite lands is an acceptable mitigation strategy for the purposes of CEQA (see CEQA Guidelines, Section 15370) and the PSA is not required to include an analysis of the exact locations of proposed mitigation lands (see California Native Plant Society v. City Rancho Cordova [March 24, 2009] 172 Cal. App. 4th 603); however, Condition of Certification **BIO-12** outline specific performance standards for mitigation lands including: requirements for acreage, types of habitat to be protected, the potential locations, and minimum qualifications of conservation easement holders. The condition does not require the completion of protocol surveys prior to adoption provided the lands meet the basic criteria and are approved by the CPM in consultation with the CDFG and USFWS.
11.37		Mitigation offsets must be managed by a competent land management entity.	Condition of Certification **BIO-12** requires that the project owner transfer the title or conservation agreement of the mitigation lands to CDFG or other non-profit organization. Condition of Certification **BIO-12** does not authorize the use of public lands (i.e., lands held by the BLM) for mitigation purposes.

11.38		Management plans referenced in the PSA are not yet available for public review.	The required plans identified by the commenter are not deferred mitigation. The Conditions of Certification which require the completion of various plans or studies are legally adequate and reflects a good faith effort to investigate and disclose environmental impacts of the project (see CEQA Guidelines § 15003 (i) & 15144). The analysis used all available resources to determine where additional surveys are required in the future. The PSA also identified Conditions of Certification that require the preparation of a more precise plan after certification of the FSA, which is acceptable under CEQA provided that practical considerations make it difficult to develop the plan at this stage of the planning process and the agency "commits itself to eventually devising measures that will satisfy specific performance criteria articulated at the time of approval" (Sacramento Old City Association v. City Council (1991) (229 Cal.App.3d 1011, 1028 1029). See also CEQA Guidelines (14 Cal. Code Regs 15123.4 (a) (1) (B)), which provides that mitigation measures may specify performance standards that would mitigate the significant effect of the project and that may be accomplished in more than one specific way. In addition, the applicant has provided draft forms of the Burrowing Owl Mitigation Plan and Bird Monitoring study.
11.39		Is identical to comment 11.38.	See comment 11.38
11.42		Impacts to waters of the state are significant and alternative sitting must be considered.	Staff and CDFG agree that impacts to Waters of the State are significant. Staff coordinated with the CDFG regional office and the Lake and Streambed Alteration Program (LSA) in the analysis of impacts, the verification of the delineation, and the development of mitigation requirements contained in **BIO-22** (State Waters Compensatory Mitigation). The waters will be mitigated at a ratio of 2:1 within the Pahrump Hydrologic Unit or adjacent basins and, combined with other measures for protecting downstream and upstream waters from indirect effects, will ensure the impacts are mitigated to a level less than significant.
11.46		Cumulative impacts to desert tortoise stemming from translocation must be addressed. Cumulative impacts to bighorn sheep and groundwater pumping must also be addressed.	The PSA considered the cumulative project effects to desert tortoise and acknowledges that translocation of desert tortoise may occur for some of the proposed projects. However, without project specific data the conclusions drawn would be speculative. Nonetheless, the Commission considers the cumulative impact analysis presented in the PSA to be adequate and comply with the requirements of CEQA.

11.47		The Desert Renewable Energy Conservation Plan (DRECP) has identified the project site as a location for conservation.	Staff reviewed the preliminary maps for the DRECP and the site appears to be east of the proposed conservation area. However, even if the project site was proposed within an identified area of Conservation Opportunity, this would not preclude permitting or construction of the facility. Project analysis is completed on a case by case bases and compensatory mitigation is developed for each area. Projects located in conservation areas will likely have higher mitigation ratios because of the proposed conservation value of the area.
11.48		The PSA fails to evaluate the DRECP as a LOR.	The DRECP is currently in a draft form and has not yet been adopted by the REAT agencies.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
13	**July 23, 2012**	**Applicant, BrightSource Energy, Inc.**	
13.1		What performance thresholds does the PSA use, and how should Appendix G be applied.	The lead agency has the discretion to identify the significance criteria for a given project and develop thresholds for significance. Section 15064(b) of the CEQA guidelines identifies that "The determination of whether a project may have a significant effect on the environment calls for careful judgment on the part of the public agency involved, based to the extent possible on scientific and factual data. An ironclad definition of significant effect is not always possible because the significance of an activity may vary with the setting. For example, an activity which may not be significant in an urban area may be significant in a rural area." For the case of the HHEGS project staff utilized a variety of factors in determining whether a project would be a significant impact. This includes but was not limited to the scale and magnitude of the project; the current status, range, and population of the resource; the temporal effects to the specific resource; and whether the project would result in long term cumulative effects. In addition, staff relied on precedent from previous projects completed by the Commission and other lead agencies; existing management plans; polices, and professional experience.

13.2		The site is more disturbed than the PSA acknowledges	The PSA presented a thoughtful and accurate description of the physical and biological characteristics that are present on the project site. The biological resource section of the PSA based this information on data provided by the applicant in the AFC, supplemental biological technical reports, aerial photography, and physical inspections of the project site. The PSA describes the physical setting objectively and does not suggest the site supports a pristine desert ecosystem. However, although the AFC indicates the site has been previously disturbed and developed for a housing subdivision only a portion of the site appear to have been subject to ground disturbance. These include a network of roads, an orchard, a small area surrounded by an earthen berm, and several larger areas that indicate either grading or agriculture. The new data provided by the applicant regarding disturbed areas will be incorporated into the FSA after a review of the updated calculations. Staff also objects to the applicant's mischaracterization of habitat quality on the project site. Despite the presence of weeds which are acknowledged in the PSA as locally abundant in some areas, most of the lands present on the project site are relatively intact and are characterized by areas supporting biotic soil crusts, native shrub cover, and a diverse assemblage of annual plant life. Most of the heavily disturbed areas are located along the primary access roads that form a grid pattern across much of the site; however, lands within the existing road system continue to support large areas of native vegetation. For example, Section 5.2.6.3.1 of the AFC indicates that for creosote bush scrub communities " the understory consists of a large variety of mainly annual forbs, a few species of native grasses, and a few species of non-native grasses" . Staff confirmed this during biological surveys of the project site and a review of the annual plant species detected during botanical surveys conducted by the applicant. In addition, based on a review of information provided in the AFC approximately 131 native annuals and shrubs occur on the project site.
			This includes approximately ten plants considered rare by the California Department of fish and Game and California Native Plant Society. Similarly, approximately 63 species of birds, 18 reptiles, and nine mammals were detected or expected to occur on the project site. Notwithstanding the presence of invasive weeds, and some heavily disturbed areas a large the presence and distribution of native plants and animals indicates the site supports a fairly diverse assemblage of wildlife which are not associated with more heavily disturbed areas. In regards to habitat for the desert tortoise the commenter suggests that the existing levels of weeds and disturbance renders portions of the site unsuitable for desert tortoise. Staff presented a discussion of weeds and their adverse effects to both desert ecosystems and the desert tortoise in the PSA. However, only limited areas of the projects site are infested to levels that would likely preclude use by desert tortoise. As previously described most of the project site still supports a broad assemblage of native annuals and perennial plant species. While weeds do reduce habitat value there is no data available which supports the applicants position that the abundance of weeds on the project site excludes use by desert tortoise.

13.3		The site is not a bighorn corridor.	Bighorn sheep are known from the project region and have been documented to use valley floors to support intermountain. As described in the PSA the site has not been classified as an important or designated movement corridor rather as an area likely subject to periodic use by bighorn sheep. The presence of a horn fragment and potential pellets were identified in Section 5.2.6.7.3 of the AFC and support use of the site by this species. The contention presented by the commenter that the horn may have been dragged or deposited at the project site by predators, storm flows, or other mechanisms is speculation and not supported by other data. Further the argument that multiple pellet piles for bighorn sheep were not observed may have merit; however there is no indication that survey crews were focusing on the detection of bighorn sheep scat. As noted in the AFC the pellets and horn fragment were detected as incidental observations during botanical surveys. Regarding the recent observation of potential bighorn sheep by residents of Charleston View; staff considers the observations legitimate and not inconsistent with sporadic use of the valley floor to support intermountain movement.
13.4		Mitigation for desert tortoise should be negotiated further, and a revised translocation plan will be submitted to the Energy Commission.	Staff reviewed the proposed compensatory mitigation plan for desert tortoise provided by BSE and determined the plan has some merit but was overly dismissive of habitat quality and potential use of the site by desert tortoise. However, staff would consider continued negotiations on this subject. For additional discussion on this subject please refer to Report of Conversation (ROC) Monasmith C Huntley TN-66649.pdf. on the Commission web site. Additional language regarding mitigation and translocation is presented in the FSA.
13.5		The PSA does not treat species correctly pursuant to ESA and CESA.	The PSA properly evaluated project level impacts to common, sensitive and listed plants and wildlife. Where impacts were considered significant Conditions of Certification were recommended to reduce or minimize adverse effects to these species. In some circumstances this included the acquisition and management of compensatory mitigation lands. The PSA does not attempt to bundle mitigation together or require the applicant to mitigate collectively. Rather the PSA allows nesting of mitigation where land acquisition required to mitigate for desert tortoise may also satisfy mitigation requirements for species such as rare plants, owls, or State waters.

13.6		The FSA should not declare a species rare unless the statement is supported.	The PSA properly evaluated project level impacts to common, sensitive and listed plants and wildlife. Where impacts were considered significant Conditions of Certification were recommended to reduce or minimize adverse effects to these species. Staff considers landscape level project effects to many common species to pose a significant impact and have the potential to cumulatively effect the populations of some species.
13.7		BrightSource does not agree with descriptions of certain plants are "rare"	"Rare" and "rarity" are generic, commonly used terms in the scientific literature used to describe scarcity, a statement about the geographic distribution and population sizes of a particular species. The terms "threatened" and "endangered" typically refer to human activities and other processes that are increasing a species' vulnerability to extinction, and the degree of endangerment. Rarity is based upon patterns of distribution and abundance. There are three basic kinds of rarity based on these two factors: 1) restricted in distribution, but locally abundant (e.g., Pahrump Valley buckwheat); 2) more widespread, but never abundant; and 3) localized and not abundant. The affected species' rarity and endangerment is clearly demonstrated in Biological Resources Table 15, and in the spatial representation of these species' highly restricted range in California (Biological Resources Figure X). The case for rarity and concern is also reflected in the CNDDB Element Rank, an index of extinction risk within the state.

13.8		Significant criteria were incorrectly applied to plants on the project site.	CEQA provides protection not only for State-listed or Federally-listed species, but "also for any species that can be shown to meet the criteria for listing (CEQA Guidelines Section 15380(d)) "*A species not included in any listing identified in subdivision (c) shall nevertheless be considered to be endangered, rare or threatened, if the species can be shown to meet the criteria in subdivision (b).* " CEQA requires a "mandatory finding of significance" for special-status species that meet CEQA's definition of "rare" or "endangered," regardless of their formal listing status under the Native Plant Protection Act (NPPA), California Endangered Species Act (CESA) or any other law: "*When any of the following conditions occur the lead agency shall find that a project may have a significant effect on the environment which will require a Mandatory Finding of Significance...When a project has the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of an endangered, rare or threatened species.*" Cal. Code Regs., tit. 14, § 15380, subds. (b) and (d). The CEQA Guidelines are located at Cal. Code Regs., tit. 14, § 15000 et seq. The CEQA Guidelines independently define a species to be "rare" when "either: (A) Although not presently threatened with extinction, the species is existing in such small numbers throughout all or a significant portion of its range that it may become endangered if its environment worsens; or (B) The species is likely to become endangered within the foreseeable future throughout all or [a] significant portion of its range and may be considered "threatened" as that term is used in the Federal Endangered Species Act." (Cal. Code Regs., tit. 14, § 15380, subd. (b)(2).) CEQA independently defines a species to be "endangered" when "its survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, disease, or other factors . . . ." (Cal. Code Regs., tit. 14, § 15380, subd. (b)(1).) The project would eliminate a substantial portion of the entire California range of four species (gravel milk-vetch; Wheeler's skeletonweed; Preuss' milk-vetch, and Torrey's joint-fir); with impacts ranging from 18% to 50% of all documented occurrences in California for species whose entire distribution is limited to 19 to 25 occurrences in a very small region of the eastern Mojave. The degree of the impact, relative to the entire California distribution is shown in Biological Resources Table 15 and depicted spatially in Biological Resources **Figures 9 and 10.**

13.9		Different data sources are used in determinations of "rare" for plants.	The applicant incorrectly states that "The CNDDB process is well-documented in the PSA, though the reliance on NatureServe to access CNDDB information is new" and "the California Native Plant Society list process is not well-described". The NatureServe rank is, in fact, synonymous with the CNDDB rank and CNPS rank have been included in the CNDDB reports and CDFG Special Plants List since the early 1980s (Bittman pers. comm.). The CNDDB Element Rank (NatureServe rank) is described in the PSA on page 4.2-131 and in the CDFG *Special Plants List (* CNDDB 2012b). The definitions of the ranks are provided in the footnotes to Biological Resources Table 15 (PSA p. 4.2-134). The applicant incorrectly states that the CNPS (CRPR) listing process is not well documented. PSA page 4.2-131 summarizes the process "The Rare Plant Status Review groups—a consortium of over 300 botanical experts from government, academia, non-governmental organizations, and private consultants—is jointly managed by CNPS and CDFG; the "CNPS List" rank assignments are the product of a collaborative effort and not solely a CNPS assignment." The CNPS website , a site familiar to the applicant's botanical consultants and accessible to the general public, provides over 18 pages of details on the Rare Plant Program and Rare Plant Status Review Groups, including: the rare plant status review process; the relationship between CNPS and CDFG in establishing the lists, or ranks; staff and leadership; the Rare Plant Program Committee; contact information; a flow chart of the process; instructions for recommending an addition, list change, deletion, or name change; a description of the regional plant status review groups; a description of the rare plant status review public forum; and sample forms for proposed additions and proposed status changes. CDFG, BLM, USFWS, California Board of Forestry and other agencies have long regarded CNPS as an authority on rare and endangered plants of California. The CNPS *Inventory* is considered by CDFG and other agencies as a primary source of information for determining whether non-listed plants meet CEQA's independent definitions of "rare" and "endangered," thus triggering a mandatory finding of significance, environmental review, and the implementation of all feasible mitigation measures to reduce or avoid impacts to such special-status, non-listed plants.

13.1O		Condition BIO-19 should be deleted.	Condition of Certification BIO-19 merely specifies best management practices (BMPs) to be implemented *onsite* that will protect the nine rare plant occurrences offsite - and in close proximity to the project boundary - from the indirect effects of operation, including: the spread of weeds already present onsite; chemical drift relating to weed management and dust control; fugitive dust from mowing and road maintenance, increased risk of wildfire from project operation and increased traffic on area roads; sedimentation of washes offsite from erosion of channels onsite and upstream, and other impacts discussed under "Indirect Impacts to Special Status Plants". A map showing the location of the vulnerable offsite rare plant occurrences near the project boundary is provided in Biological Resources Figure 10. The avoidance measures in BIO-19 are standard BMPs for protecting oaks, streams, wetlands, and other sensitive resources adjacent to work activities, and recommended in the Energy Commission BMP Manual (CEC 2010). A similar condition was adopted for at least three other Energy Commission-licensed projects (Blythe, Genesis, Palen) to protect rare plants adjacent to the project boundary.
13.11		Mitigation ratios for plants are not legally supported.	The four (of 11) species determined to require mitigation are among the most imperiled of the non-listed species in California, as indicated by the CNDDB Element Rank (NatureServe rank), and documented in CNDDB (2012a),the CNPS *Inventory* (CNPS 2012), and the Consortium of California Herbaria (CCH 2012). Staff provided a clear, science-based justification for the mitigation of rare plants based on CNDDB Element Rank in the FSA. Staff chose to use these ranks as a basis for the mitigation ratios because they are an index of a species' extinction risk, based on rarity, threats, and population trend based on a widely recognized methodology used by CNDDB and other natural heritage programs around the world (Master et al. 2009). The same mitigation strategy and a similar condition of certification was required to minimize special-status plant impacts on at least three other Energy Commission-licensed projects (Blythe, Genesis, Palen). **BIO-20** requires the project acquire and preserve 3 offsite occcurrences for every S1-rank ("critically imperiled") species affected, and 2 offsite occurrences for every S2-rank ("imperiled") species affected. **BIO-20** also includes an option for mitigation through restoration of an at-risk population.
13.12		Condition BIO-21 should be deleted.	**BIO-21** (Botanist Qualifiecations) lists six specific mitigation measures that require implementation by a qualified botanist; all other mitigation measures relating to plants may be carried out by the Designated Biologist. It is not a full time position; it merely indicates which taks require expertise, and lists the minimum qualifications. **BIO-21** was revised to allow for more tasks to be carried out by the Designated Biologist, as requested by the applicant in the July 2, 2012 public workshop.

13.13		The PSA is overly conservative in treatment of burrowing owl.	Burrowing owls are considered a species of special concern (CSC) by the CDFG and are treated accordingly in the PSA. As defined by the CDFG a species is considered a CSC if it meets a set of criteria that include but are not limited to "is experiencing, or formerly experienced, serious (noncyclical) population declines or range retractions (not reversed) that, if continued or resumed, could qualify it for State threatened or endangered status." The species are also protected by both the federal Migratory Bird Treaty Act and relevant CDFG codes including 3503 and 3503.5. As such the PSA identifies potential impacts to this species on the project site in accordance with CEQA and provides conditions of certification to reduce but not avoid impacts to the species. The applicant also suggests that burrowing owl is common based on their distribution and due to the fact they are commonly detected during surveys for other energy commission projects. Notwithstanding the current conservation designation assigned to this species by the CDFG and BLM habitat for burrowing owls continues to be lost through development. A ranking of the most important threats to the species included loss of habitat, reduced burrow availability due to rodent control, and pesticides (James and Espie 1997). In addition, in a 2003 report by the U.S. Fish and Wildlife Service, breeding burrowing owls were thought to be largely extirpated during the last 10-15 years from multiple areas in California, including Napa, Marin, San Francisco, Santa Cruz, and Ventura counties, coastal San Luis Obispo county and Coachella Valley (http://burrowingowlconservation.org/PR12-09-2010.html). The observation of this species on other Energy Commission projects in no way substantiates the claim by the applicant that this species is abundant in California. The applicant indicated that the requirement for the acquisition of 600 acres of compensatory mitigation is unprecedented. Staff acknowledges that the current approach to mitigation has not been applied to previous Energy Commission Projects. The current mitigation approach was developed after review of The Staff Report on Burrowing Owl Mitigation (CDFG 2012) which indicates that "reversing declining population and range trends for burrowing owls will require implementation of more effective conservation actions, and evaluating the efficacy of the Departments' existing recommended avoidance, minimization and mitigation approaches for burrowing owls. The requirement in the PSA based the mitigation requirement on a subset of the potential home range of burrowing owls in an arid ecosystem. Because burrowing owls can exhibit high site-fidelity and reuse burrows year after year (County of Riverside 2008), replacing a portion of the realized home range was determined to be an effective strategy for reducing project impacts to this species. Citations: James, P.C., and R.H.M. Espie. 1997. "Current Status of the Burrowing Owl in North America: An Agency Survey." Journal of Raptor Research 9:3–5.
13.14		The PSA did not identify what "groundwater dependent vegetation" is.	The PSA explicitly defines "groundwater-dependent vegetation" on page 4.2-37 to 44 of the PSA, beginning with a discussion of characteristic groundwater-dependent habitats, and then describing in detail the groundwater-dependent resources contained within an approximate 5 mile radius of the project. A list of groundwater-dependent plant species known to occur in the 5-mile area centered on the project was provided in subparagraph 14 of Condition of Certification **BIO-23** (Groundwater-dependent Vegetation Monitoring). The list of plant species contained in **BIO-23** has been added to the setting section of the FSA, as well as definitions of "obligate" versus "facultative" groundwater-dependent species.

13.15		CEQA analysis should not be performed for project effects occurring in Nevada.	This issue was addressed by the Commissioner's in the "ORDER RE: APPLICANT'S MOTION IN LIMINE" dated and posted October 2, 2012 (Docket No. 11-AFC-02).From the Order: "This [Public Resources Code section 21080(b)(14)] does not exempt in-state project activities whose impacts are only felt out-of-state. For example, if a project dug a well inside California and the project's water consumption from the well caused an impact in another state but not in California, then that out-of-state impact must be analyzed under CEQA because the impact was generated in California."
13.16		The PSA requires the project to monitor groundwater with a precision that is not possible. The requirement to monitor is unprecedented.	The applicant incorrectly states that groundwater level monitoring requires a precision that is not possible (staff responded to the same comment at the June 14, 2012 public workshop), and in the Water Supply sections of the PSA and FSA. Water Resources staff concluded that because water levels on the project site are stable (unlike offsite wells in other parts of the basin), the 0.5 foot drawdown can be detected with nearly 100 percent confidence. The requirement to monitor groundwater impacts and to stop, modify, or reduce pumping if demonstrated by monitoring to adversely affect sensitive resources is hardly unprecedented. Not only was an almost identical condition imposed on another Energy Commission-licensed project (Palen Solar Power Project) – a project that was ultimately financed – but it is now common practice to require monitoring, management, and mitigation plans for groundwater impacts; so common that the term "3M plans" is used by practitioners (Harrington pers. comm.; Custis pers. comm.). As an example, the monitoring plan for the Coso Hay Ranch Water Extraction Project in Inyo County requires monthly monitoring at 10 well locations for the life of the 30-year project, identifies triggers at each well, some as low as 0.2 ft, and specifies that pumping must stop, change, or reduce pumping: "Requiring that observed drawdown values [at intervening monitoring wells],over time be kept below these defined trigger levels would provide an early warning system, allowing for the system operations to *change, to reduce or stop pumping* before maximum acceptable drawdown levels propagated down the valley to Little Lake."
13.17		BIO-23 is over conservative in its approach to groundwater monitoring.	As indicated under comment 13.16, above, requirements for groundwater monitoring are not unprecedented; nor is the scale of the groundwater monitoring specified "astounding"; in addition to a nearly identical condition adopted for an Energy Commission-licensed project, similar monitoring plans have been imposed by the County of Inyo (Harrington pers. comm.). The monitoring requirements in **BIO-23** and **WATER SUPPLY-8** (Groundwater Level Monitoring) are consistent with the specifications for monitoring recommended by hydrologists from BLM Nevada and BLM California, Inyo County, The Nature Conservancy, and Amargosa Conservancy (BLM 2012a; BLM 2012b; Inyo 2012a; Inyo 2012b; TNC 2012b; ARM 2012a).
13.18		Conditions BIO-23 and BIO-24 should be deleted.	Comment noted.

13.19		Condition BIO-22 reflects inaccurate acreages of waters of the State.	The PSA was clear that the total acres of state waters on the project was a preliminary figure, pending a field verification of the delineation. Staff and CDFG conducted a field verification and identified a number of new, previously unmapped features. Additionally, the delineated road puddles and roadside ditches with no hydrologic connection to a stream were removed from the total. The applicant has since revised the delineation maps and calculated new acreage totals (23.21 ac. jurisdictional state waters onsite; 0.45 ac. upstream of the project and within CA).
13.20		The PSA overstates potential project effects upon desert washes.	CDFG typically requires 3:1 mitigation for permanent impacts and 1:1 mitigation for temporary impacts (Vyverberg pers. comm). The FSA acknowledges that the project will maintain at least some portion of the hydrologic functioning of the stream by not diverting them around the site. This is reflected in the reduction of the mitigation from 3:1 to 2:1. However, staff and CDFG are united in their assessment that habitat functions and values will be eliminated for all but the most disturbance-tolerant species due to perimeter exclusion fencing, partial grading, noise, glare, and human disturbance, vegetation mowing, etc.
13.21		Avian survey information is complete.	In response to staff questions the applicant continues to provide additional data regarding solar flux modeling, avian risk and potential mortality associated with the facility. This information will be included in the **FSA**.

13.22		Solar flux impacts will not be "substantial".	The applicant has provided a variety of useful information regarding potential impacts to birds from solar flux. This includes a study that investigated effects of concentrated solar energy on bird carcasses presented during a workshop conducted on August 28, 2012. Staff considers the data useful but not conclusive. Carcasses of three species (chickens, doves, and quail) were exposed to various energy flux level for periods of 10 to 30 seconds. Burned or singed feathers and discolored or dried muscle tissue were observed in the carcasses exposed for 20 to 30 seconds to flux levels above 50 kW/m2. These effects were not observed in carcasses exposed to lower flux levels for the same intervals. No data on longer exposures were available. The applicant notes that feather temperatures in living birds probably would not reach the same temperatures during the same exposure periods due to convective heat dissipation by air motion surrounding them. Staff believes that the levels of feather and tissue damage reported for these exposures at 50 kW/m2 or above would be likely to kill living birds. In addition, staff believes that shorter exposures at these energy flux levels would be likely to cause other tissue or feather damage that could impair flight or vision or cause physiological effects and ultimately cause or contribute to mortality from other causes (e.g., reduce ability to forage, escape from predators, or thermoregulate). Staff also believes that longer exposures to lower energy flux levels are likely to cause feather damage or physiological effects. Based on staff's understanding of energy flux intensity and exposure times, staff believes that birds flying for short periods through energy flux exceeding about 25 kW/m2 will likely suffer significant damage to flight feathers, eyes, or skin so that they will be unable to survive longer than a few days. Staff does not have estimates of potential bird mortality however staff considers it likely that some loss will occur either through collision, electrocution or from exposure to solar flux. Therefore staff concludes that project effects are substantial and warrant mitigation. Additional language regarding solar flux is presented in the FSA.
13.23		Responses to staff's questions regarding flux are comprehensive.	Comment noted.

13.24		Avian issues are treated too conservatively.	Project related impacts to birds from collision, electrocution, and solar flux are presented using the best available information and relevant scientific literature. The conclusions presented in the report are valuable but irrelevant in the context of the project specific analysis. The fact that the study cites collisions with buildings and windows and the predation risk from domestic cats to be the primary sources of avian mortality does not diminish the projects potential to result in the loss of both common and protected bird species. Considering the vast areas of the United States that have been developed and the millions of house cats that predate birds it is not surprising theses sources pose risks to birds. The further contention that the project will result in a lower risk to birds than a wind farm may be accurate but depends on many factors including siting, scale of the project, and the type of wind turbines that are used at the site. In addition this technology has not been extensively studied and there does not appear to be any rigorous scientific studies to support this claim. Where data on bird mortality is available, bird mortality was found to occur both through collision with heliostats and from exposure to solar flux (McCray et al., 1986). Based on bird use in the project area including the presence of golden eagles staff considers the potential risk to birds from collision and solar flux to be appropriately addressed in the PSA and pose a significant impact to common and sensitive birds.
13.25		Desert kit fox will not be hunted for fur.	The PSA does not treat the desert kit fox as a State Fully Protected Species pursuant to Fish and Game Code Sections 3511, 4700, 5050 and 5515 or as a State listed species protected under Fish and Game Code 2050 et seq. For the purposes of the PSA this species is being treated as sensitive in accordance with the regulations identified in Title 14. While staff acknowledges that the project owner does not intend to conduct hunting or trapping on the project site the PSA presents reasonable minimizations measures to avoid the loss of this species.
13.26		The project is not located within NEMO.	The PSA acknowledges the HHSEGS facility site is located on private lands and not subject to the NEMO. The text will be clarified on the PSA.
13.27		The California Desert Conservation Area Plan does not apply to the project.	The PSA acknowledges the HHSEGS facility site is located on private lands. The text will be clarified on the PSA.
13.28		No wild and scenic rivers exist within the project area.	The PSA included a discussion of potential ground water related impacts to Wild and Scenic Rivers. No changes have been made to the PSA.
13.29		Applicant notes that badger may be "taken".	The American badger is a California species of special concern and is treated accordingly in the PSA. Although hunting of this species is allowed, Section 465 of the Fish and Game Code (Method of Take) describes the legally approved methods of take. As described in the Fish and Game Code furbearing mammals may be taken only with a firearm, bow and arrow, or with the use of dogs, or traps in accordance with the provisions of Section 465.5 of these regulations and Section 3003.1. The reference to unlimited take of this species is not relevant to the analysis of potential impacts to this species under CEQA.
13.30		CDFG code was incorrectly referenced.	The incorrect reference to American badger as a fully protected species in the PSA will be corrected.

13.31		Add provided language.	The recommend language was added to the FSA.
13.32		Add provided language regarding bird nests.	The recommend language was added to the FSA.
13.33		Add provided language regarding Migratory Bird Treaty Act.	The recommend language was added to the FSA.
13.34		Add language regarding the California Native Plants Act	The recommend language was added to the FSA.
13.35		Please refer back general comments regarding project size.	The FSA will be revised to include a description of land disturbance provided by the applicant. For the purposes of the PSA and FSA temporary impacts to desert tortoise habitat have been treated as permanent due to the temporal loss of habitat and extremely long recovery times required in desert ecosystems.
13.36		Please update pipeline description.	The FSA will be revised to include this information.
13.37		Please update transmission system description.	The FSA will be revised to include this information.
13.38		Add a temporary construction well to the FSA.	The FSA will be revised to include this information.
13.39		Revise ACEC description.	The FSA will be revised to include this information.
13.40		The land for the proposed project site is not abandoned.	The FSA will be revised to clarify the orchard has been left fallow and the site remains largely undeveloped.
13.41		Acreages in the PSA were incorrect.	The FSA will be revised to include this information; however preliminary data was based on the contents of the AFC.
13.42		Revise acreages in the FSA.	The FSA will be revised to include this information.
13.43		Revise sentence regarding native vegetation.	The FSA will be revised to include this information.
13.44		Describe why a developed project site would not be suitable habitat for wildlife.	The conclusions drawn in the PSA are accurate and are based on the basic tenants of ecology and conservation biology. An analysis of these effects is described in detail in the PSA under Project Operation Impacts and Mitigation. This includes the rational for lost functional values to wildlife, including numerous scientific citations describing the ecological effects of roads, noise, lighting, and weed management activities.

13.45		The FSA must include data on nest failure.	The FSA will provide additional language regarding human and disturbance related effects to birds. However, disturbance and human intrusion near nest sites are well studied and has been documented to reduce nest success in many birds. Some of the studies that have correlated human intrusion with degree of reproductive success for birds include Reijnen et al. (1995), Gramza (1967), Ellison and Cleary (1978), Tremblay and Ellison (1979), Westmoreland and Best (1985), Rodgers and Smith (1995), Gutzwiller et al. (1997), Swarthout and Steidl (2003), Weidinger (2008), and Grubb et al. (2010). Citations: Ellison, L. N., and Cleary, L. 1978. Effects of human disturbance on breeding of Double-crested Cormorants. Auk 95:510–517. Gramza, A. F. 1967. Responses of brooding nighthawks to a disturbance stimulus. Auk 84:72–86. Gutzwiller,K. J., Kroese, E. A., Anderson, S. H., and Wilkins, C. A. 1997. Does human intrusion alter the seasonal timing of avian song during breeding periods? Auk 114:55–65. Grubb, T. G., DeLaney, D. K., Bowerman, W. W., and Werda, M. R. 2010. Golden eagle indifference to heli-skiing and military helicopters in northern Utah. Journal of Wildlife Management 74:1276–1285. Reijnen, R., Foppen, R., Braak, C.T., and Thissen, J. 1995. The effects of car traffic on breeding bird populations in woodland: III. Reduction of density in relation to the proximity of main roads. Journal of Applied Ecology 32:187–202. Rodgers, J. A., and Smith, H. T. 1995. Set-back distances to protect nesting bird colonies from human disturbance in Florida. Conservation Biology 9:89–99. Swarthout, E. C. H., and Steidl, R. J. 2003. Experimental effects of hiking on breeding Mexican spotted owls. Conservation Biology 17:307–315. Tremblay, J., and Ellison, L. N. 1979. Effects of human disturbance on breeding of Black-crowned Night Herons. Auk 96:364–369. Weidinger, K. 2008. Nest monitoring does not increase nest predation in open-nesting songbirds: Inference from continuous nest-survival data. Auk 125:859–868.
13.46		Construction effects on common wildlife are insignificant.	The PSA concluded that impacts to common wildlife were significant due to the large scale land use conversion and expected mortality to common wildlife. The lead agency has great discretion in the determination of significance under CEQA. Based on the potential impacts to common wildlife the PSA concluded that impacts were significant. Please note that while Conditions of Certification were applied to salvage wildlife compensatory land acquisition was not required for common species.

13.47		The site has only two plant communities.	The site does include more than two plant communities according Sawyer et al. (2009). Creosote bush scrub and shadscale scrub are two broad plant community descriptions when mapped according to Preliminary Descriptions of the Terrestrial Natural Communities of California by Holland (1986). However surveys conducted by staff noted that each of the two dominant plant communities varied across the site both in species composition and diversity of dominant shrub cover. At the association level at least one sensitive plant community Creosote bush scrub/big galleta was also noted.
13.48		Revise sentence regarding diversity of mammalian species detected on the project site.	The site does appear to support a wide variety of mammals. As identified by the applicant 12 species of mammals were noted on the project site. This included a range of species from small pocket mice to larger carnivores. In addition, staff observed weasel scat on lands due east of the project site. The PSA language regarding well represented is not intended to suggest the site supports unique assemblages of mammals but rather acknowledges the number and type of mammals present.
13.49		Bobcat do not use the project site.	The PSA erroneously suggested that bobcat were observed on the site. This fact will be rectified in the FSA. However, there is no reason why this species would not be a periodic to routine visitor at the project site. The species is known from the region and would be expected to forage within the community types present on the project site.
13.50		Revise FSA description of bat species survey data.	The FSA will be revised to include this information.
13.51		Pallid bat use the project site.	The FSA will be revised to include this information.
13.52		There is no evidence that bats could roost on solar structures.	Bats are known to roost on a variety of manmade structures including bridges, buildings, bell towers, under the eaves of houses and water tanks. Because of the size and scale of the project staff included this language to ensure that roosting bats, should they use the project site, are afforded protection.
13.53		The project would not impact the Amargosa Wild and Scenic River	Please refer to staff's analysis of the project's groundwater pumping impacts on the Amargosa Wild and Scenic River (Water Supply section of the FSA).
13.54		The HHSEGS project poses no collision threat to bats.	The PSA acknowledges that due to the unique ecology of most bats; project construction is unlikely to result in direct mortality. However, pallid bats, which forage on the ground, will incur a loss of habitat. In addition, while bats generally are capable of avoiding structures through the use of echolocation, bats still periodically collide with facility structures during inclement weather.
13.55		There is a difference between tortoise in Nevada and tortoise occurring in California.	The PSA correctly identifies where desert tortoise occur on and near the project site. Staff considers desert tortoise found within 150 meters of the project site to have the potential to utilize home ranges that include portions of the project site.

13.56		Mesquite thickets are not scientifically shown to be of importance in the greater ecosystem.	The importance of mesquite habitats -- in all forms -- is a matter of empirical fact, supported by the literature, and by resource agency policy and practice. All mesquite in southern Nevada, and particularly the mesquite in Pahrump Valley and Stump Springs, are recognized conservation priorities in the BLM-sponsored "Mesquite-Acacia Conservation Management Strategy (Crampton et al. 2006), adopted for the Clark County Multiple Species Habitat Conservation Plan. The applicant has provided no evidence to support this arbitrary and unsupported statement.
13.57		There is not "an abundance" of prey onsite for bats.	The FSA will be revised to further describe the sites value to bats.
13.58		Tecopa Road should not be fenced with desert tortoise fencing.	The FSA will be revised to further describe the location of proposed desert tortoise fencing. Staff does not believe that fencing on the south side of Tecopa Road is warranted.
13.59		Revise language regarding applicant's proposed use of an onsite retention area.	The FSA will be revised to clarify the retention pond would hold water only after significant rainfall events.
13.6		The project will not cause an increase in polarized light.	The PSA attempts to provide a thorough discussion of the potential effects of the projects to birds from collision. Polarized light may not pose a significant concern for the project however the PSA discloses potential effects from this effect. Nonetheless studies conducted at other facilities using reflective technologies cite collision as a source of bird mortality. Considering the heliostats would likely reflect conditions including clouds or a darkened sky there does appear to be potential for birds to mistake the site for a pool of water.
13.61		Update project acreages relative to desert tortoise impacts.	The FSA will be revised to include the disturbance acreage provided by BSE.
13.62		Revise sentence regarding desert tortoise.	The FSA will be revised to clarify this statement.
13.63		Please refer to applicant's comments regarding desert tortoise population estimate.	The PSA based the estimate of potential desert tortoise on the project site on information identified in Section 5.2.6.2 (Federally Listed Desert tortoise Protocol Survey). Staff acknowledges the approach of not including animals found adjacent to the site in the calculations; however this rationale disregards the fact that desert tortoise in adjacent areas likely use the site as a component of their home range and may use burrows on the project site. As the numbers reflect only an estimate of the potential desert tortoise that may occur on the project site staff considers the approach to be biologically sound and appropriate for the FSA.
13.64		Please refer to applicant's comments regarding desert tortoise population estimate.	Please see response to comment 13.4.
13.65		The applicant will submit a revised desert tortoise translocation plan.	Staff looks forward to working with BSE to develop an effective desert tortoise Translocation Plan.

13.66		Please refer to applicant's comments regarding desert tortoise population estimate.	Please see response to comment 13.4.
13.67		The project would not attract nuisance predators.	The PSA accurately presents information addressing existing nuisance predators that are present in the project area. Specifically, page 4.2-92 of the PSA (Ravens, Coyotes, and other Predators) describes the existing subsidized predators that occur near the community of Charleston View. Staff also considers the project to pose an additional attractant to ravens and other predators from road kill, trash, and the creation of perch and nesting sites.
13.68		Burrowing owl likely do not occupy the project site long-term.	Burrowing owl and their sign was detected on the project site during surveys desert tortoise conducted by the applicant. In addition, these burrows were revisited during winter months. What is not clear is if the applicant returned to the burrows to evaluate if any of the burrows supported breeding birds. However, there is some indication that supplemental surveys to detect breeding were not conducted as the site was considered to support burrowing owls. Nonetheless the FSA will be revised to clarify the potential use of the site by burrowing owls.
13.69		The developed project would provide habitat for birds.	The PSA accurately reflects the expected post development landscape and potential use by resident and migratory birds. With the exception of disturbance tolerant species the site is expected to have lost functional value for most nesting and foraging birds.
13.7		LORS with "may" in them are speculative.	Staff considers the large scale loss of foraging habitat to pose a substantial risk to golden eagles. The USFWS considers that foraging habitat loss may be interpreted as take under the Bald and Golden Eagle protection Act if it causes territory abandonment or reduced productivity. Staff believes the large scale loss of habitat could result in the loss of reproductive output or other lost fitness; however staff acknowledges it would be difficult to attribute the loss to the proposed project. Staff concludes that the loss of foraging habitat would be significant under CEQA but would not constitute take under state or federal LORS.
13.71		No residual impacts to golden eagles would occur if the project were developed.	Staff considers the potential risk of collision, electrocution, loss of habitat and risk of solar flux to be significant under CEQA. Staff believes the use of anti-perch devices and other mechanisms to be valuable and required to minimize impacts to golden eagles. However, the potential loss of birds would remain significant after mitigation.
13.72		Update FSA with spring 2012 nesting surveys.	The FSA will be updated with this information.
13.73		Remove reference to an evaporation pond.	The FSA will be updated with this information.
13.74		Only 3 eagles were seen at the same time on the project site.	The FSA will be updated with this information. However, use of the site by golden eagles is not in dispute. The surveys conducted by the applicant provide only a limited sampling time. Golden eagles have been observed by staff immediately adjacent to the site and soaring east of the project area. Additionally, applicant consultants docketed **FIGURE 30** -- a pair of golden eagles observed 1/11/2 along Stateline Road adjacent to the proposed project site.
13.75		The loss of forage is unimportant to golden eagle.	The project will result in the direct loss of over 3,000 acres of foraging habitat for this species. Staff considers this a significant impact under CEQA. Please see response to comment 13.70 for further information regarding the loss of golden eagle foraging habitat.

13.76		Clarify statements regarding mitigation of loss of golden eagle foraging habitat.	The language regarding significance conclusions will be revised in the FSA.
13.77		Bighorn sheep do not use the Stump Springs ACEC.	Thank you for the information regarding bighorn sheep. It is not clear whether bighorn sheep use the spring at Stump Springs or water in the adjacent drainages. Use of the spring would pose a predation risk to the animals due to the heavy brush cover which sheep often avoid.
13.78		The site is not a bighorn sheep corridor.	Bighorn sheep are known from the project region and have been documented to use valley floors to support intermountain. However, the PSA does not suggest the site is an important corridor for movement. Please see response to comment 13.2 for additional information regarding bighorn sheep.
13.79		Bighorn sheep do not cross Tecopa Road.	Staff disagrees with the assertion that bighorn sheep would not cross Tecopa Road for intermountain movement. Bighorn sheep may use almost any portion of the desert floor for movement and are known to cross major highways and existing roads.
13.80		The project owner is unwilling to pay for necropsy of dead kit fox found on the project site.	The PSA acknowledges the project will displace desert kit fox and result in a net loss of habitat for this species. However, it is unknown and speculative if the project will either result in the manifestation or spread of distemper. However, to monitor the possible consequences of this threat the PSA included condition of certification **BIO-14** which requires monitoring and adaptive methods to reduce this threat. As a condition of **BIO-14** disease testing may be required if animals succumb during project activities.
13.81		Provides data on kit fox behavior and habitat use patterns.	Thank you for the information regarding desert kit fox. The FSA will be revised to include the applicability of BLM lands east of the project site for desert kit fox.
13.82		Applicant states that badger may be "taken".	Please see response to comment 13.29.
13.83		Applicant presents a different interpretation of kit fox legal status.	Please see response to comment 13.25.
13.84		Please provide evidence that mammals are in high density on the project site.	The site does appear to support a wide variety of mammals and numerous rodent burrows. As identified by the applicant 12 species of mammals were noted on the project site. This included a range of species from small pocket mice to larger carnivores. In addition, dense concentrations of burrows, to numerous to count, were routinely observed across the site. Staff did not conduct small mammal trapping or complete a census of burrow. However, it is clear that small mammal density across much of the site is high.
13.85		Applicant is confused about what further information could have been collected for kit fox.	Staff considers the existing information on desert kit fox to be adequate for the purposes of the FSA. Additional data acquisition will be required as a component of Condition of Certification **BIO-14.**
13.86		Revise discussion of desert washes per provided language.	Thank you for the clarification; however, the acreages have been revised to reflect the additional and previously unmapped washes documented by staff during the field verification of the state waters delineation on August 1-2, 2012, and the removal of the artificial features on roads.

13.87		BIO-22 should be deleted.	Comment noted.
13.88		Applicant disputes potential for washes upstream of the project site to be impacted by project construction.	Staff agrees that the upstream portion of the delineated streams located in Nevada are not state waters. However, staff included the small portion of upstream waters (0.45 ac.) located in California that are immediately adjacent to the project boundary and pipeline alignment, and will be indirectly affected by the project. Construction of the pipeline would require trenching through many of these washes. Indirect impacts to the habitat functions and values of the adjacent streams are also expected during operation from human disturbance, noise, glare, lighting, and potential head-cutting or erosion immediately above the pipeline trench.
13.89		Revise discussion of state waters delineation.	Regarding the indirect effects of the project that extend across the state line into Nevada, staff maintains that 1) consistent with the CEQA Guidelines and statutory provisions, our analysis does not consider the impacts of projects or portions of parts of projects (in this case, the project linears in Nevada); however, our analysis does include analysis and mitigation for impacts of the power plant on both sides of the border
13.90		Revise sentence regarding waters of the U.S.	Thank you; the language was revised in the FSA as suggested.
13.91		Revise statement regarding Porter-Cologne Water Quality Control Act.	Agreed; Porter-Cologne was the authorizing legislation for the Water Quality Control Act, which is more correctly referenced as California Water Code Division 7. Water Quality Act, and the Waters of the State definition is section 13050(e). The language has been revised in the FSA.
13.92		Revise statement regarding onsite storm water retention.	The applicant's Drainage, Erosion, and Sedimentation Control Plan (DESCP) indicates the project would use strategically placed sediment controls in addition to the retention area at the western boundary. Staff understands the controls would not be placed within the retention area; however, staff expected that stone filters and check dams "strategically placed throughout the project site" would mean placement near the power blocks and perhaps and in spot locations in the solar fields. These would reduce sediment transport from one portion of the project to the other. Otherwise, there may be a significant build-up of sediment near the western boundary over time. Water Resources staff indicated they would still expect that stone filters and check dams "strategically placed throughout the project site to avoid blocking drainage pipes and changing the flood characteristics of the retention area.
13.93		Provides revisions to Table 2.	The acreages were revised in the PSA to reflect the most current figures for state waters, which include the additional and previously unmapped washes documented by staff during the field verification of the state waters delineation on August 1-2, 2012, and removal of the road puddles and unconnected roadside ditches originally delineated as state waters.
13.94		Provides revision to regulatory authority over desert washes.	The language was revised to include the federal Clean Water Act, as suggested. However, the proposed edit relating to mesquite woodland was rejected; this issue is discussed in detail in the FSA.

13.95		Provides revisions to the desert wash discussion.	The definition of a stream in Title 14, Section 1.72 of the California Code of Regulations (CCR) is not the definition used by Fish and Game Code (F&GC) Section 1600 *et seq* . *The Section 1.72 definition was developed to address a specific sports fish issue that came before the Fish & Game Commission* ; note that while the definition does speak to periodic and intermittent flow, *Section 1.72 is limited to fish-bearing or aquatic life-bearing streams* .
13.96		Provides revisions to discussion of U.S. Army Corp correspondence.	More importantly, rather than limiting CDFG jurisdiction to fish-bearing streams alone, F&GC Chapter 6, Fish and Wildlife Protection and Conservation, Section 1600 *et seq* was enacted to provide for the conservation of fish *and* wildlife resources associated with stream ecosystems. The F&GC further defines fish *and* wildlife to include: *all wild animals, birds, plants, fish, amphibians, invertebrates, reptiles, and related ecological communities, including the habitat upon which they depend for continued viability* (FGC Division 5, Chapter 1, section 45, and Division 2, Chapter 1, section 711.2(a), respectively). *Fish means wild fish, mollusks, crustaceans, invertebrates, or amphibians, including any part, spawn or ova thereof* (FGC, Division 5, Chapter 1, section 45).
13.97		Revise acres of state jurisdictional waters.	The language was revised in the PSA to reflect URS Corporation as the author of the delineation report (not CH2M Hill). However, the proposed edit to total acres of state waters is not consistent with the total established in the field verification (see comment 13.86).
13.98		Revise citation.	The citation for the delineation report in the PSA was revised as suggested (to "URS 2012").
13.99		Revise language regarding the 401 certification for the project.	This section was revised instead to reflect the results of staff and CDFGs field verification of the state waters delineation
13.1		Revise citation.	The citation was revised as suggested.
13.101		Disputes loss of habitat function and values. Correct acres of state waters impacted by the proposed project.	The importance of ephemeral desert washes is undisputed; it is well-documented in the literature, the sum of which represents decades of observations and surveys (Levick et al. 2008; Baxter 1988; Kirkpatrick et al. 2007; Kubick & Remsen 1977; Tomoff 1977; Daniels & Boyd 1979, and others); observations that are also consistent with staff's observations during multiple site visits by staff and CDFG biologists. The burden of proof is on the applicant to substantiate any assertion that -- contrary to the body of scientific body of knowledge -- these ephemeral streams have no value to wildlife. This comment was addressed in detail under 13.19 and 13.20.
13.102		Revise acreages of waters of the U.S.	As stated in the FSA and under comment 13.20, the project would maintain a portion of the hydrologic and geomorphic functions of the washes by allowing them to pass through the site, rather than diverting them around the project in an artificial channel; however, the habitat functions and values would be eliminated for most wildlife due to perimeter exclusion fencing, partial site grading, road construction and maintenance, vegetation maintenance, spraying, noise, glare, and human disturbance. Staff and CDFG consider this a significant impact

13.103		Revise sentence regarding importance of washes.	Staff rejects the proposed edit; this issue has been addressed in more detail under comments 13.19, 13.20, and 13.101, and in the FSA.
13.104		Provides suggested revisions and disputes staff's recommended mitigation ratio for waters of the state.	This argument was addressed by staff under comment 13.20. Fish and Game Code (FGC) Section 1605 assumes implicitly that some form of mitigation will likely be part of *any* Lake and Streambed Alteration Agreement issued for a project (Vyverberg pers. comm.). Combined with CDFGs policy that there be no net loss of riparian/riverine habitat - which includes desert washes and the vegetation that occurs along the washes - means that if a project results in a loss of one acre of stream then a minimum of two acres of compensatory stream mitigation are *required* to satisfy the no net loss goal. In practice, compensatory mitigation is typically mitigated at a minimum mitigation-to-effect ratio of 3:1 for permanent effects and 1:1 for temporary effects (*ibid.*)
13.105		Revise statement regarding Proposed edit accepted; the revised language is contained on	Proposed edit accepted; the language was revised in the FSA.
13.106		Mitigation is inappropriate unless functions are demonstrated.	This issue was addressed in detail under comments 13.19, 13.20, and 13.101.T he applicant has not provided any evidence to substantiate any assertion that -- contrary to the body of scientific body of knowledge about the habitat functions and values of ephemeral desert streams (Levick et al. 2008; Baxter 1988; Kirkpatrick et al. 2007; Kubick & Remsen 1977; Tomoff 1977; Daniels & Boyd 1979, and others) that the these ephemeral streams have no value to wildlife. The wildlife connection is presumed by CDFG and the agency will require compensatory mitigation for the washes under the authority of California Fish and Game Code (FGC), which links stream protection with the presence of fish or wildlife habitat. F&GC further defines fish and wildlife to include: "...all wild animals, birds, plants, fish, amphibians, invertebrates, reptiles, and related ecological communities, including the habitat upon which they depend for continued viability." (FGC, Division 5, Chapter 1, section 45, and Division 2, Chapter 1, section 711.2(a), respectively). "Fish means wild fish, mollusks, crustaceans, invertebrates, or amphibians, including any part, spawn or ova thereof." (FGC, Division 5, Chapter 1, section 45)
13.107		Applicant disagrees with staff's valuation of ephemeral stream values.	See comment above.

13.108		Provides suggested revisions to discussion of state and federally-regulated waters	Fish and wildlife resources are held in trust for the people of the State by and through the California Department of Fish and Game (Department) (FGC § 711.7). The Department is responsible for conserving, protecting, and managing fish, wildlife, native plants, and the habitat necessary for biologically sustainable populations of these species (FGC § 1802). FGC Sections 1600-1616 were enacted to conserve the natural resources associated with streams (and lakes), and the code sections are implemented by the Department through its Lake and Streambed Alteration (LSA) Program. Streams that are afforded protection under FGC Section 1600 et seq are those bodies of water associated with a local biological community, or that contribute to the chemical, physical, or biological integrity of downstream waters or ecosystems. Whether flow is ephemeral, intermittent or perennial, streams, their sources (e.g., swales, springs, ponds, lakes, marshes, wetlands, or other such features), floodplains, and associated ecosystems (i.e., the living flora and fauna, and physical processes that sustain their habitats) are all considered integral parts of a stream system and are extended protection accordingly. These comments have been addressed in more detail under comments 13.19, 13.20, 13.86-13.106.
13.109		Revise discussion of waters of the U.S.	Agreed; the language in the FSA was revised accordingly. Compensatory mitigation for the project impacts to desert washes is required for state waters impacts; not waters of the U.S.
13.110		Revise acreages of impacted state waters.	Staff disagreed with the total acres of state waters shown in the State Waters Delineation report (URS 2012). The total shown in the FSA (23.21 ac.) reflect additional, previously unmapped washes found by staff and CDFG during the field verification of the delineation, and the removal of non-jurisdictional features..
13.111		Provides a reference	Agreed; the citation was revised in the FSA as suggested (URS. 2012. BrightSource Energy Hidden Hills Solar Project, Inyo County, CA Preliminary Delineation of Jurisdictional Waters of the State. March 20, 2012. (Submitted as Attachment DR8-1, Data Response, Set 1C-2).
13.112		Revise Findings of Fact	Proposed edit accepted; the language was revised in the FSA.
13.113		Revise waters of the state acreage	See response to comment 13.11, above.
13.114		Revise findings for plant communities' value	Staff disagreed with the proposed changes in the PSA regarding the discussion of habitat value and movement.
13.115		Revise findings for bighorn sheep	Please see response to comment 13.
13.116		Revise findings of fact for groundwater dependent ecosystems.	Comment noted.

13.138		State groundwater table elevation in relation to mesquite vegetation.	The position of the groundwater table relative to the effective rooting depth of the mesquite can only be determined through groundwater monitoring, combined with vegetation monitoring or soil core samples (**BIO-23**, **WATER SUPPLY-4**). No previous studies have been conducted in the area east of the project; nor has the applicant provided any direct evidence. This is the basis for staff's recommendations for groundwater monitoring, and vegetation monitoring to monitor the effects of a declining water table, and/or soil core sampling. Regarding concerns about natural variations in water levels, Water Resources staff responded to the same comment during the June 14, 2012 public workshop. Water Resources staff stated it is the offsite wells east of the fault zone and in other parts of the valley that fluctuate; not the wells onsite (the trigger will be measured at the project boundary, on the stable side of the fault). Because water levels onsite are stable, (unlike offsite wells in other parts of the basin), the 0.5 foot drawdown can be detected with nearly 100 percent confidence.
13.139		PSA needs to included aquifer performance test results.	See comment 13.138, above, regarding groundwater information for the site and areas to the east. The groundwater analysis puts emphasis on the "region" because it is contained within the cone of depression (drawdown zone) identified in the applicant's groundwater analysis and staff's independent analysis of the project pump test results, and it is an area that supports extensive groundwater-dependent vegetation, as well as seasonal springs. Regarding the comment about what constitutes "onsite" versus "offsite", the PSA clearly states on page 4.2-18 that only two communities are present onsite -- creosote bush scrub and shadscale scrub – and on PSA page 4.2-20 "No mesquite-dominated habitats were mapped within the project boundary with the exception of a few scattered [mesquite]." Nevertheless, the statement was repeated in the several additional places in the FSA to address the applicant's concern.
13.140		PSA discussion must not emphasize regional context of groundwater.	See comments 13.138 and 13.139, above.

13.141		BIO-18 is too difficult to implement.	A very similar condition of certification was adopted for several Energy Commission-licensed projects (palen, Blythe, and Genesis projects). The guidelines in the condition are consistent with guidelines for weed plans by BLM and The Nature Conservancy (BLM 1992; Tu & Meyers-Rice 2001; Hilmer & Liedtke 2003). The applicant's proposed edits to BIO-18 (Weed Management Plan) were discussed in the July 2, 2012 public workshop. Staff accepted several but not all of the proposed edits. For example, additional language regarding an emphasis on the weed species of greatest ecological concern (versus common ubiquitous weed species) was accepted; it is a widely accepted approach to weed management. The accepted edits are incorporated into the revised BIO-18 in the FSA.
13.142		Data collection for special status plant species is ongoing.	Staff first raised the concern about recent additions to the CNDDB and CNPS inventory (CNPS 2012) in the PSA. It is not unreasonable to assume the possibility that newly added species—particularly species that are not even in the past or current state floras (Hickman 1993; Baldwin et al 2011), such as Torrey's joint-fir. However, two years of extensive offsite surveys have now been conducted to determine if these species were more common than previously understood, including the spring 2012 surveys, the results of which have been considered and addressed in the FSA. The applicant is now asking for another round of surveys following the publishing of the FSA (fall 2012) and a second round following the Final Decision (spring 2013). Staff concluded that surveys were adequate to determine if the four significantly affected species were more common, with one exception: --Torrey's joint-fir – because: 1) it was just added to the CNDDB and CNPS Inventory (CNPS 2012) in January 2012; and 2) the species was not known to occur in California before it was discovered on the project site, and it is not included in the state flora (Baldwin et al. 2011). This means, in this unique case, there is a high potential that it may have been overlooked by other surveyors, an opinion shared by at least one other recognized local expert (Silverman pers. comm.). Currently, only one round of surveys has been conducted to assess the size of the species' population in California. BIO-20 includes a provision that if many new occurrences are found in fall 2012 or spring 2013 that results in a downgrading of the CNDDB Element Rank from an S1 to an S3 ("vulnerable but not under immediate threat of extinction"), and the proportion of the statewide distribution affected by the project is less than 10 percent, the mitigation requirement for that species would be dismissed.
13.143		Provides a clarification of site geomorphology.	

13.144		Delete "scrubs [plural]"; replace with "scrub".	Edit accepted; the language was revised accordingly in the FSA.
13.145		No evidence exists to support that mesquite are stressed by groundwater pumping.	The comment the applicant is objecting to (was informed by the BLM document Conservation Management Strategy for Mesquite and Acacia Woodlands in Clark County, Nevada (Crampton et al. 2006) and literature on the groundwater declines in the Pahrump area during the last century: Harrill (1986); Malmberg (1967); Buqo (2004), and Comartin (2010). "Many local springs experienced precipitous water table declines and ultimately stopped flowing as a result of groundwater depletion in the middle of the last century (Harrill 1986; Malmberg 1967; Buqo 2004; Comartin 2010). Before extensive agricultural development, the Pahrump Valley playa area (northwest of the project) contained some phreatophytic vegetation. Groundwater pumping in the Pahrump Valley for agriculture (predominantly alfalfa and cotton) peaked in 1968 and there was a significant downward trend in static water levels between the years 1953 and 1996, based on an analysis of 651 wells within 1 mile of a mesquite woodland (Crampton et al. 2006). Groundwater withdrawals accompanying large-scale agricultural development caused some major springs in the area to stop flowing during this period of groundwater withdrawal. Some springs eventually recovered after some the pumping stopped (Moreo et al. 2003). Historically, Manse and Bennetts Springs discharged along the base of the broad alluvial fans at the foot of the Spring Mountains. Groundwater withdrawal in the valley caused these springs to cease flowing in the 1970s. In the late 1990s, after the heavy agricultural pumping stopped, Manse Spring began to flow again. Other springs have not recovered." Groundwater pumping and water level declines are documented to have caused the decline or death of mesquite in many areas of the southwest (Sawyer et al. 2009; Judd et al. 1971; Webb & Leake 2006; Stromberg pers. comm.; Keeler-Wolf pers. comm.).
13.146		Vegetation monitoring isn't proportional to the projected impact.	See response to comment 13.135.

13.147		Nomenclature for mesquites needs to be standardized.	Many of the applicant's comments on vegetation communities and their nomenclature are based on the incorrect application of old and obsolete classification systems and concepts no longer in usage in California. The CDFG Vegetation Program was consulted for information on the conservation status and classification of mesquite in California. The Senior Vegetation Ecologist (Keeler-Wolf pers. comm.) affirmed that the mesquite-dominant habitats (alliances) in California are classified as "Honey Mesquite Alliance" under the classification system used in California, not "thickets" or "bosque" or "woodland"; the state and national standard is based on dominant species, not on habitat structure. Under the US National Vegetation Classification system (USNVC) (a system still in development), honey mesquite alliances fall under several different "Ecological Systems" including "North American Warm Desert Riparian Low Bosque & Shrubland Group" (Keeler-Wolf pers. comm.). This might explain why BLM uses the term "bosque" to describe the mesquite habitats east of the project. In the Mesquite-Acacia Conservation Management Strategy (CMS) (Crampton et al. 2006) prepared for and adopted by the Clark County Multiple Species Habitat Conservation Plan, commissioned by BLM, the mesquite are referred to as "woodlands" throughout the study area, which includes the stands near the project. The management plan also notes that the southern portion of the Pahrump "Metapatch" (aggregation of smaller patches) known as Stump Spring is "...distinct from the rest of the region in topography, hydrology, soils and mesquite growth form...Many of these woodland patches are comprised of shrubby dune mesquite; however, larger shrubs and trees grow along the deeply eroded wash." (Crampton et al. 2006). Regardless of the terminology used, the conservation status of Stump Spring ACEC, the mesquite-dominant habitats north of the ACEC and east of the project, and the value of the habitats to wildlife, are a constant; the ACEC and the entire Pahrump Valley metapatch are identified conservation priorities in the Mesquite-Acacia Conservation Management Strategy (Crampton et al. 2006). BLM is in the process (early planning stages) of developing an additional ACEC that would encompass the mesquite habitats just east of the project (Poff pers. comm.). The importance of mesquite to wildlife are described in more detail under "Setting: Groundwater-dependent Ecosystems". Biological Resources Figure 4 contains photos of the mesquite habitats characteristic of the incised washes east of the project site.
13.148		Nomenclature for mesquites needs to be verified by other experts.	See comment 13.147, above.
13.149		Revise PSA language regarding mesquites.	The reference to m,esquite in the study area was revised to read "Sensitive plant communities *potentially* indirectly affected by the proposed project groundwater pumping....", and added "Groundwater-dependent communities (mesquite-dominant habitats) do not occur onsite except as a few scattered small stands. Offsite, the nearest mesquite habitats occur within 500-1000 feet of the eastern project boundary, predominantly in a shrubby form on coppice dunes."

13.150		Applicant questions the necessity of mitigating for Larrea-pleuraphis vegetation type.	During the field verification of the state waters delineation conducted by staff and CDFG on August 1-2, staff documented a one-acre stand of the creosote bush-galleta grass association (*Larrea tridentata/Pleuraphis rigida association*) -- a rare natural community --along the eastern boundary, where it occurs as an upland (non-riparian) habitat. Because the habitat does not occur along the washes, staff is not treating it as a feature subject to jurisdiction under Fish and Game Code. Although it is still considered a rare natural community (Sawyer et al. 2009) from a CEQA perspective, a one acre loss of a S3-ranked community ("vulnerable" but not imperiled) would not be significant and no mitigation is recommended.
13.151		The discussion of mesquite communities is confusing.	Page 4.2-20 of the PSA clearly states that “No mesquite woodlands were mapped within the project boundary, with the exception of a few scattered trees.” Nevertheless, the statement has repeated in the introduction to “Sensitive Plant Communities”, and the bulleted list of sensitive communities further subdivided as suggested to address the applicant’s concern.
13.152		Please add suggested language regarding mesquite.	See comment 13.151, above. The PSA clearly stated "The mesquite-dominated habitats closest to the project occur as lower-growing shrublands”. Nevertheless, to further address the applicant's concern, the language was revised to read “ ...as a shrub-like, rather than tree-like growth form, on the dunes east of the project.”
13.153		Add citiations supporting conclusions regarding mesquite and groundwater pumping.	The PSA never states that sand accumulation is a potential cause of mesquite die-off. The definition of coppice dunes was cited in the PSA (Huang et al. 2011) from Huang, P.M, Li, Y., and M.E. Summer, Handbook of Soil Sciences: Properties and Processes [2nd ed.] CRC Press, 2011. The citation was included in the References subsection of the PSA [pp. 4.2-256]. It is an industry standard, included in the USDA soil science reading list. The specific statement “If the sand accumulates faster than the plant can grow, however, the plant will die, and the dune will usually be deflated (wind-eroded and moved downwind) is from the U.S. Army Corps of Engineers description of coppice dunes <http://www.agc.army.mil/research/products/desert_guide/lsmsheet/lscopp.htm>
13.154		Please have document reflect that mesquite coppices are clones.	This is already implied on page 4.2-21 in the PSA “This same process fostered the development of ancient creosote bush clones (McAuliffe et al. 2007). Clones (off-shoots from a single parent that are genetically identically and connected to the older, original, and now dead parent plant) may reach ages of several thousand years and are most common in places where fluvial and aeolian deposition has repeatedly occurred throughout the Holocene (ibid.). Clones in such locations are derived from plants that originally established on surfaces of older, now buried surfaces.”
13.155		Mesquites present offsite are not bosques.	This distinction was clearly stated in the PSA (page 4.2-21). See also comment 13.147.

13.156		Clarify the importance of mesquite in Nevada.	The project is located on the California side of the California-Nevada state line. Groundwater-dependent vegetation occurs within 500-100 ft of the eastern boundary of the project, in Nevada, within the groundwater pumping cone of depression identified by the applicant in the AFC (HHSEGS 2011a, Appendix 5.15D) and in staff's independent groundwater analysis (Water Supply section of the FSA). The issue of analyzing and mitigating the impacts of California projects in Nevada is addressed by the Commissioner's in the "ORDER RE: APPLICANT'S MOTION IN LIMINE" dated and posted October 2, 2012 (Docket No. 11-AFC-02). From the Order: "This [Public Resources Code section 21080(b)(14)] does not exempt in-state project activities whose impacts are only felt out-of-state. For example, if a project dug a well inside California and the project's water consumption from the well caused an impact in another state but not in California, then that out-of-state impact must be analyzed under CEQA because the impact was generated in California." The PSA clearly states, in numerous locations, the planning documents that identify the mesquite habitats as a conservation priority (PSA p. 4.2-21, last paragraph of the subsection "Mesquite Woodlands and Mesquite Dune Scrub", also PSA p. 4.2-39-42; 143; 149). They are also referenced in the BLM comment letter from March 12, 2012 (BLM 2012a): "The local mesquite bosques, including Stump Spring ACEC, are located in both Nevada and California. These bosques are considered an important type of riparian habitat, getting their water from the shallow basin-fill aquifer. In 2006, the BLM developed a Conservation Management Strategy for Mesquite and Acacia Woodlands in Clark County, Nevada. This strategy identified the mesquite bosques located in the Pahrump Basin as a high priority area for conservation actions..." From the Summary of the Conservation Management Strategy (Crampton et al. 2006): "Mesquite and acacia woodlands are of significant biological importance, providing habitat to many wildlife species in southern Nevada, including several species covered under the Clark County Multiple Species Habitat Conservation Plan (MSHCP). A number of covered plant species also co-occur with these woodlands. The extent and condition of woodlands, however, is severely impacted by the diverse activities of a growing human population. In response, the development of a Mesquite-Acacia Conservation Management Strategy (eMS) was mandated in the MSCHP, with the goal of bringing the best available scientific information to bear on the protection and management of these woodlands and their associated species in Clark County.....In order for the CMS to satisfy the stated objectives ofthe MSCHP with regards to protecting covered species and their habitats, three Conservation Goals were developed: 1) To restore and maintain mesquite and acacia woodlands to the extent (area) they covered in year 2000 (inception of MSCHP), by protecting all woodlands on public land from habitat loss and acquiring (directly or with conservation partners and/or easements) as many woodlands as possible from private owners; 2) To restore and sustain mesquite and acacia woodlands in a healthy ecological condition (active recruitment of new plants, large trees with few stems, ability to support moderate mistletoe infection); 3) To maintain stable or increasing populations of mesquite- and acacia-dependent and associated species.
13.157		Make nomenclature updates for Hymenoclea.	Thank you; the language was revised in the FSA as suggested.
13.158		Revise summary language.	Edit accepted; the language was revised in the FSA as proposed.
13.159		Add text regarding invasive weed survey data.	Edit accepted; the language was revised in the PSA as proposed.

13.160		Clarify how the incremental effect of noxious weeds from this project was considered cumulatively considerable.	The PSA includes a 17-page analysis of cumulative impacts (PSA pp. 155-174). The cumulative impact analysis methods are discussed in three pages (PSA pp.155-157), and invasive weeds are discussed on pages 165-167 of the cumulative effects analysis.
13.161		Revise special status plants language.	The language was instead revised to reflect staff's analysis of the spring 2012 special-status plant survey results. The analysis concluded impacts were significant to four species (gravel milk-vetch; Wheeler's skeletonweed; Preuss' milk-vetch; Torrey's joint-fir), and that the impact could be mitigated offsite through acquisition and preservation, or restoration. Staff's analysis included an analysis of ownership and management threats and opportunities and the feasibility of offsite mitigation.
13.162		Delete compensation for special status plants.	Mitigation ratios are developed based on a combination of 1) the degree of rarity and extinction risk, as defined in the CNDDB (NatureServe) Element Rank, and 2) on agency policy and practice for species mitigation. Staff provided a clear, science-based justification for the mitigation of rare plants based on CNDDB Element Rank. Staff chose to use these ranks as a basis for the mitigation ratios because they are an index of a species' extinction risk, based on rarity, threats, and population trend based on a widely recognized methodology used by CNDDB and other natural heritage programs around the world (Master et al. 2009).
13.163		Revise discussion of halogeton infestations.	According to the California Department of Food and Agriculture (CDFA) website, halogeton is still an A-rated pest plant. The CDFA definition of the A rating: "A" = A pest of known economic or environmental detriment and is either not known to be established in California or it is present in a limited distribution that allows for the possibility of eradication or successful containment. A-rated pests are prohibited from entering the state because, by virtue of their rating, they have been placed on the of Plant Health and Pest Prevention Services Director's list of organisms "detrimental to agriculture" in accordance with the FAC Sections 5261 and 6461. The only exception is for organisms accompanied by an approved CDFA or USDA live organism permit for contained exhibit or research purposes. If found entering or established in the state, A-rated pests are subject to state (or commissioner when acting as a state agent) enforced action involving eradication, quarantine regulation, containment, rejection, or other holding action." Condition of Certification **BIO-18** (Weed Management Plan) requires plans include a "weed risk assessment based on Cal-IPC or Nature Conservancy criteria" (PSA pp. 4.2-215). BLM and CDFA have also created science-based, transparent, decision-making tools to help land managers prioritize weed populations for eradication. These ranking tools typically assess the relative impact, potential spread, and the cost and feasibility of eradication for each population; thus, the condition allows the project to systematically target weed infestations by putting their limited resources into populations known to cause the highest impacts and that are most feasible to eradicate.

13.164		Quality of habitat is affected by the presence of onsite weeds.	The presence of invasive weeds onsite is discussed throughout the PSA and FSA. However, the mere presence of weeds does not diminish the value of the habitat. Staff conducted a methodical field review of habitat quality and found that most areas still had good species diversity and were only lightly infested, or the ecological consequences still minor. The abundance and distribution of rare plants and native species diversity in the eastern half of the project is a testament to the habitat quality. The western portion of the project is more infested; however, there are still large areas where the native species diversity is largely unaffected and the habitat functional. Representative photos of the habitat quality in the western and eastern portions of the project area provided in **Biological Resources Figures 2 and 3**.
13.165		Noxious weeds exist both on and off the project site.	It is true that noxious weeds already occur offsite in the immediate vicinity of the project, particularly in disturbed areas and roadsides. However, staff is also concerned about the spread of weeds into the currently uninfested areas in the project vicinity; spread that can occur over many miles on contaminated vehicles and equipment. This concern was also expressed by the Inyo-Mono County Agricultural Commissioner (INYO 2012a).
13.166		Onsite noxious weed control is not possible.	Condition of Certification BIO-18 requires the project to manage weeds for "containment"; not eradication, which is infeasible in most cases, or would require heavy widespread use of herbicides. BIO-18 also guides the Plan to do a weed risk assessment to prioritize weed management activities on those species with the greatest ecological consequences or feasibility for containment. Small infestations of highly invasive weeds, however, can and should be eradicated.
13.167		Revise discussion of habitat degradation.	See comment 13.164.
13.168		Control of noxious weeds offsite is not feasible.	**BIO-18** does not require the project to control weeds offsite.
13.169		Special status plants within the project boundaries will not be avoided.	Onsite avoidance is not specified in either BIO-19 (Special-status Plant Avoidance and Minimization) or **BIO-20** (Special-status Plant Compensatory Mitigation). **BIO-18** (Weed Management Plan) specifies that invasive weeds onsite that occur in close proximity to the nine occurrences of rare plants just off the project boundary should be a management priority.
13.170		Revise discussion of noxious weeds and where they've been identified to exist.	The descriptions of these two species on PSA page 4.2-22-23 clearly state the two additional species of concern to the Inyo/Mono Counties Agricultural Commissioner were not found onsite; however, the FSA to revised to include the suggested subheading.

13.171		Revise sentence regarding Torrey's joint-fir.	This comment includes suggested additions/revisions to the special-status plant sections based on the results of the spring 2012 surveys. While staff has not yet received a final special-status plant report, the applicant has submitted the field data forms, GIS shape files, and displayed the data for staff on various GIS layers during two recent meetings, and answered questions regarding field methods, to facilitate staff's analysis of impacts. Staff accepts the proposed edit based on this evaluation of the raw data. CNDDB has updated the Element Rank (NatureServe rank) for all 11 species based on the spring 2012 data.
13.172		Eleven special status plant species occur on the project site.	Staff revised the reference to the total number of special-status species from 10 to 11 based on the applicant's recent confirmation of an eleventh species – Torrey's joint-fir. The reference to eight species in on PSA page 4.2-134 and is a correct reference to the total number of species with a CRPR 2 rank. No references to "nine species" were found.
13.173		Natureserve plant rankings may change as data is collected.	Staff coordinated with CNDDB to update the Element Rank (NatureServe rank) upon receipt of the applicant's 2012 survey in July-August to ensure the ranks used in the analysis and mitigation were current and reflect all new survey data. The new ranks are show in Biological Resources Table 3 and 15, and in all subsequent references to the ranks.
13.174		Revise discussion of special status plant impacts.	Edit accepted; the language was revised in the FSA.
13.175		Remove references to a mitigation ratio within the FSA.	The PSA stated in numerous locations that the special-status plant analysis was ongoing, that the PSA analysis was preliminary and would be revised upon receipt of the spring 2012 survey results. The FSA reflects new data from the spring surveys. Compensatory mitigation will be required for four species. See response to comment 13.162 regarding justification and precedent for the mitigation ratios.
13.176		Revise date that applicant performed reconnaissance-level surveys.	Edit accepted; the language in the PSA was revised accordingly.
13.177		Confirm Natureserve status codes for shadscale scrub.	CNDDB was not asked to update this status code because mitigation for shadscale scrub is based on the loss of habitat for the state and federal listed desert tortoise; not because of its CNDDB rank.
13.178		Add the status code for Torrey's joint-fir.	Edit accepted; the language in the PSA was revised to reflect the new spring 2012 data.
13.179		Use California Rare Plant Rank as opposed to the California Native Plant Society rankings.	Staff chose to use the old name ("CNPS List") in the PSA because the CRPR rank is quite new and unfamiliar to most readers. However, the new name "CRPR Rank" has been added to the FSA and the name change explained in the analysis.
13.180		Revise dates of special status plant surveys.	Edit accepted; the language in the PSA was revised to reflect the new spring 2012 data.

13.181		Revise text regarding performance of special status plant surveys.	Edit accepted; the language in the PSA was revised to reflect the new spring 2012 information on survey methods.
13.182		Add language regarding the description of Androstephium.	Edit accepted; the language in the PSA was revised to reflect the new spring 2012 information on survey methods.
13.183		Add language regarding Androstephium survey results.	Edit accepted; the language in the PSA was revised to reflect the new spring 2012 information on survey methods.
13.184		Revise the discussion of the Nye milkvetch.	Edit accepted; the language in the PSA was revised to reflect the new spring 2012 data and the applicant's conversation with the Nevada Natural Heritage Program (the CNDDB equivalent in Nevada).
13.185		Add language regarding Preuss' milkvetch.	Edit accepted; the language in the PSA was revised to reflect the new spring 2012 information on survey methods.
13.186		Add language regarding gravel milkvetch.	Edit accepted; the language in the PSA was revised to reflect the new spring 2012 information on survey methods.
13.187		Add language to description of Tidestrom's milkvetch.	Edit accepted; the language in the PSA was revised to reflect the new spring 2012 information on survey methods.
13.188		Revise discussion of Wheeler's skeletonweed.	Edit accepted; the language in the PSA was revised to reflect the new spring 2012 information on survey methods.
13.189		Revise discussion of Wheeler's skeletonweed.	Edit accepted; the language in the PSA was revised to reflect the new spring 2012 information on survey methods.
13.190		Add language regarding purple-nerve spring parsley.	Edit accepted; the language in the PSA was revised to reflect the new spring 2012 information on survey methods.
13.191		Discussion of Pahrump Valley buckwheat appears to be missing text.	Edit accepted; thank you for bringing this to our attention. The language in the PSA was also revised to reflect the new spring 2012 data.
13.192		Add language regarding the Pahrump valley buckwheat.	Edit accepted; the language in the PSA was revised to reflect the new spring 2012 data.
13.193		Add language regarding the Pahrump valley buckwheat.	Edit accepted; the language in the PSA was revised to reflect the new spring 2012 data.
13.194		Add discussion of surveys for Selinocarpus.	Edit accepted; the language in the PSA was revised to reflect the new spring 2012 data.
13.195		Update nomenclature for Selinocarpus.	Edit accepted; the language in the PSA was revised to reflect the new spring 2012 data.
13.196		Revise discussion of ephedra species identified onsite.	Edit accepted; the language in the PSA was revised to reflect the new spring 2012 data.

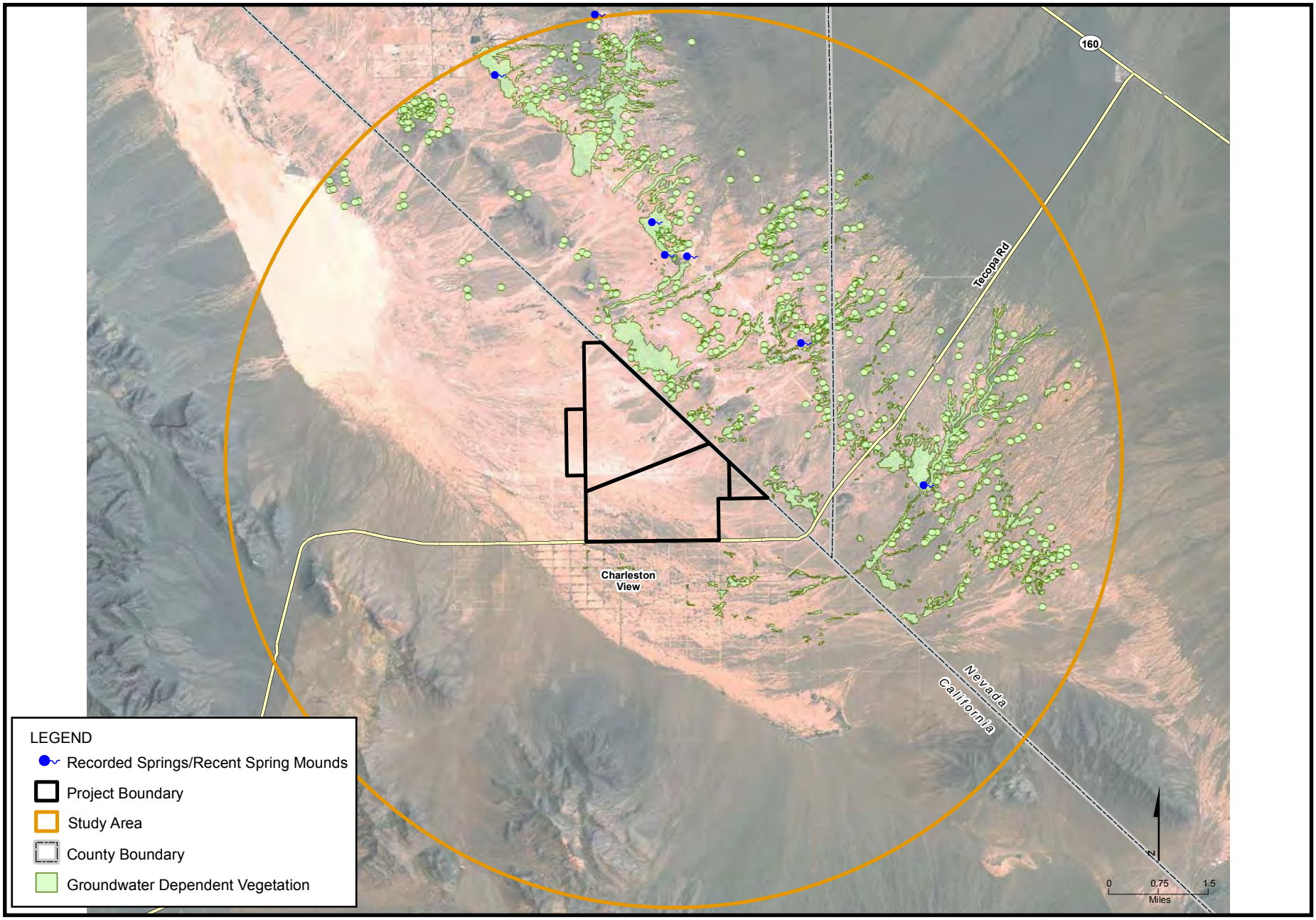
13.197		Update discussion of ephedra with 2012 survey data.	Edit accepted; the language in the PSA was revised to reflect the new spring 2012 data.
13.198		Revise discussion to reflect that 11 special status plant species have been found onsite.	Edit accepted; the language in the PSA was revised to reflect the new spring 2012 data.
13.199		Clarify what is a substantial loss of plant occurrences.	The question is answered quantitatively in Biological Resources Table 15, and in narrative under "Direct Impacts". The project would eliminate between 18 percent and 50 percent of all the known occurrences in California of four of the 11 special-status plant species that occur onsite. The PSA was clear that the analysis was preliminary, pending the results of spring 2012 surveys (PSA p. 4.2-9; 130; 137) and that the final analysis would consider a range of factors, not just rarity (PSA p. 4.2-137-138). The final analysis in the FSA reflects the results of the spring 2012 offsite surveys.
13.20		Clarify what is a significant impact for plant species.	See the comment above and the discussion of significance under "Conclusions and Discussion of Special-status Plant Mitigation".
13.201		BIO-20 is infeasible.	The comment is referring only to the metric for establishing mitigation security in **BIO-20** (Special-status Plant Compensatory Mitigation"). The compensatory mitigation ratios are clearly stated in the condition, and are based on the CNDDB Element Rank (Nature Serve rank), an index of extinction risk based on a nationally accepted methodology. **BIO-20** requires acquisition and preservation of 3 offsite occurrences for every S1-ranked species affected, and 2 offsite occurrences for every S2-rank species. This is entirely feasible, based on a GIS analysis of ownership and management opportunities. **BIO-20** also includes an option for mitigation through restoration of at-risk occurrences (occurrences threatened by, e.g., ORV, noxious weeds, etc.). The guidelines for establishing mitigation security in **BIO-20** were revised in the FSA; the estimated acquisition costs and amount of the security shall be calculated based on the estimated cost per acre for Desert Tortoise mitigation as a best available proxy.

13.202		Compensatory mitigation is not reflective of LORS.	See the comment above for simplifying the method for establishing mitigation security. The mitigation ratios are simple and straightforward (see discussion above under comment 13.201). The significance of the impacts are not based on LORS; CEQA requires a "mandatory finding of significance" for special-status species that meet CEQA's definition of "rare" or "endangered," regardless of their formal listing status under the NPPA, CESA or any other law:"When any of the following conditions occur the lead agency shall find that a project may have a significant effect on the environment which will require a Mandatory Finding of Significance. Such a finding shall require an EIR to be prepared (CEQA Guidelines Section 15065)...When a project has the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of an endangered, rare or threatened species." Staff's conclusion that the significantly affected CRPR Rank 2 (CNPS List 2) species may meet the criteria for state listing is shared by CDFG . In the CDFG Special Plants List (CNDDB 2012b) "Taxa which meet the criteria for listing, even if not currently included on any list, as described in Section 15380 of the California Environmental Quality Act (CEQA) Guidelines; these taxa may indicate "None" under listing status, but note that all CNPS 1 and 2 and some List 3 and 4 (now known as California Rare Plant Ranks 1A, 1B, 2, 3, and 4) plants may fall under Section 15380 of CEQA."
13.203		Securities held for the project should include both land acquisition and land management costs.	The guidelines for establishing mitigation security in BIO-20 were simplified in the FSA based on the discussion at the July 2, 2012 workshop. Tthe estimated acquisition costs and amount of the security shall be calculated based on the estimated cost per acre for Desert Tortoise mitigation as a best available proxy.
13.204		Plants ranked S1 should not be mitigated at 3:1.	**BIO-20** requires the offsite preservation of 3 occurrences for every S1-rank species affected. This mitigation ratio is justified given that S1-rank species are "critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province." It's also entirely feasible, based on a GIS analysis of ownership and management threats and opportunities. **BIO-20** also includes an option for mitigating through restoration of occurrences that are threatened by unauthorized off-road vehicles, noxious weeds, or other factors. A 1:1 ratio still results in a net loss of an occurrence, thus impacts to such rare species must be mitigated at higher ratios to truly offset the impact. A similar condition was adopted for three Energy Commission-licensed projects (Palen, Blythe, and Genesis). CDFG, in practice, requires 3:1 mitigation for permament impacts to washes, and 1:1 for temporary.

BIOLOGICAL RESOURCES - FIGURE 1

Hidden Hills Solar Electric Generating System (HHSEGS) - Groundwater-dependent Vegetation in the Project Vicinity

* Mesquite-dominant groundwater-dependent habitats within the cone of depression of the project pumping wells identified by the applicant. Photos of the mesquite and springs provided in Biological Resources Figure 2a.



BIOLOGICAL RESOURCES

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SOURCE:CH2M Hill, Data Response Set 1A

BIOLOGICAL RESOURCES - FIGURE 2a

Hidden Hills Solar Electric Generating System (HHSEGS) - Groundwater-dependent Resources in the Project Vicinity*

*The resources shown below occur within the cone of depression identified by staff for the project pumping wells (see the Water Supply section of the FSA)

#1 – Mesquite canyon approximately 1.75 miles east of the project boundary near the airport; characteristic of the larger "mesquite washes". No evidence of surface water within the last 10 years or longer; the vegetation appears to be dependent wholly on groundwater. The mesquite range from approximately 6 to 15 feet in height, and many with a trunk diameter of 8 inches or larger, sufficient for cavity-nesting special-status birds. Similar groundwater-dependent habitat on washes near the firearms training center and throughout the Stump Springs area; the ephemeral hydrology of the washes is insufficient to support the mesquite – an "obligate phreatophyte" (groundwater-dependent).

#2 – Representative photo of the mesquite coppice dunes just east of the project (between 600 and 2600 feet east of the project boundary). The mesquite on coppice dunes are typically shorter in stature than the mesquite in washes, and associated with four-wing saltbush (Atriplex canescens), a facultative "phreatophyte" (groundwater-dependent plant). The coppice dunes are arranged linearly along the state line fault, and are supported wholly by groundwater (no washes or other surface water present). Honey mesquite (Prosopis glandulosa) is considered an obligate phreatophyte in California and southern Nevada (Sawyer et al. 2009; Crampton et al. 2006).

SOURCE: CEC Staff and BLM (Boris Poff, Southern Nevada District) photos

BIOLOGICAL RESOURCES - FIGURE 2b

Hidden Hills Solar Electric Generating System (HHSEGS) - Two seasonal spring-supported pools at Stump Springs ACEC. BLM reports that the pools are present from approximately December to June or July.

SOURCE: CEC Staff and BLM (Boris Poff, Southern Nevada District) photos

BIOLOGICAL RESOURCES - FIGURE 2c

Hidden Hills Solar Electric Generating System (HHSEGS) - Groundwater-dependent Resources in the Project Vicinity*

*The resources shown below occur within the cone of depression identified by staff for the project pumping wells (see the Water Supply section of the FSA)

Active seep-spring, and groundwater-supported riparian vegetation just south of the Front Sight Firearms Training Center, approximately 1.5 miles east of the project. Surface water present.

Another active spring and wetland located west of Cottonwood Spring. Not currently in the BLM spring database.

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SOURCE: CEC Staff and BLM (Boris Poff, Southern Nevada District) photos

BIOLOGICAL RESOURCES - FIGURE 2d

Hidden Hills Solar Electric Generating System (HHSEGS) - Groundwater-dependent Resources in the Project Vicinity*

*The resources shown below occur within the cone of depression identified by staff for the project pumping wells (see the Water Supply section of the FSA)

Both photos: Healthy mesquite stand with many age classes, located approximately 3.5 miles northeast of the project boundary.

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SOURCE: CEC Staff and BLM (Boris Poff, Southern Nevada District) photos

BIOLOGICAL RESOURCES - FIGURE 2e

Hidden Hills Solar Electric Generating System (HHSEGS) - Lush mesquite coppice dune vegetation at Stump Springs Area of Critical Environmental Concern (ACEC) south of Tecopa Highway. Photo from applicant's data response #1A, Figure 49-1.

Relatively lush mesquite coppice dune vegetation south of the Tecopa Highway.

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SOURCE: CEC Staff and BLM (Boris Poff, Southern Nevada District) photos

BIOLOGICAL RESOURCES - FIGURE 3a

Hidden Hills Solar Electric Generating System (HHSEGS) - Characteristic Stream Forms on the Project Site

One of the larger features, a jurisdictional state waters and waters of the U.S., photographed at the eastern project boundary. A few widely scattered mesquite. At the eastern boundary, where there is a greater slope gradient, the washes are generally more incised and the channel forms are more or less single thread, as in this photo. The single-thread forms generally lack a true floodplain, unlike the “braid plain”.

The terminus of the washes, i.e., where the washes are less defined, were noticeably wetter than the upper single-thread reaches following a 0.2 inch storm event, and the changes in species composition along the washes more distinct. Germination of annuals like rattlesnake weed (Chamaesyce albomarginata) – a native favored by desert tortoise – was abundant in the lower, wetter reaches following an August summer storm event.

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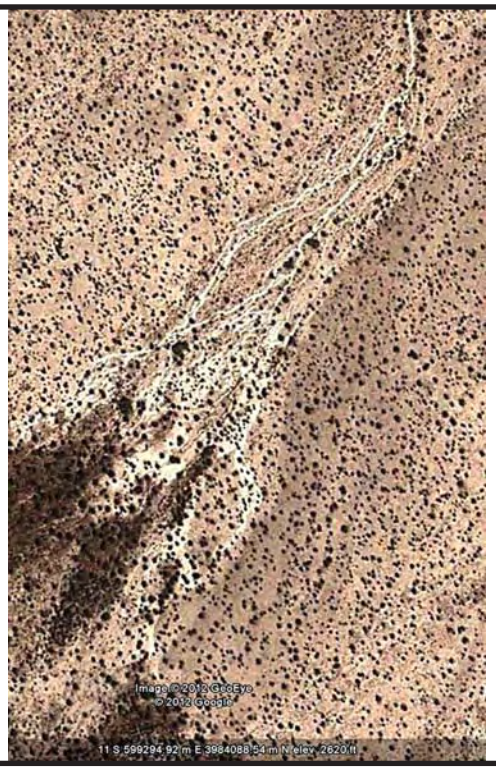
SOURCE: CEC Staff Photos

BIOLOGICAL RESOURCES - FIGURE 3b

Hidden Hills Solar Electric Generating System (HHSEGS) - Characteristic Stream Forms on the Project Site

One of the features delineated as a non-jurisdictional "pooled area" at the terminus of a wash, inundated for a day following a 0.2 in. storm event. The feature in the photo is one of multiple small channels across a larger "braid plain", or floodplain of multiple small braided channels. It is the most common channel form on the project site, and characteristic of alluvial fan distributary networks.

An aerial photo of the watercourse described above, and a signature characteristic of alluvial fan distributary channel networks



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SOURCE: CEC Staff Photos and Google Earth Imagery

BIOLOGICAL RESOURCES - FIGURE 3c

Hidden Hills Solar Electric Generating System (HHSEGS) - Characteristic Stream Forms on the Project Site

Distributary channel characteristic of the smallest features; this feature one of several small channels across a larger braid plain. Unlike their temperate-region counterparts where streams typically decrease in number as they converge toward a single, larger channel, these distributary channels diverge from the single-thread source at the apex of the fan, and increase in number but decrease in size toward the toe of the fan, due to diversion of flow (avulsion) by channel blockages of sediment and debris deposited during previous flow events.

Another single thread channel form delineated near the eastern project boundary. Bunchgrasses like galleta grass (Pleuraphis rigida) and alkali sacaton (Sporobolus airoides) are often more abundant in the washes, as in this photo.

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SOURCE: CEC Staff Photos

BIOLOGICAL RESOURCES - FIGURE 4a

Hidden Hills Solar Electric Generating System (HHSEGS) - Desert Tortoise Habitat Mapping Field Verification

Photo and data point locations depicted in Biological Resources Figure 5

#1 - Creosote bush scrub; taken at applicant's demarcation between the Mojave desert scrub (creosote scrub) and Shadscale scrub but no apparent shift in type on the ground; creosote bush scrub in all directions. Away from the road edge, disturbance and weeds light.

#2 - Start of shadscale scrub to west (left) of disturbed area. Beyond the graded area disturbance light to moderate, weeds light.

#2 (east of point) - Creosote bush scrub to east of the graded area. Beyond the grading, the habitat is lightly disturbed and recovering.

#3 - Creosote bush scrub; shadscale present but not dominant, patchy disturbance near road edge, weeds moderate to heavy (>5% cover)

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SOURCE: CEC Staff Photos

BIOLOGICAL RESOURCES - FIGURE 4b

Hidden Hills Solar Electric Generating System (HHSEGS) - Desert Tortoise Habitat Mapping Field Verification

Photo and data point locations depicted in Biological Resources Figure 5

#4 - Creosote bush scrub; disturbance patchy, weeds associated largely with disturbed patches.

#5 - Creosote bush scrub to east and west; heavily disturbed, heavy weed component (10-15%)

#6 (no photo) #7 - Creosote bush scrub (beyond the road edge); diverse shrub layer, off road, disturbance is light, weeds moderate to heavy (7-10% cover) in patches in disturbed areas and concentrated in low-lying (moist) areas. Good to excellent habitat for all tortoise life-stages.

#8 - Creosote bush scrub (beyond the road edge); diverse shrub and herb layer, disturbance light with a moderate (7%) component of weeds (red brome), heavy weed cover (10-15%) of halogeton on the desert pavement.

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SOURCE: CEC Staff Photos

BIOLOGICAL RESOURCES - FIGURE 4c

Hidden Hills Solar Electric Generating System (HHSEGS) - Desert Tortoise Habitat Mapping Field Verification

Photo and data point locations depicted in Biological Resources Figure 5

#8 (west of point) - Creosote bush scrub; diverse shrub and herb layer, lightly disturbed with moderate weed componen of halogeton mostly on the desert pavement.

#9 (no photo)- #10 - Desert pavement and disturbed area with heavy component of halogeton (15-20%) and little natural vegetation (background of photo) interspersed with patches of intact and diverse shadscale scrub (shadscale-rabbit thorn with <2% creosote) in foreground.

#11 - Shadscale scrub; close-up of the shadscale-rabbit thorn ssociation described above (rabbit thorn dominant; not shadscale).

#12 - Creosote bush scrub (beyond the road edge); interspersed with pavement, lightly to moderately disturbed, moderately weedy but good diversity in shrub layer.

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SOURCE: CEC Staff Photos

BIOLOGICAL RESOURCES - FIGURE 4d

Hidden Hills Solar Electric Generating System (HHSEGS) - Desert Tortoise Habitat Mapping Field Verification

Photo and data point locations depicted in Biological Resources Figure 5

#13 - Shadscale scrub (to west, creosote bush scrub to east); diverse shrub and herb layer in both habitats, weed component light (3%).

#14 (no photo) - #15 - Shadscale scrub (all directions); heavy component of halogeton (10-15%) near roads but good shrub diversity and well-developed bio crust between shrubs beyond disturbed areas.

#16 - Shadscale scrub to west, cresosote bush scrub to east; disturbance and weeds light (<2%), good shrub diversity.

#17 (no photo; Creosote bush scrub of high quality with 10-15% cover of bio crust and only trace element of weeds) - #18 - Creosote bush scrub to east, shadscale scrub to west; light disturbance, moderately weedy (5%) with Russian thistle.

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SOURCE: CEC Staff Photos

BIOLOGICAL RESOURCES - FIGURE 4e

Hidden Hills Solar Electric Generating System (HHSEGS) - Desert Tortoise Habitat Mapping Field Verification

Photo and data point locations depicted in Biological Resources Figure 5

#19 - Creosote bush scrub to east (in photo), shadscale scrub to west; lightly disturbed but heavy component of Russian thistle (10-15%)

#20 (no photo; badger burrow) - #21 - Creosote bush scrub; nearly pristine, gravelly soils but low shrub species diversity relative to many other areas. Weeds nearly absent so may have a good component of native annuals in spring.

#22 - Highly disturbed; apparently disked historically with little native vegetation and heavy component of Russian thistle and halogeton

#23 - Shadscale scrub; undisturbed abd high quality, high shrub diversity, no (or trace) component of weeds.

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SOURCE: CEC Staff Photos

BIOLOGICAL RESOURCES - FIGURE 4f

Hidden Hills Solar Electric Generating System (HHSEGS) - Desert Tortoise Habitat Mapping Field Verification

Photo and data point locations depicted in Biological Resources Figure 5

#24 - Creosote bush scrub to west and east; lightly to moderately disturbed, moderately weedy.

#25 - creosote bush scrub in all directions; lightly disturbed, light to moderate weed component (3%).

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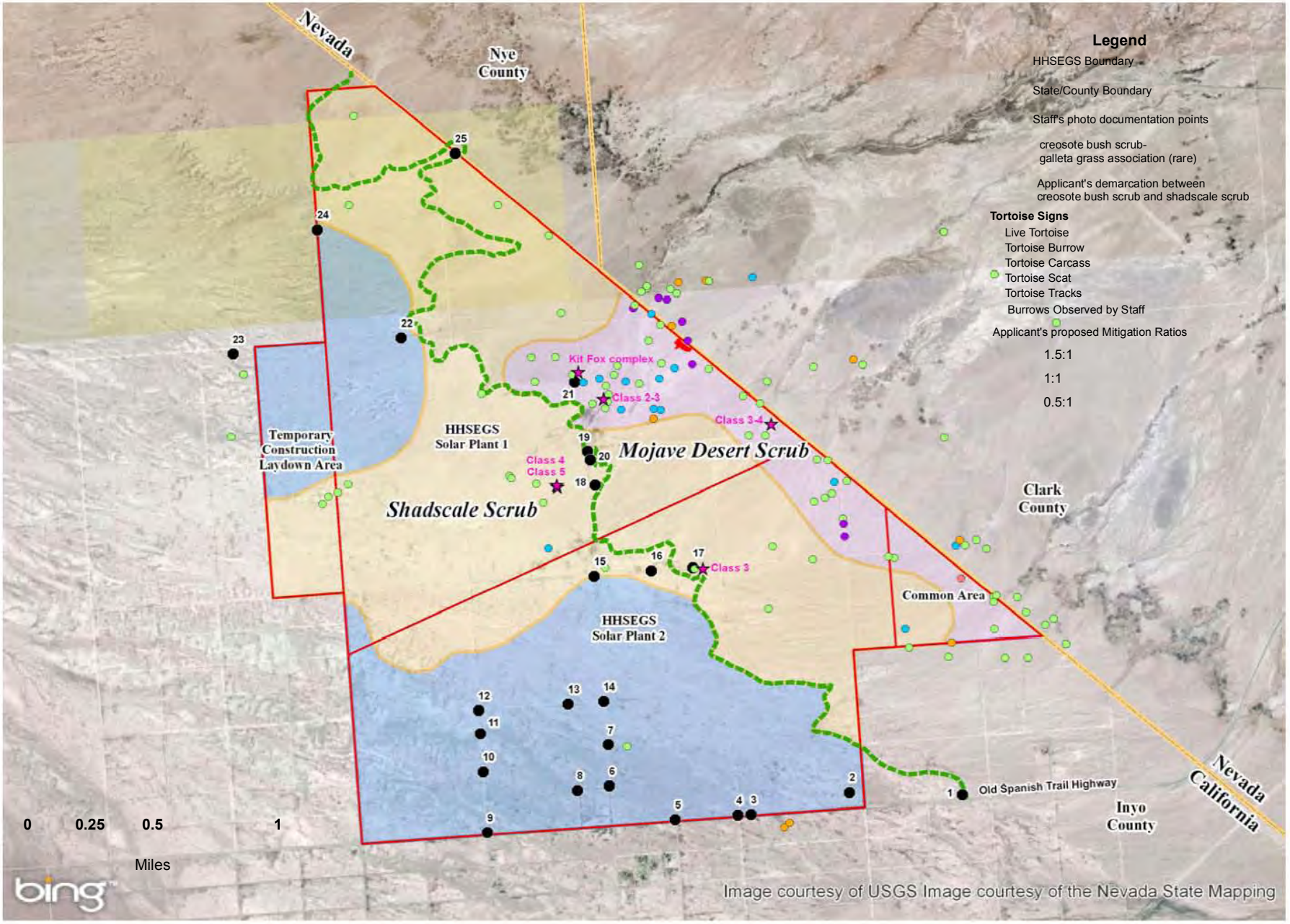
SOURCE: CEC Staff Photos

BIOLOGICAL RESOURCES - FIGURE 5

Hidden Hills Solar Electric Generating System (HHSEGS) - Desert Tortoise Habitat Mapping Verification



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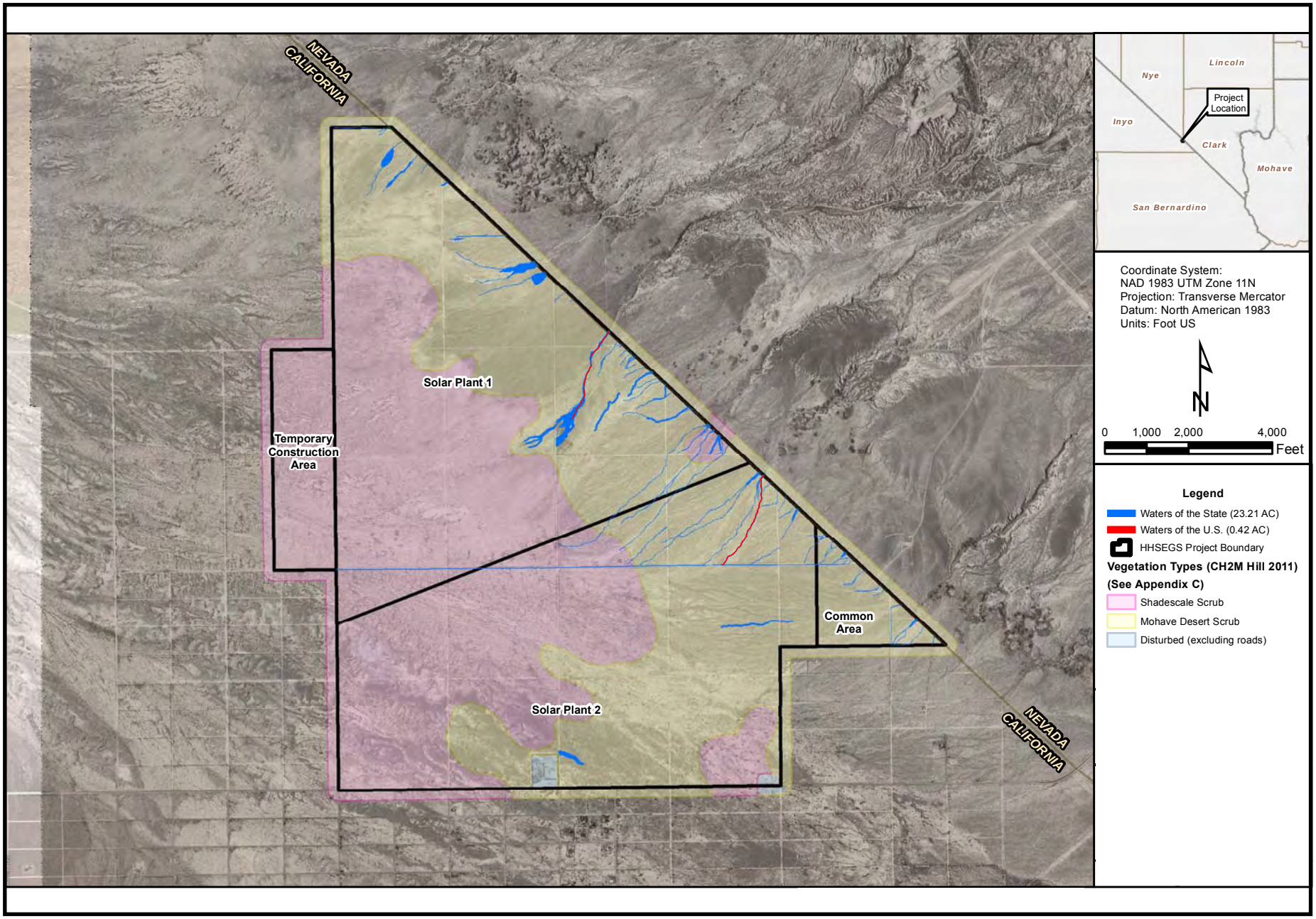
SOURCE: CH2M HILL, CEC Staff

BIOLOGICAL RESOURCES - FIGURE 6

Hidden Hills Solar Electric Generating System (HHSEGS) - Revised Delineation of Waters of the State



BIOLOGICAL RESOURCES

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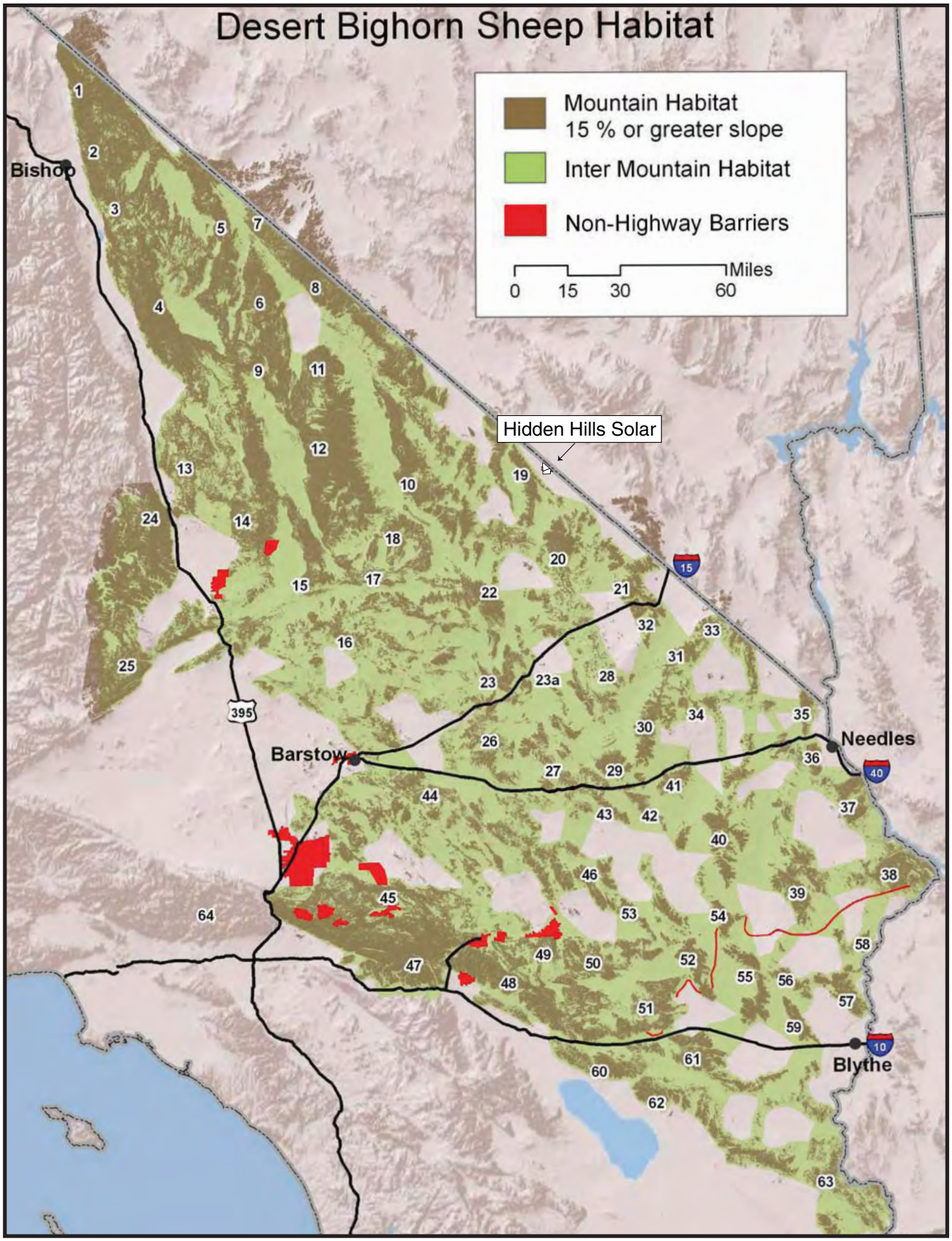
SOURCE: M.J. Klinefelter GIS & Environmental Consulting

BIOLOGICAL RESOURCES - FIGURE 7

Hidden Hills Solar Electric Generating System (HHSEGS) - Desert Bighorn Sheep Habitat in California



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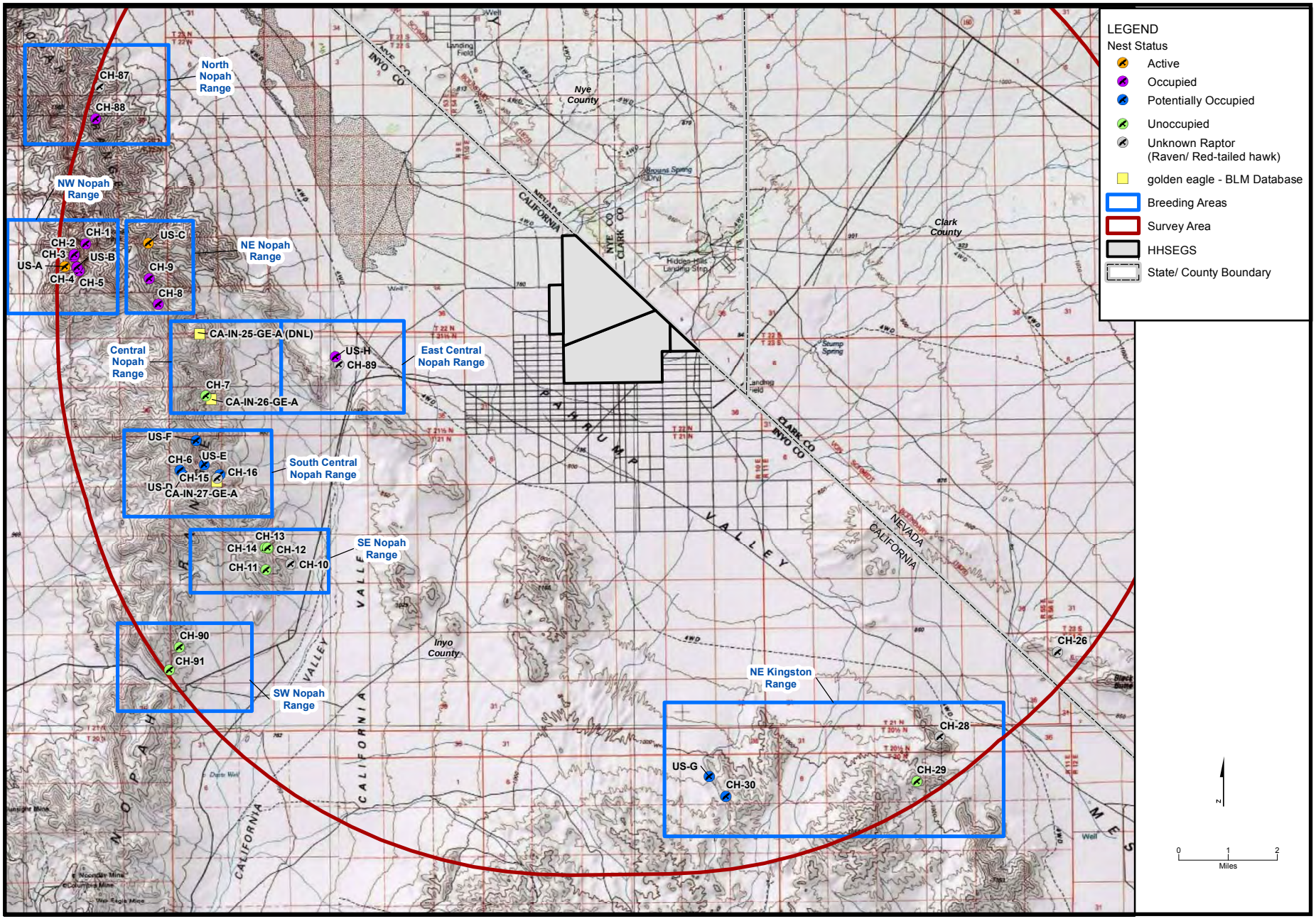
SOURCE: CA DFG

BIOLOGICAL RESOURCES - FIGURE 8

Hidden Hills Solar Electric Generating System (HHSEGS) - Golden Eagle Observations in the Project Vicinity



BIOLOGICAL RESOURCES

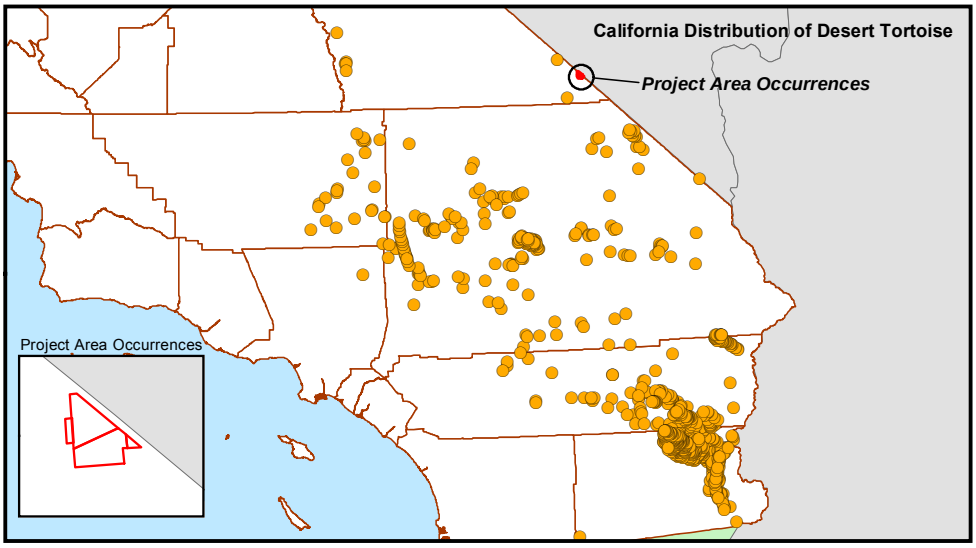
CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: DR52.3-1

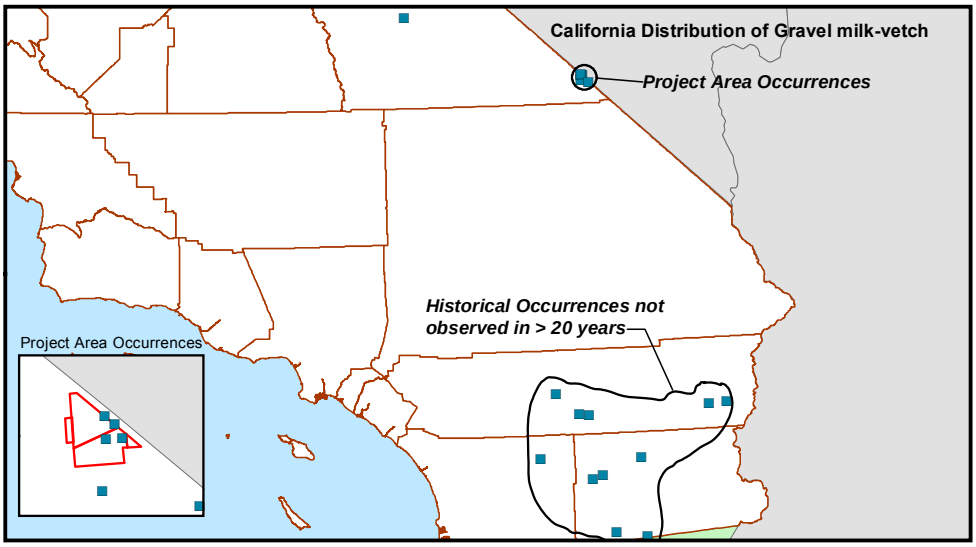
BIOLOGICAL RESOURCES FIGURE 9a

Hidden Hills Solar Generating System (HHSEGS) - California Range of Special-status Plants* Impacted by the Project

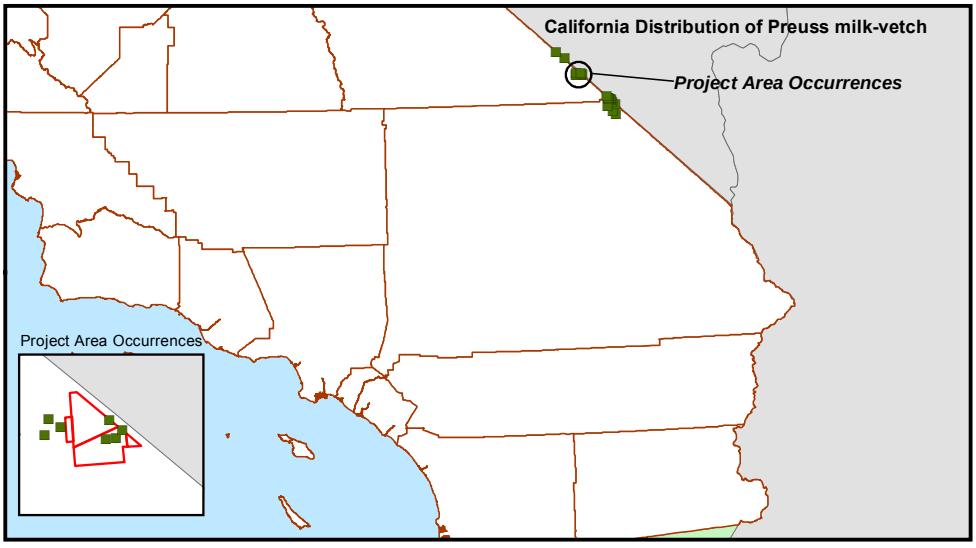
* State range maps are also provided for Desert Tortoise and Mohave Ground Squirrel to demonstrate the narrow range of the affected rare plant species relative to two listed wildlife species



Desert tortoise (*Gopherus agassazii*) – Federal Threatened, State Threatened



Gravel milk-vetch (*Astragalus sabulonum*) – CRPR 2; CNDDB S2



Preuss' milk-vetch (*Astragalus preussii var. preussii*) – CRPR 2; CNDDB S1

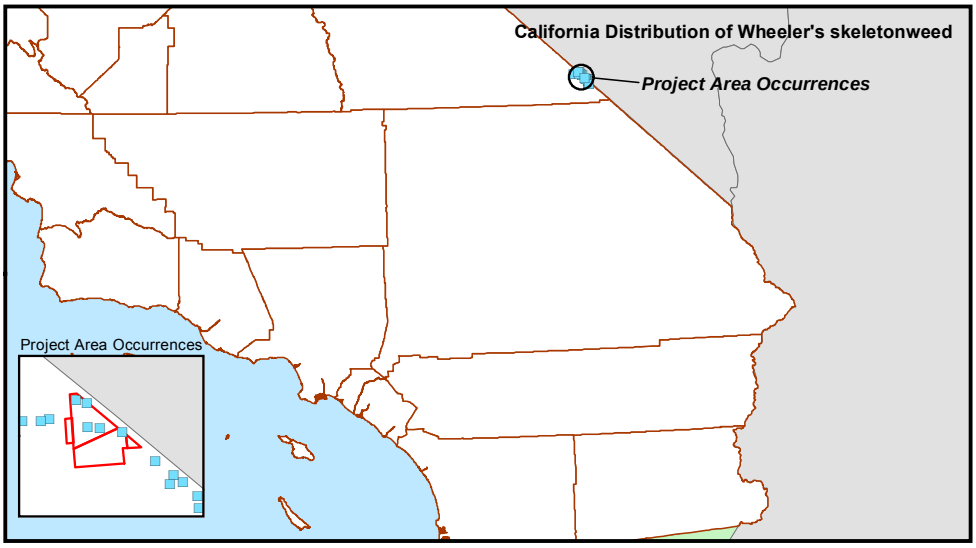
CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CNDDB, 9-4-2012 and CH2MHILL

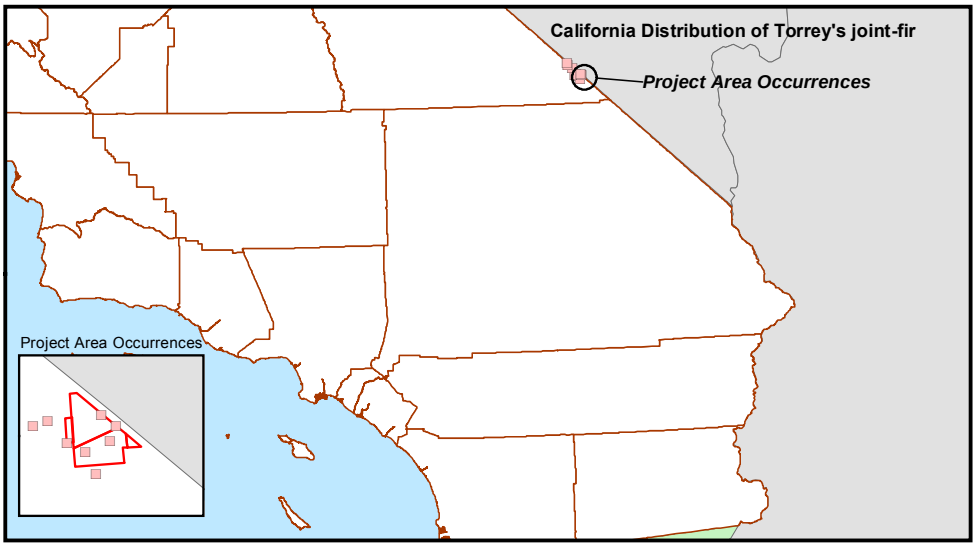
BIOLOGICAL RESOURCES FIGURE 9b

Hidden Hills Solar Generating System (HHSEGS) - California Range of Special-status Plants* Impacted by the Project

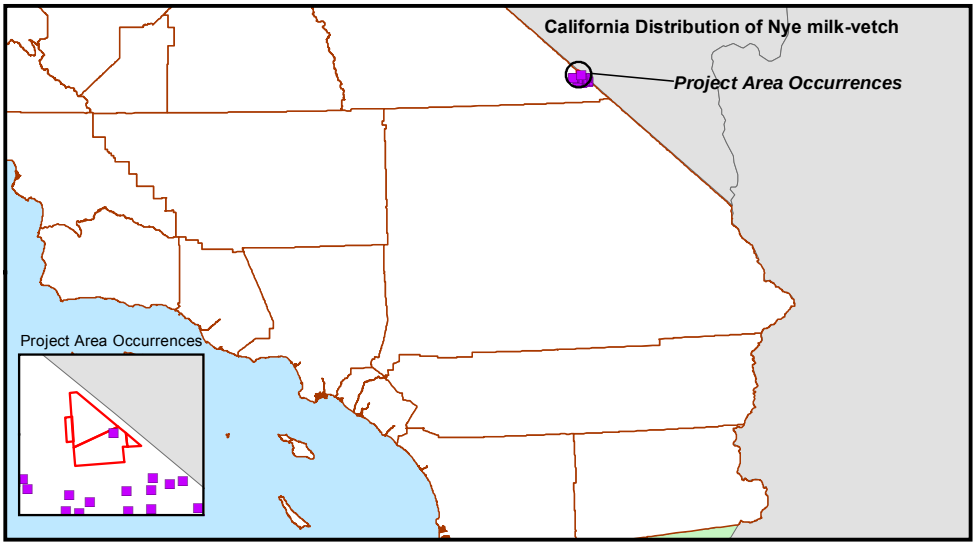
* State range maps are also provided for Desert Tortoise and Mohave Ground Squirrel to demonstrate the narrow range of the affected rare plant species relative to two listed wildlife species.



Wheeler's skeletonweed (*Chaetadelpha wheeleri*) – CRPR 2; CNDDB S1/S2



Torrey's joint-fir (*Ephedra torreyana*) – CRPR 2; CNDDB S1



Nye milk-vetch (*Astragalus nyensis*) – CRPR 1B; CNDDB S1

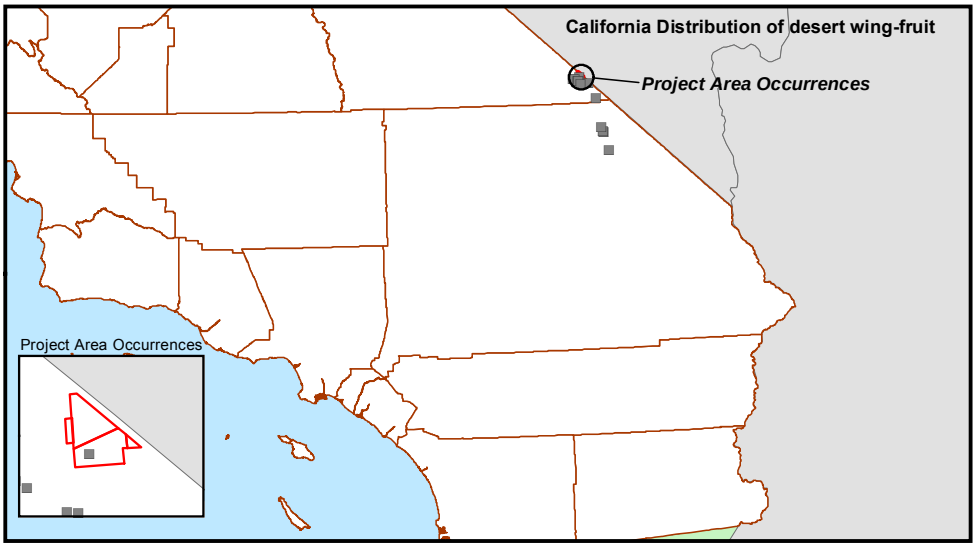
CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CNDDB, 9-4-2012 and CH2MHILL

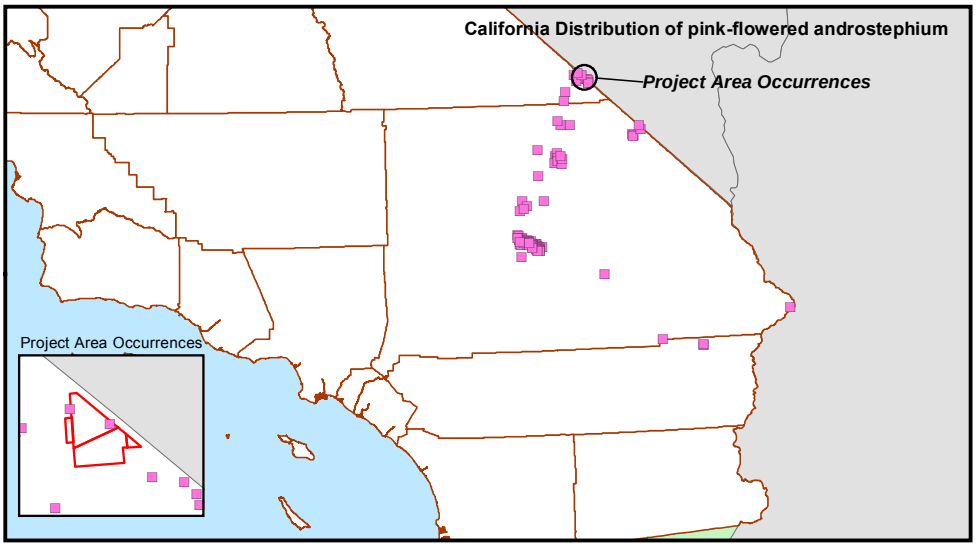
BIOLOGICAL RESOURCES FIGURE 9c

Hidden Hills Solar Generating System (HHSEGS) - California Range of Special-status Plants* Impacted by the Project

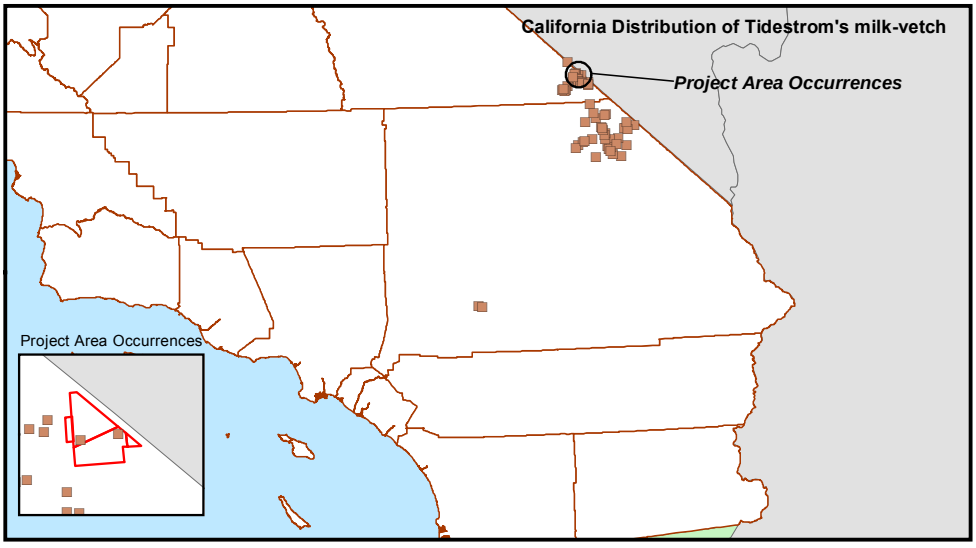
* State range maps are also provided for Desert Tortoise and Mohave Ground Squirrel to demonstrate the narrow range of the affected rare plant species relative to two listed wildlife species



desert wing-fruit (*Acleisanthes nevadadensis*) (syn=*Selinocarpus nevadensis*) – CRPR 2; CNDDB S1



pink-flowered androstephium (*Androstephium breviflorum*) – CRPR 2; CNDDB S3



Tidestrom's milk-vetch (*Astragalus tidestromii*) – CRPR 2; CNDDB S2

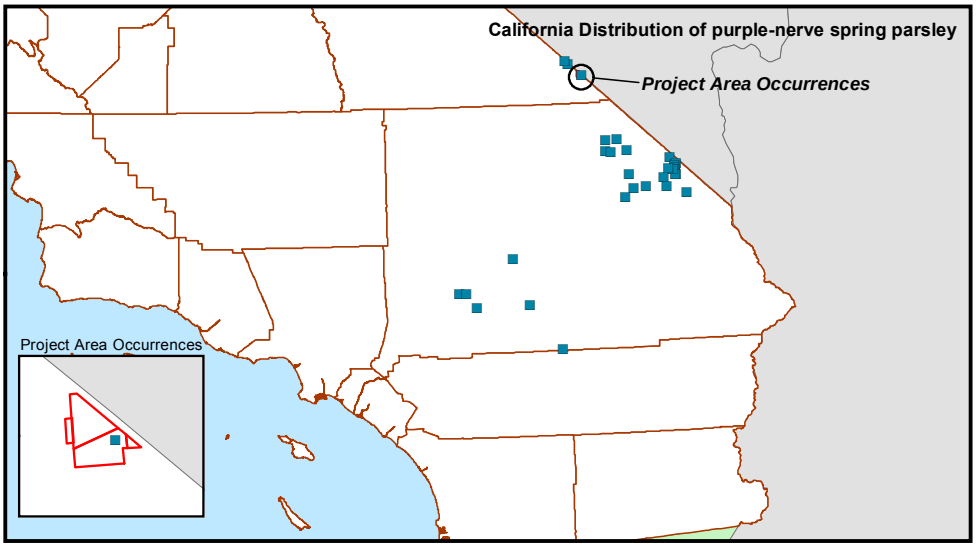
CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CNDDB, 9-4-2012 and CH2MHILL

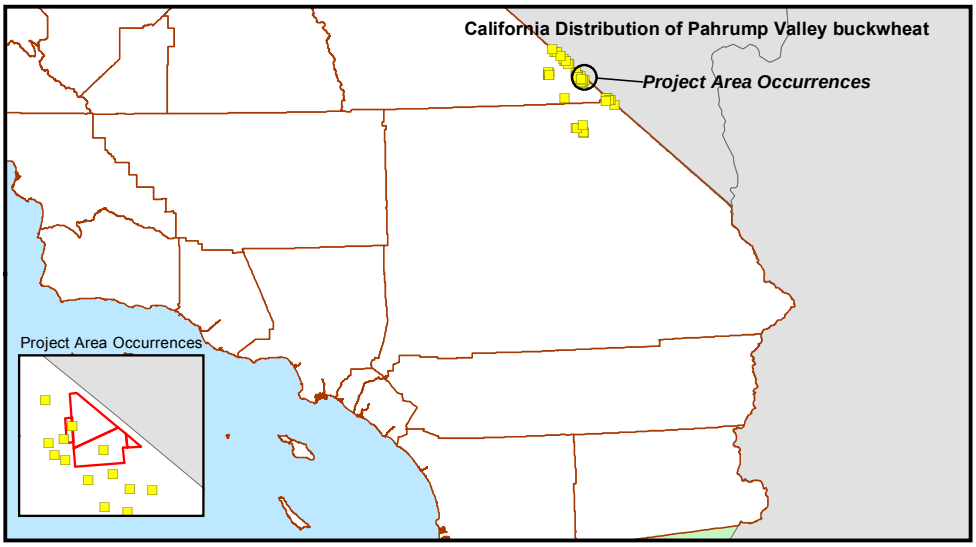
BIOLOGICAL RESOURCES FIGURE 9d

Hidden Hills Solar Generating System (HHSEGS) - California Range of Special-status Plants* Impacted by the Project

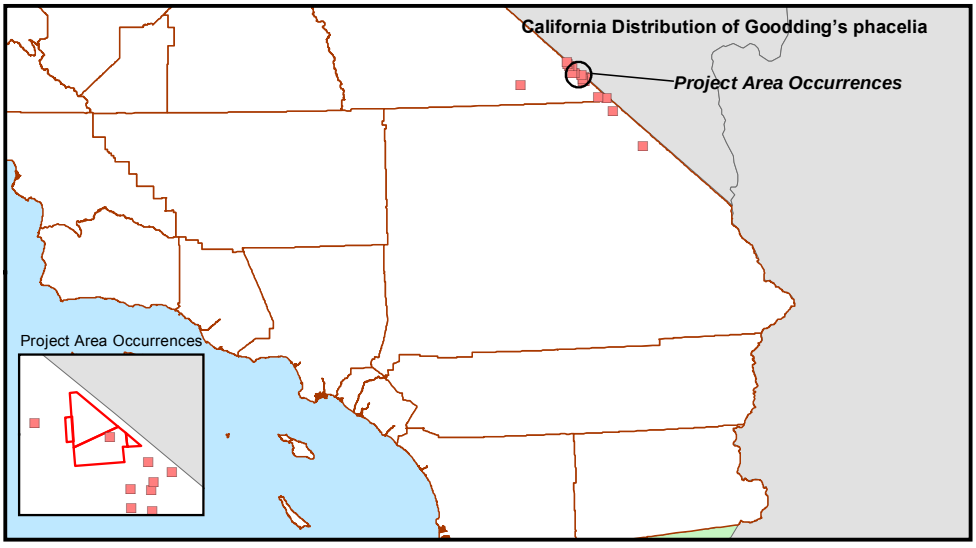
* State range maps are also provided for Desert Tortoise and Mohave Ground Squirrel to demonstrate the narrow range of the affected rare plant species relative to two listed wildlife species



purple-nerve spring parsley (*Cymopterus multinervatus*) – CRPR 2; CNDDB S2



Pahrump Valley buckwheat (*Eriogonum bifurcatum*) – CRPR 1B; CNDDB S3



Goodding's phacelia (*Phacelia pulchella var. gooddingii*) – CRPR 2; CNDDB S2

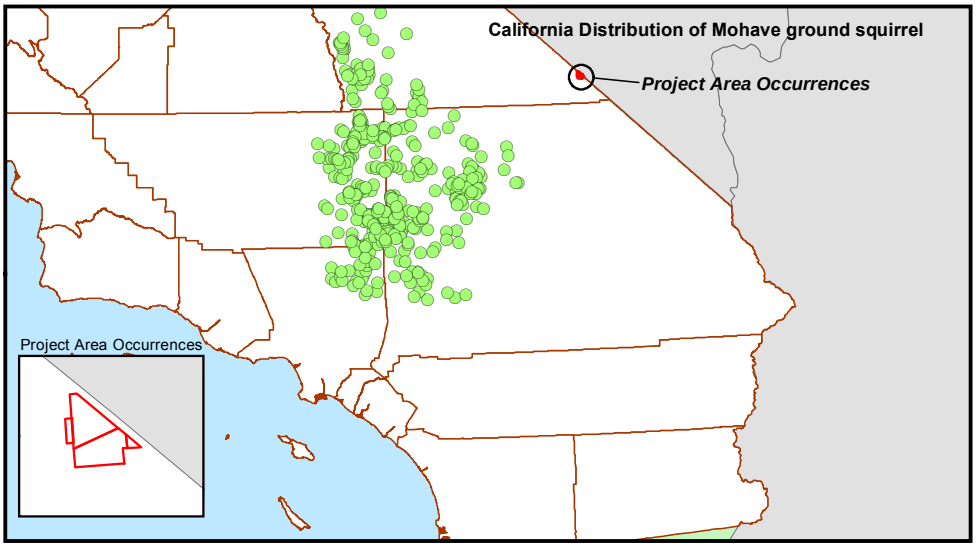
CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CNDDB, 9-4-2012 and CH2MHILL

BIOLOGICAL RESOURCES FIGURE 9e

Hidden Hills Solar Generating System (HHSEGS) - California Range of Special-status Plants* Impacted by the Project

* State range maps are also provided for Desert Tortoise and Mohave Ground Squirrel to demonstrate the narrow range of the affected rare plant species relative to two listed wildlife species



Mohave ground squirrel (*Xerospermophilus mohavensis*) - State Threatened

STATUS CODES

CNDDB Element Rank (NatureServe):

State rank (S-rank) is a reflection of the overall condition of an element throughout its state range (Master et al.2009). Multiple rankings indicate a range of values.

S1 = Critically Imperiled Critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state;

S2 = Imperiled Imperiled in the state because of rarity due to very restricted range, very few populations(often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state.

S3 = Vulnerable Vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

S4 = Apparently Secure Uncommon but not rare; some cause for long-term concern due to declines or other factors.

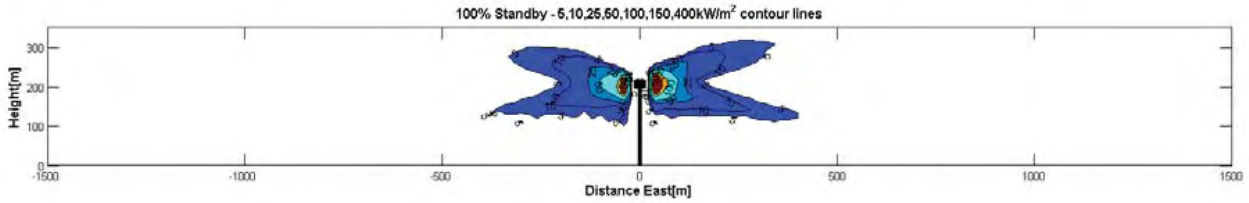
S5 = Secure Common, widespread, and abundant in the state.

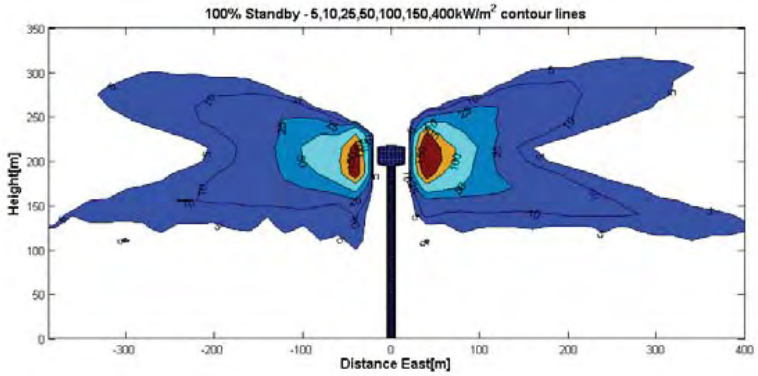
California Rare Plant Rank (former California Native Plant Society List):

CRPR 1B = Rare, threatened, or endangered in California and elsewhere
CPRP 2 = Rare, threatened, or endangered in California but more common elsewhere
CRPR 3 = Plants which need more information
CRPR 4 = Limited distribution - a watch list.

APPENDIX BIO2 - FIGURE 1

Hidden Hills Solar Electric Generating System (HHSEGS) - Full standby





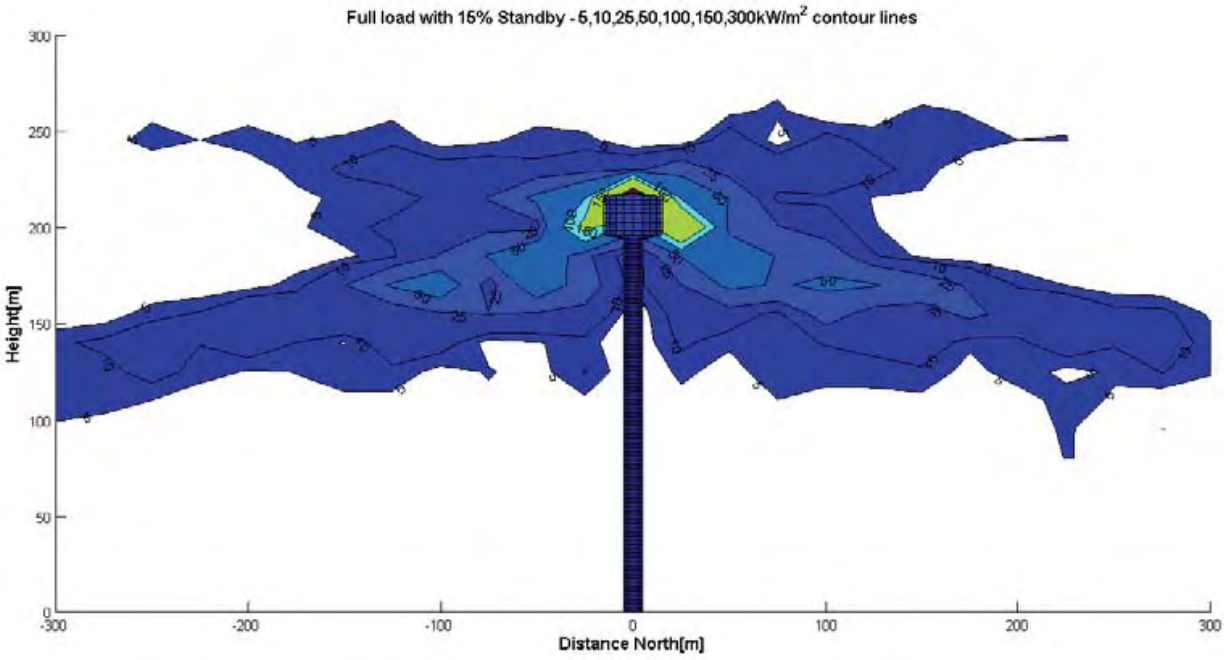
Side views of maximal flux quantifier vertical cross section plot at 20m resolution

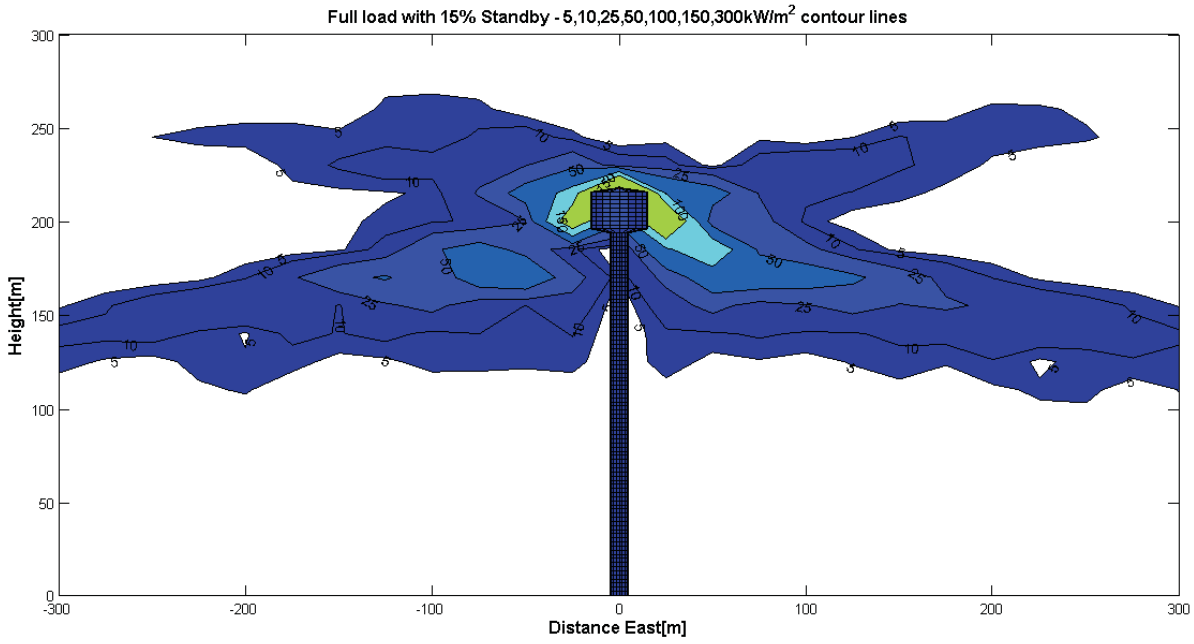
Top: view from east; bottom:zoom in of view from east.

Views from other direction are expected to be similar

APPENDIX BIO2 - FIGURE 2

Hidden Hills Solar Electric Generating System (HHSEGS) - Full load with 15% standby





View of vertical cross section through the tower of maximal flux quantifier at full load with 15% of solar field at standby.

Top: view from east (25m resolution),

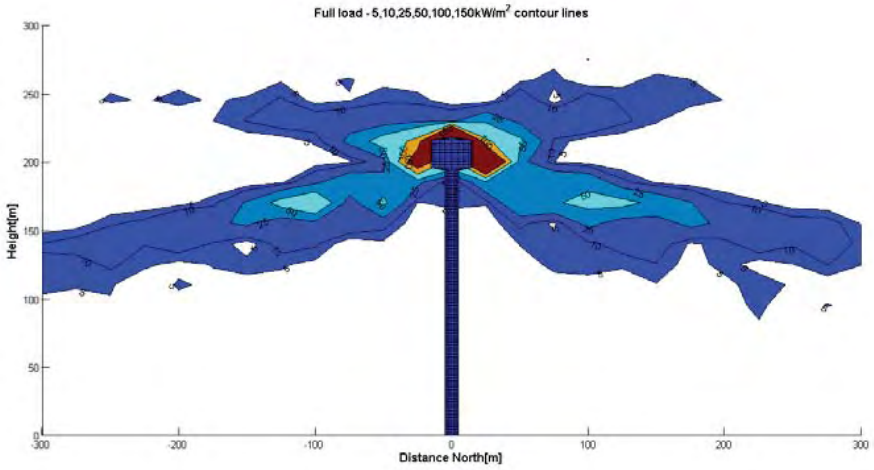
Bottom: view from south(25m resolution).

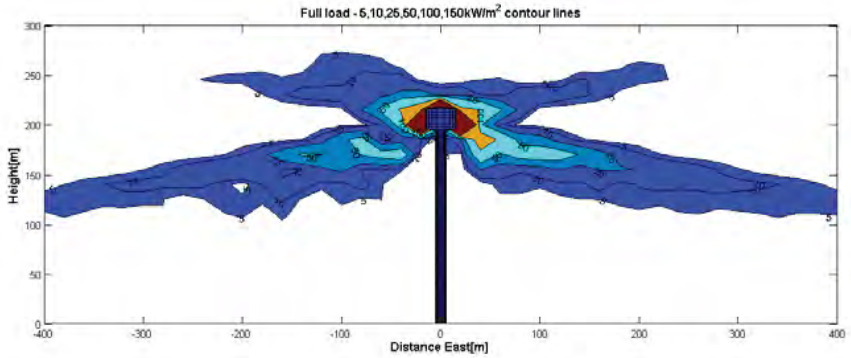
CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

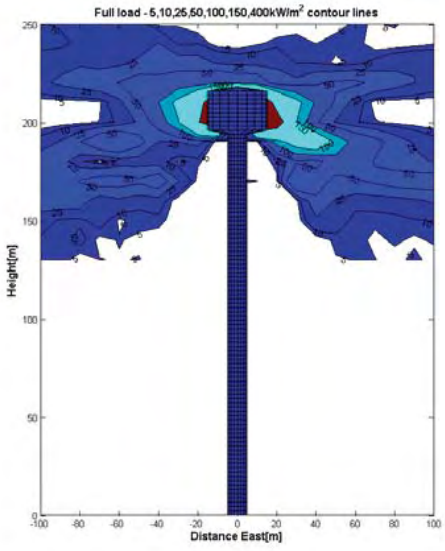
SOURCE:Applicant's Response to Data Requests, Set 2A, #159_Page 8, July 20, 2012

APPENDIX BIO2 - FIGURE 3

Hidden Hills Solar Electric Generating System (HHSEGS) - Full load with 0% standby







Profile views of Maximal Flux Quantifier at full load (with no standby)

Top: View from East (25m resolution)

Middle: View from South (25m resolution)

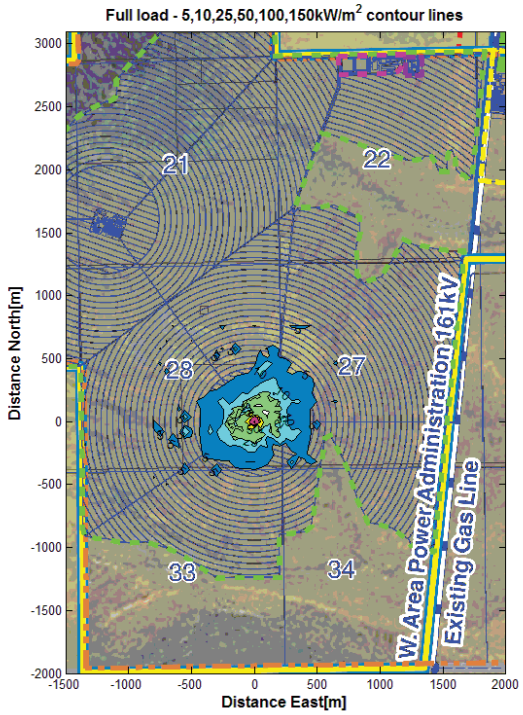
Bottom: Enlarged view from South (10m resolution)

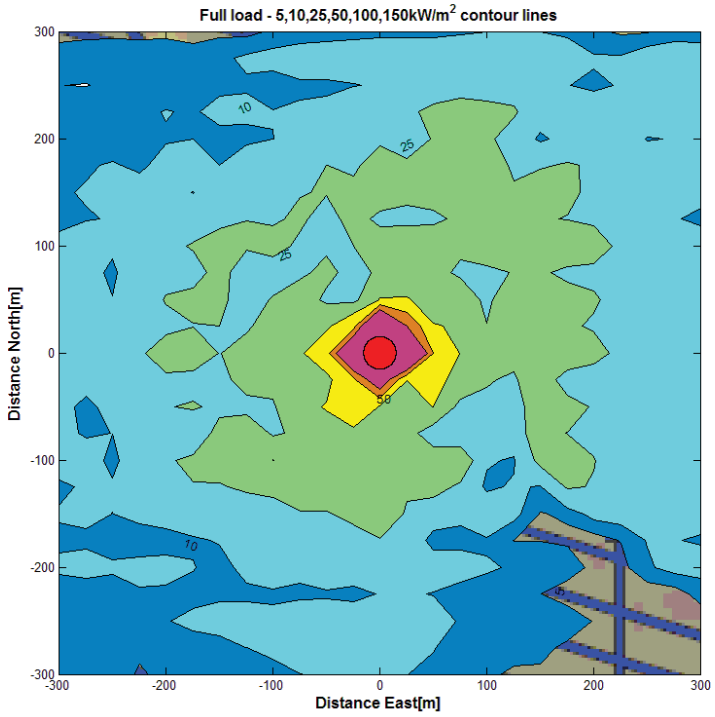
CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE:Applicant's Response to Data Requests, Set 2A, #159_Page 6, July 20, 2012

APPENDIX BIO2 - FIGURE 4

Hidden Hills Solar Electric Generating System (HHSEGS) - Plan View of Flux at Full load with 0% standby over RMS 1 Solar Field





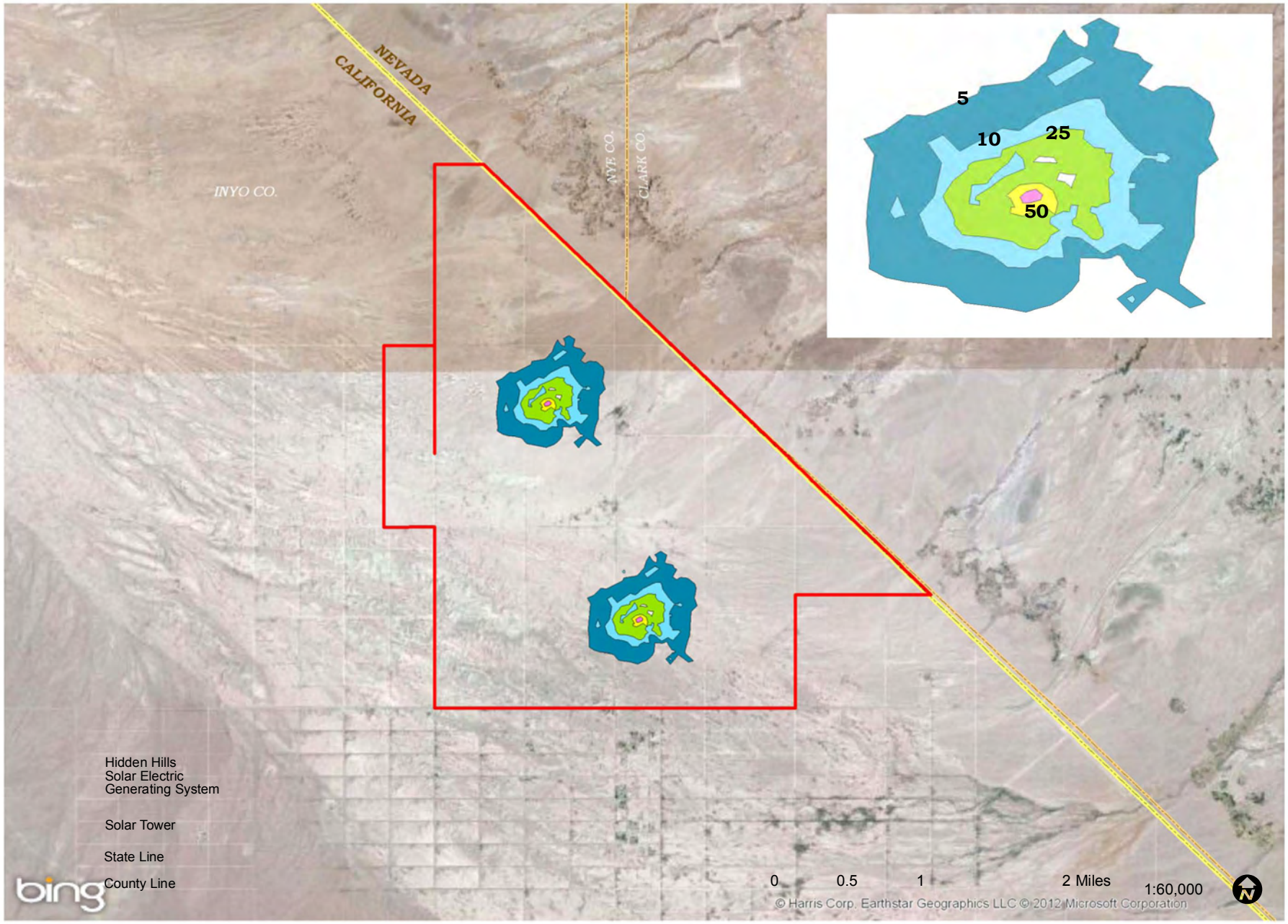
The above plan views show the maximal flux quantifier over the solar field at full load (no standby).

Top Image. Overview of the RMS site

Bottom Image: Enlargement of inner rectangle. Red circle represents the receiver location

APPENDIX BIO2 - FIGURE 5

Hidden Hills Solar Electric Generating System (HHSEGS) - Radiant Flux

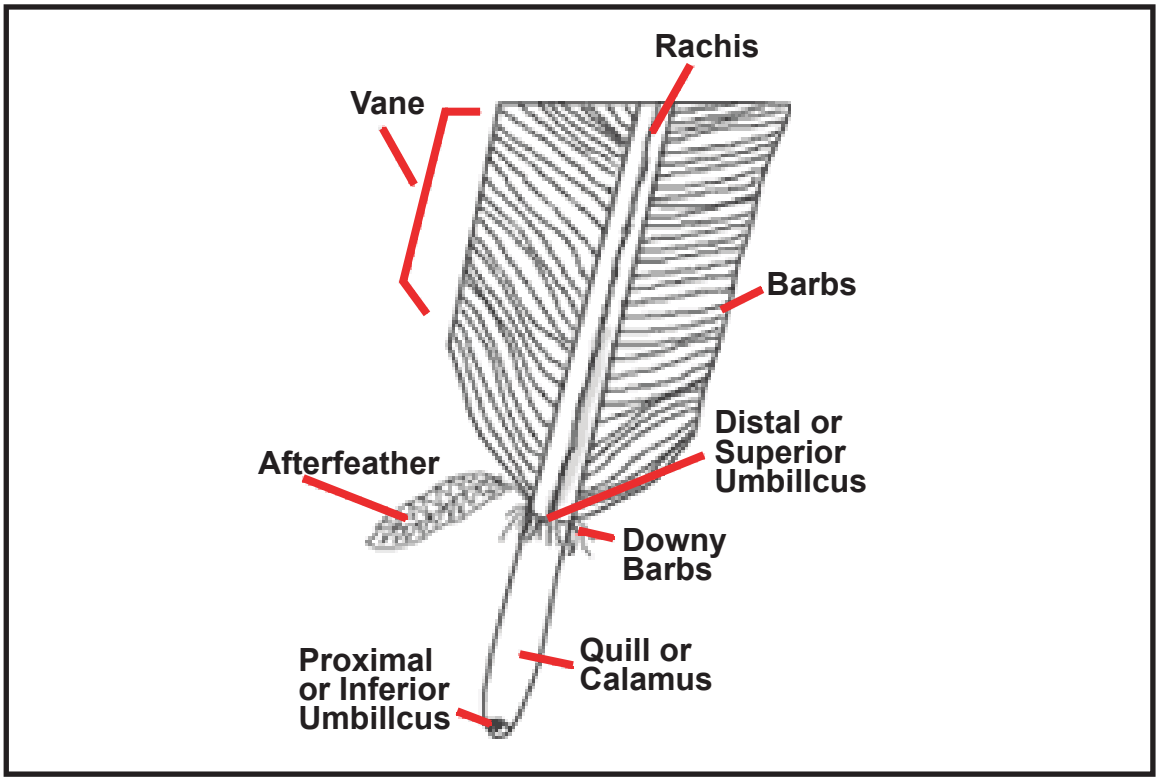


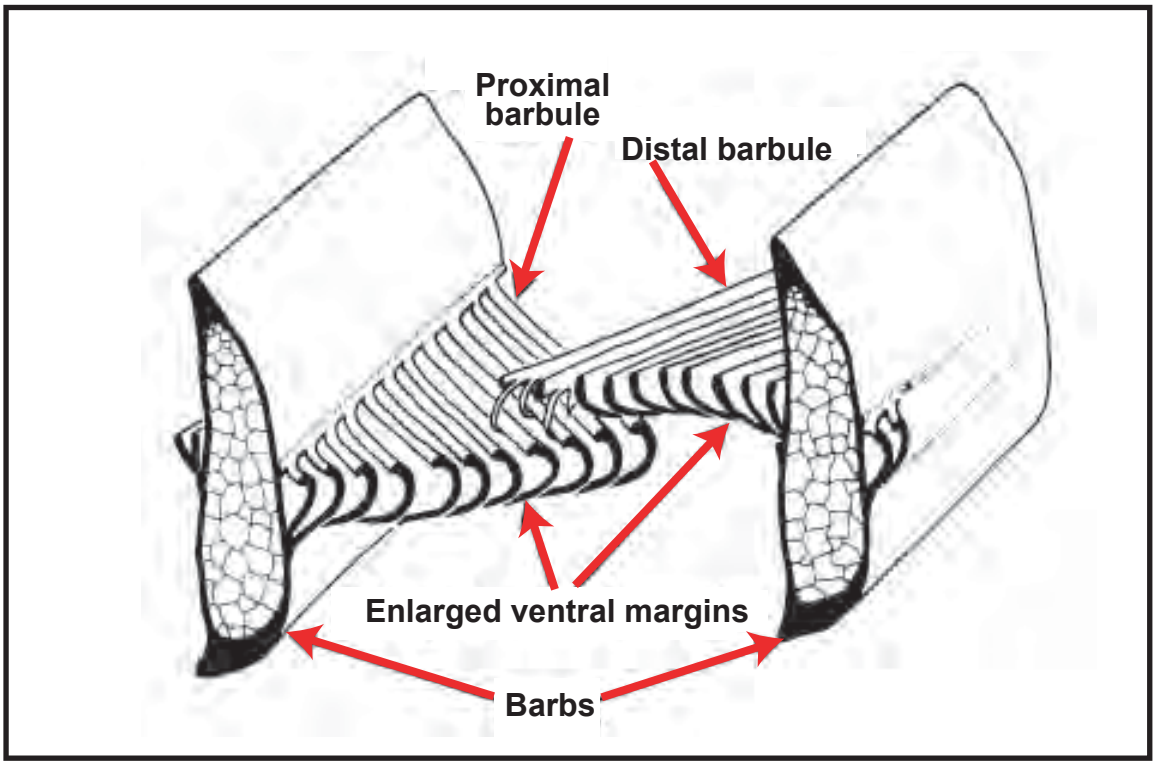
CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Applicant's Response to Data Requests, Set 2A, #159_Page 7, July 20, 2012, Bing Aerial

APPENDIX BIO2 - FIGURE 6

Hidden Hills Solar Electric Generating System (HHSEGS) - Bird Feather Types





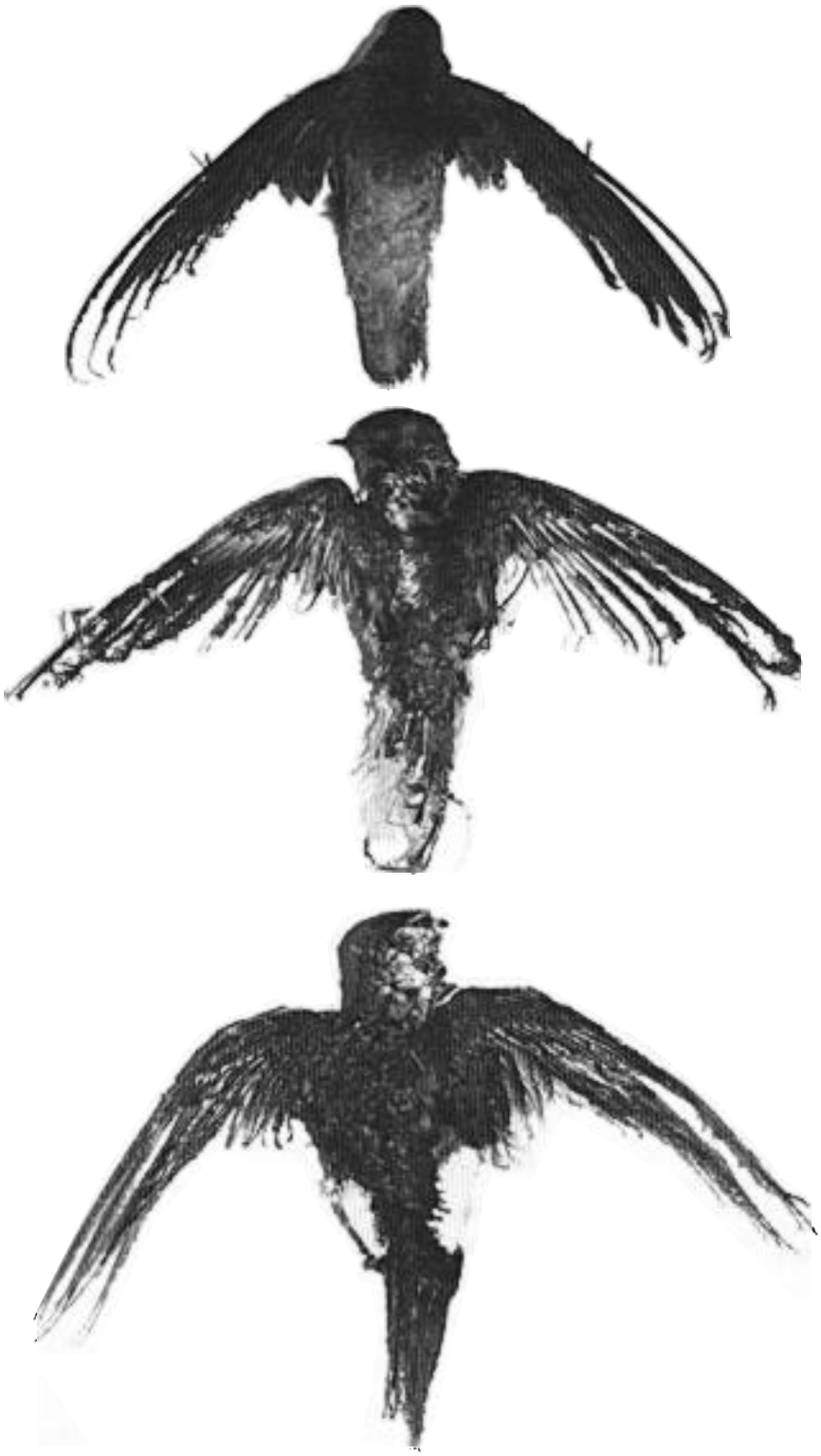
CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: *Upper Figure:* Bird Feather Types, Anatomy, Growth, Color, and Molting by Doctors Foster and Smith at http://www.peteducation.com/article.cfm?c=15+1829&aid=2776

Lower Figure: Muller and Patone 1998 - Muller W. and G. Patone. 1998. Air Transmissivity of Feathers. The Journal of Experimental Biology 201, pages 2591-2599.

APPENDIX BIO2 - FIGURE 7

Hidden Hills Solar Electric Generating System (HHSEGS) - Burnt Birds



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: McCrary et al. 1986 – McCrary, M. D., R. L. McKernan, R. W. Schreiber, W. D. Wagner, and T. C. Sciarrotta, Avian Mortality at a Solar Energy Plant, In: Journal of Field Ornithology 57(2): 135-141

CULTURAL RESOURCES

Testimony of Thomas Gates, Ph.D[1]

SUMMARY OF CONCLUSIONS

Staff concludes that the proposed Hidden Hills Solar Electric Generating System project would have significant and unavoidable impacts to five historical resources: an archaeological landscape, three ethnographic landscapes, and a historic transportation corridor. Staff has proposed feasible mitigation in the recommended cultural resources Conditions of Certification **CUL-1** through **CUL-11**, with specific emphasis on **CUL-9** through **CUL-11**. However, the mitigation measures, individually or cumulatively, for impacts on the five historical resources (the Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape, the Salt Song Landscape, the Pahrump Paiute Home Ethnographic Landscape, the Ma-hav Ethnographic Landscape, and the Old Spanish Trail–Mormon Road Northern Corridor) would not reduce the impacts of the proposed project to a less than significant level.

ARCHAEOLOGY

The archaeological analysis for the Hidden Hills Solar Electric Generating System HHSEGS or Hidden Hills) project has identified the Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape, located just to the northeast of the facility site, as a historical resource assumed eligible for the California Register of Historical Resources (CRHR) with portions in both California and Nevada. This resource represents the aboriginal use of a locally significant ecological zone during still undetermined periods over probably at least the last 12,000 years. The visual impact of the proposed project on the landscape would severely degrade the ability of the resource to convey its association with aboriginal lifeways[2] of the Holocene epoch. Staff proposes Conditions of Certification **CUL-10**, in part, and **CUL-11** to reduce this impact, though not to a less than significant level. The subject landscape may also suffer indirect impacts if the proposed project draws down the local water table to a level that overly stresses or kills the mesquite woodland that is a central feature of the landscape. Staff places additional emphasis on the importance of the implementation of Conditions of Certification **BIO-23**, **BIO-24**, **WATER SUPPLY-6**, and **WATER SUPPLY-8** to avoid this further effect.

Staff has also concluded that the archaeological deposits found within the boundaries of the project site are not historically significant as individual resources and are not contributors to the Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape.

[1] Thomas Gates' contribution to this cultural resources section only pertains to the ethnographic portions of this section, and therefore his testimony is limited to ethnographic resource subject matters.

[2] A "lifeway," as used herein, refers to any unique body of behavioral norms, customs, and traditions that structure the way a particular people carry out their daily lives (http://www.thefreedictionary.com/lifeway).

Staff has also proposed Conditions of Certification **CUL-1** through **CUL-8**, intended to ensure that all significant impacts to archaeological historical resources discovered during HHSEGS project construction (including the potential project use of borrow and disposal sites) and operation are mitigated below the level of significance.

ETHNOGRAPHY

The ethnographic analysis for the HHSEGS project has identified three ethnographic landscapes that are within the ethnographic project area of analysis (PAA) and assumed eligible for the CRHR:

1. Salt Song Landscape

2. Pahrump Paiute Home Landscape

3. Ma-hav Landscape

The impacts of the proposed project on these historical resources would be significant, and the mitigation recommended in **CUL-10** would not reduce impacts to a less than significant level for any of the landscapes. However, even with the adoption and implementation of the proposed mitigation, the project would still have significant and unmitigable effects on Native American spiritual practices dependent on the Salt Song landscape.

HISTORIC-PERIOD BUILT-ENVIRONMENT

One historic-period resource, the Old Spanish Trail-Mormon Road, has been identified in the HHSEGS built-environment PAA. Based on substantial evidence, including the National Register of Historic Places listing of the Nevada segments of the Old Spanish Trail, the National Historic Trail Feasibility Study and Environmental Assessment, and information provided by both the applicant and the Old Spanish Trail Association (OSTA) staff has determined that the Old Spanish Trail-Mormon Road is eligible for the CRHR. Staff has concluded that the impacts of the proposed HHSGS project to this Old Spanish Trail-Mormon Road Northern Corridor would be significant and, even with full implementation of **CUL-9, CUL-10**, and **VIS-6,** would not be mitigated to a less than significant level. The visual impacts on the setting and feeling to the segment of the OST-MR in the Pahrump Valley and NRHP-listed Nevada Segments[3] would remain significant and unavoidable. The impacts to the NRHP-eligible Emigrant Pass segment[4] would be less than significant as the project is not visible from Emigrant Pass (see Visual Resources Figure 17) as portions of the Nopah Mountain Range block these views.

[3] This specifically refers to the Stump Spring Segment, which is closest to the Nevada-California border.

[4] The Emigrant Pass segment NRHP nomination is currently in Draft-Internal Review format and is undergoing review by the Nevada BLM.

INTRODUCTION

This environmental assessment identifies the potential impacts of the HHSEGS project on cultural resources. The term “cultural resource” means any tangible or observable evidence of past human activity, regardless of significance, found in direct association with a geographic location, including tangible properties possessing intangible traditional cultural values. Historical resources are defined under California state law as including, but not necessarily limited to, any object, building, structure, site, area, place, record, or manuscript that is historically or archaeologically significant, or is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California, provided the agency’s determination is supported by substantial evidence in light of the whole record” (Cal. Code Regs., tit. 14, § 15064.5(a)). Three kinds of cultural resources, classified by their origins, are considered in this assessment: prehistoric, ethnographic, and historic-period. Under federal and state historic preservation law, cultural resources must be at least 50 years old to have sufficient historical importance to merit consideration of eligibility for listing in the CRHR. A resource less than 50 years of age must be of exceptional historical importance to be considered for listing.

Prehistoric archaeological resources are associated with the human occupation and use of California prior to prolonged European contact. These resources may include sites and deposits, structures, artifacts, rock art, trails, and other traces of Native American human behavior. In California, the prehistoric period began over 12,000 years ago and extended through the eighteenth century until 1769, when the first Europeans settled in California.

Ethnographic resources represent the heritage of a particular ethnic or cultural group, such as Native Americans or African, European, Latino, or Asian immigrants. They may include traditional resource-collecting areas, ceremonial sites, value-imbued landscapes and related features, cemeteries, shrines, or ethnic neighborhoods and structures. Ethnographic resources are variations of natural resources and standard cultural resource types. They are subsistence and ceremonial locales and sites, structures, objects, and rural and urban landscapes assigned cultural significance by traditional users. The decision to call resources "ethnographic" depends on whether associated peoples perceive them as traditionally meaningful to their identity as a group and the survival of their lifeways.

Historic-period resources, both archaeological and architectural, are associated with Euro-American exploration and settlement of an area and the beginning of a written historical record. They may include archaeological deposits, sites, structures, traveled ways, artifacts, or other evidence of human activity. Groupings of historic-period resources are also recognized as historic districts and as historic vernacular landscapes.

For the HHSEGS project, staff provides an overview of the environmental setting and history of the project area from a cultural resources perspective, an inventory of the cultural resources identified in the project vicinity, and an analysis of the project’s

potential impacts to significant cultural resources, using criteria from the California Environmental Quality Act (CEQA) and CEQA Guidelines.

If cultural resources are identified, staff identifies which are historically significant (defined as eligible for the CRHR or by other significance criteria) and whether the HHSEGS would have a substantial adverse impact on those that are determined or assumed to be historically significant. Staff's primary concern is to ensure that all potentially significant cultural resources are identified, all potential project-related impacts to those resources are identified and assessed, and conditions are recommended that ensure that all significant impacts that cannot be avoided are mitigated to a less than significant level or to the extent feasible.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Projects subject to the Energy Commission's licensing process are reviewed and conditions of certification are imposed, as needed, to ensure compliance with all laws, ordinances, regulations, and standards (LORS); plans; and policies that are applicable to the proposed project and related facilities, or would be applicable but for the Energy Commission's exclusive authority. For this project, there is no federal project land in California. The federal involvement occurs in Nevada, outside Energy Commission jurisdiction;[5] therefore, most of the LORS subject to Energy Commission review are California state laws and local regulations.

CULTURAL RESOURCES Table 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	**Description**
State	
Public Resources Code (PRC), sections 5097.98(b) and (e)	Requires a landowner on whose property Native American human remains are found to limit further development activity in the vicinity until s/he confers with the Native American Heritage Commission-identified Most Likely Descendents (MLDs) to consider treatment options. In the absence of MLDs or of a treatment acceptable to all parties, the landowner is required to reinter the remains elsewhere on the property in a location not subject to further disturbance.

[5] Cultural resources in California are also protected under provisions of the federal Antiquities Act of 1906 (Title 16, United States Code, Section 431, et seq.) and subsequent related legislation, policies, and enacting responsibilities, e.g., federal agency regulations and guidelines for implementation of the Antiquities Act.

Applicable Law	Description
PRC, sections 5097.99, 5097.991, and 5097.993–994	5097.99 establishes as a felony the acquisition, possession, sale, or dissection with malice or wantonness of Native American remains or funerary artifacts. 5097.991 establishes a state policy requiring the repatriation of Native American remains and funerary artifacts. 5097.993–994 establishes that various forms of deliberate damage to historical resources on public or private land are subject to fines and imprisonment unless the damaging act occurred consistent with a number of defined exemptions.
Health and Safety Code, section 7050.5	This code makes it a misdemeanor to disturb or remove human remains found outside a cemetery. It also requires a project owner to halt construction if human remains are discovered and to contact the county coroner.
Government Code, section 62544.10 – California Public Records Act	Provides for non-disclosure of records that relate to archaeological site information and reports maintained by, or in the possession of, the Department of Parks and Recreation, the State Historical Resources Commission, the State Lands Commission, the Native American Heritage Commission, another state agency, or a local agency, including the records that the agency obtains through a consultation process between a California Native American tribe and a state or local agency.
Local	
County of Inyo General Plan, Conservation/ Open Space Element (Chapter 8.7), Cultural Resources Policy CUL-1.3	CUL-1.3 Protection of Cultural Resources – Preserve and protect key resources that have contributed to the social, political, and economic history and prehistory of the area, unless overriding circumstances are warranted.

SETTING

Information provided regarding the setting of the proposed project places it in its geographical and geological context and provides the context for the evaluation of the historical significance of any identified cultural resources within the several PAAs.

PROJECT SITE AND VICINITY

The proposed project area includes approximately 3,277 acres of privately owned land in the Pahrump Valley in Inyo County, California, approximately 8 miles south of Pahrump, Nevada and approximately 45 miles west of Las Vegas (see Cultural Resources Plates 1-3). The Pahrump Valley lies in the eastern Mojave Desert, part of the Basin and Range physiographic province (Fenneman 1931), a broad region of

almost parallel, block-faulted mountain ranges that trend approximately north to south and are characteristically separated by internally draining, debris-filled structural basins. The erosion of the largely Cenozoic era ranges of the province (beginning 65 million years ago and continuing to the present) continues to contribute sediment to the poorly sorted gravel aprons or bajadas that predominate along the range flanks. The bajadas form most valley margins as they slope gradually down to the basin bottoms where seasonal lakes or playas often form. Low fault scarps and alluvial fans at the mouths of canyons periodically break the smooth, low-angle sweep of the bajadas (Eaton 1982; Thompson and Burke 1974). The elevation of the proposed project area varies from approximately 2,737 feet above mean sea level (amsl) along the eastern area boundary and 2,583 feet amsl along the western area boundary (HHSG 2011a, Appendix 2G: 1). Local elevations in this part of the Pahrump Valley range from a high of approximately 11,916 feet amsl (3,632 m) on Mount Charleston in the Spring Mountains, the dominant peak in the region, to approximately 2,516 feet amsl (767 m) on the floor of the valley bolson[6] in the center of Pahrump Dry Lake, approximately 4 miles to the west-northwest of the proposed facility site.

A bi-seasonal precipitation pattern in the eastern Mojave Desert delivers an average of six inches of annual rainfall from November through April and from July through September, with cool season precipitation being more significant (Hereford 2004). The Colorado River, flowing generally southwesterly from the Rocky Mountains, makes a significant bend within 75 miles of the project area that changes the course of the river towards the south and the Gulf of California. The largely alluvial parent material of the region's bajadas and valley bottoms, and the desert climate generally, support more weakly developed soil orders (Entisols and Aridisols) (NRCS 2007) where a Mojave Creosote Bush Scrub vegetation type predominates (BSE2007a:5.2-9).

The available archaeological evidence indicates a great deal of variability in the Native American use of different portions of the project vicinity through time. A relatively sparse veneer of toolstone acquisition debris on the present surface of the proposed facility site indicates a transitory Native American use of that area, while the presence and moderate frequency of fire pit ruins, stone tool production and maintenance debris, and fragmentary stone tools demonstrate a much more extensive use of the discontinuous mesquite woodland along the fault zone to the immediate northeast of the facility site, through which the transmission line and natural gas pipeline for the proposed project would be built.

The project vicinity also appears to have been subject to prospecting over the last approximately 160 years. Sporadic mineral prospecting near the project area continues today.

[6] A bolson is a semi-arid, flat-floored desert valley or depression, usually centered on a playa or salt pan. Bolson development may occur due to a number of different structural geologic scenarios.

ENVIRONMENTAL SETTING

Paleoclimate

The present climate in the proposed project area represents a moderately dry and harsh period in the climate of the region relative to the last 14,000 years, the minimum time frame for a human presence in the Mojave Desert. The climate of the Mojave Desert since late Pleistocene time (prior to 10,000 thousand years ago) can be split into three broad phases. The climate of the region during the Pleistocene was relatively much more moist or mesic than the present climate and led to the development of a number of large permanent lakes on the floors of the region's valleys. The lakes slowly evaporated during early Holocene time (10,000 years ago to present) as the climate progressively became more arid. The period from approximately 5,000 to 3,000 B.C. marks a time of extreme aridity, often referred to as the mid-Holocene Altithermal (Antevs 1948), one result of which was the final desiccation of the lakes in the region. The climate since approximately 3000 B.C. has typically been more mesic relative to conditions during the Altithermal, and there is evidence for particularly wet periods from approximately 1000 B.C. to A.D. 1, and again from approximately A.D. 500 to 1400 (Bamforth 1990:72).

Geology

The proposed project area is sited on the eastern margin of a bolson in Pahrump Valley in the Mojave Desert. Pahrump Valley is a closed, axial basin oriented roughly northwest to southeast. The geology of the valley reflects many of the closed basins in the region in that it has become filled with predominately fine-grained sediments with sporadic layers of stream-laid larger rocks. The valley is bounded by four principal mountain ranges, the Spring Mountains to the east, and the Kingston, Nopah, and Resting Springs Ranges, respectively, to the south-southwest, west, and, north-northwest. Valley elevations range from a high of approximately 11,916 feet (3,632 m) on Mount Charleston in the Spring Mountains, the dominant peak in the region, to approximately 2,516 feet (767 m) on the floor of the valley bolson in the center of Pahrump Dry Lake, approximately 4 miles to the west-northwest of the proposed facility site. The Spring Mountains form almost the entire eastern boundary of the valley. Primarily Paleozoic (ca. 542–251 million years ago (mya)) marine sedimentary rock predominates the geology of the range with intrusions of largely Tertiary (ca. 65.5–1.8 mya) volcanic rock found infrequently in the southern part of the range. The Kingston Range consists primarily of Mesozoic (ca. 251–65.5 mya) granitic intrusive with apparently uplifted suites of Cambrian (ca. 542–488.3 mya) and Precambrian (ca. 4,570–542 mya) rock that extend to the northeast. The Nopah and Resting Springs Ranges are Paleozoic marine sedimentary rock, predominately of Cambrian age. The Paleozoic rock includes numerous carbonate (limestone and dolomite) and siliciclastic (sandstone, mudstone, conglomerate) rock units (Jennings 1973).

Geomorphology

The proposed facility site is set on the broad, flat floor of a closed basin surrounded by a relatively diverse suite of landforms and subordinate deposits. The Pahrump-Stewart Valley fault system, the central segment of the State Line fault system, has three distinct subsegments in Pahrump Valley, the East Nopah, the Pahrump Valley, and the West

Spring Mountains fault zones, which, together, contribute to the structure of the valley (Workman et al. 2008). The Spring Mountains and Mount Charleston, the dominant peak of that range, bound the valley margin to the east of the proposed project area. A complex of coalescing alluvial fans forms a bajada that sweeps west down from the mountains toward the proposed project area. The bajada is subtly broken through its higher elevations by the West Spring Mountains fault zone which traverses the bajada in a roughly north-northeast direction (Workman et al. 2008).

The Pahrump Valley and East Nopah fault zones define the major landform that is the primary physical context for the proposed facility site, the basin floor. The Pahrump Valley fault zone visibly interrupts the toe of the Spring Mountains' western bajada roughly 1.8 miles to the northeast of the proposed facility site, the northeastern boundary of which is coterminous with the California-Nevada border. This fault zone is a relatively wide band of faults that traverses the approximate center of Pahrump Valley. The zone extends to the northwest, past the Town of Pahrump, into the Stewart Valley fault zone. The Pahrump Valley fault zone manifests as three visible scarps in the vicinity of the proposed project area. The scarps step up in elevation from west to east at intervals of 0.25, 1.6, and 1.8 miles to the northeast of the boundary of the proposed facility site and the California-Nevada border (HHSG 2011c:64). The most westerly of the scarps, the one 0.25 miles from the northeastern facility site boundary, forms the eastern edge of the graben[7], on the surface of which the proposed facility is sited. The scarps are thought to be a barrier for the aquifer that appears to underlie the Spring Mountains' western bajada (HHSG 2011a:5.15-9) and have, through time, provided multiple outlets for the aquifer, outlets that have been variably evident as seeps, springs, and desert marshes. Wind-blown or eolian deposits of sheet and dune sand flank this margin of the basin and drape up and over the scarps of the fault zone. Native stands of mesquite (*Prosopis glandulosa*, *Prosopis pubescens*) anchor lines of coppice dunes along those scarps. The East Nopah fault zone, across the basin floor to the west, is a relatively narrow band of faults that defines the western edge of the graben and creates the eastern front of the Nopah Range (Workman et al. 2008), which delimits the western margin of Pahrump Valley.

The basin floor that now forms the surface of the Pahrump Valley graben is the ongoing result of many thousands of years of the water- and wind-borne deposition of sediments, as the structural block that makes up the landform has dropped in elevation. Basin sediments nearest the present surface are a deflated, massively bedded deposit of silts and clays (CH2 2012a:8–9). Calcium carbonate ($CaCO_3$) nodules are common. The remnant deposit appears to be late Pleistocene in age and appears to evidence the former presence of phreatophyte flats[8], which, on the basis of paleoenvironmental reconstructions for the region, were probably in existence from the late Pleistocene through the early Holocene. The $CaCO_3$ nodules indicate phreatic or near-surface groundwater conditions during that time. The original deposit is thought to have been

[7] A graben is a portion of the earth's crust, bounded on at least two sides by faults, that has dropped downward in relation to adjacent portions.

[8] A phreatophyte flat is a relatively level area of ground where the predominant type of vegetation is phreatophytic plants, deep-rooted plants that obtains water from a permanent ground supply or from the water table.

subject to significant erosion during the mid-Holocene, which left the present deflated deposit of late Pleistocene-age sediments. Layers of stream gravels are also found bedded in and on the surface of these sediments. The Spring Mountains are most likely the primary source of more recent basin sediments beneath the proposed facility site, sediments which originated as alluvium washed down the mountains in rainfall runoff and snow melt. Larger rocks in the Spring Mountain alluvium are typically limestone with rare chert nodules (HHSG 2011c:64). There is also basalt and other volcanic rock exposed in the alluvium toward the eastern margin of the basin floor. There are a couple of potential sources for this rock. One source may be from a former stream that may have once flowed north approximately 20 miles from Sandy Valley, near where volcanic formations are found, north through Pahrump Valley to a confluence with the Amargosa River. Tectonic uplift, most likely during the middle Pleistocene (ca. 500 thousand years ago (kya)), eventually isolated both Sandy and Pahrump valleys (HHSG 2011c:64). Another source for the igneous rock may be the Kingston Range approximately four miles to the south of the proposed facility site (Spaulding 2012c). During parts of the Pliocene and Pleistocene epochs, alluvial fans from the Kingston Range may have reached out to the northeast, through the proposed facility site to what may at that time have been the primary focus of alluvial deposition in Pahrump Valley. That alluvium, derived in part from a late Tertiary (ca. 65.5–1.8 mya) suite of volcanic rock, would have subsequently been buried on the basin floor by other sediment sources as the depositional environment changed. East of the Pahrump Valley fault zone, the hypothetical Kingston Range alluvial fans would have become buried by ongoing deposition along the western Spring Mountains bajada. Ultimately, the Kingston Range alluvium was re-exposed along the scarps of the fault zone and subject to erosion. The Nopah Range contributes alluvial sediments to the basin along the western margin of the valley. Additional sedimentary deposits on the basin floor in the vicinity of the proposed facility site include the suite of lacustrine deposits associated with the playa, Pahrump Dry Lake, approximately four miles to the west-northwest of the proposed facility site.

The eastern portion of the basin floor is draped with a sequence (Qa) of relatively small alluvial fans that appear to emanate from the Pahrump Valley fault zone (Lawson et al. 2012, fig. 1). The sediment sources for the fans are small drainage basins through the zone where Paleozoic rocks and sediments erode from the toe of the western Spring Mountains bajada, late Tertiary volcanic rock erodes from older re-exposed fan deposits, and eolian sands and tufa erode from locales in the fault zone on and adjacent to surface seeps and springs, and near-surface water sources. This is the bulk of the inventory of the sediments that make up older dormant fans (Unit Qa2), and younger active ones (Unit Qa1). The particular proportions of the sediment types in each fan vary with the unique character of the portion of the fault zone from which each fan draws sediment.

CULTURAL RESOURCES INVENTORY

A project-specific cultural resources inventory is a necessary step in staff's effort to determine whether the proposed project may cause significant impacts to historically significant cultural resources (i.e., historical resources) and would therefore, under

CEQA, have a significant adverse effect on the environment.

The development of a cultural resources inventory entails working through a sequence of investigatory phases. Generally, the research process proceeds from the known to the unknown. These phases typically involve doing background research to identify known cultural resources, conducting fieldwork to collect requisite primary data on not-yet-identified cultural resources in the vicinity of the proposed project, assessing the results of any geotechnical studies or environmental assessments completed for the proposed project site, and compiling recommendations or determinations of historical significance (see "Determining the Historical Significance of Cultural Resources," below) for any cultural resources that are identified.

This subsection describes the research methods used by the applicant and Energy Commission staff for each phase and provides the results of the research, including literature and records searches (California Historical Resources Information System (CHRIS) and local records), archival research, Native American consultation, and field investigations. Staff provides a description of each identified cultural resource, its historical significance, and the basis for its significance evaluation. Assessments of the project's impacts on historically significant cultural resources; potential impacts on previously unidentified, buried archaeological resources; and proposed mitigation measures for all significant impacts are presented in separate subsections below.

PROJECT AREA OF ANALYSIS (PAA)

The PAA is a concept that staff uses to bound the geographic area in which the proposed project has the potential to affect cultural resources. The effects that a project may have on cultural resources may be immediate, further removed in time, or cumulative. They may be physical, visual, auditory, or olfactory in character. The geographic area that would encompass consideration of all such effects may or may not be one uninterrupted expanse. It may include the project area, which would be the site of the proposed plant (project site), the routes of requisite transmission lines and water and natural gas pipelines, and other offsite ancillary facilities, in addition to one or several discontiguous areas where the project could be argued to potentially affect cultural resources.

The configuration of the PAAs for staff's consideration of the HHSEGS project reflects the limitations that CEQA places on dual-state projects. Due to the variety of resources considered by each of the cultural resources specialist, multiple PAAs have been established: the Archaeological PAA, the Ethnographic PAA, and the Built-Environmental PAA. Staff presently sees the core of all of the PAAs **(see Cultural Resources Figure 1)** as the project site, which includes the areas of Solar Plant 1 and Solar Plant 2, the Common Area, and the Temporary Construction Area (HHSG 2011a, Figure 2.1-2). The eastern boundary of the project site is coincident with the California-Nevada border. Elements of the project proposed for construction in Nevada, such as a transmission line and a natural gas pipeline, are not assessed by staff for environmental effects within Nevada. However, impacts, regardless of where they occur, resulting from project activities in California, are evaluated and mitigated to the extent feasible. Therefore, the PAAs for the present project extend over the California border and into Nevada.

Archaeological Resources PAA

Staff is presently aware of two areas in Nevada that qualify as discontiguous components of the HHSEGS cultural resources PAA. One of these areas encompasses the portion of the shallow step fault zone that defines the eastern edge of the project site. Portions of the step fault zone, which are part of the State Line fault system, appear to have been the focus of relatively intense Native American activity for thousands of years. This activity has been related to the periodic presence of surface springs and seeps and to mesquite woodlands that have become encased in an archipelago of sand dunes along the zone. The portions of the fault zone that are coincident with these woodlands and the surface springs and seeps, and the archaeological deposits that relate to the use of these natural resources, qualify as an archaeological landscape.[9]

A second area in Nevada that staff has identified as a discontiguous component of the PAA encompasses Mount Charleston and other prominent peaks of the Spring Mountains. On the basis of early consultation with local Native American communities, and relying also on the basic tenants of ethnogeography, it is reasonable to assume a relatively high probability that these peaks are important elements of the mythologies and religions of different Native American groups in the region.

There also appear to be areas to the west of the project site that are likely to be additional discontiguous components of the PAA. On the basis of Native American consultation to date, prominent peaks of the Nopah Range also appear to be places known and named in local Native American mythological and religious repertoires. Among the lower reaches of the range, there may also be places where the visual presence of the HHSEGS power tower would degrade the ability of key places and trails to convey their respective associative values.

Ethnographic Resources PAA

The Ethnographic PAA encompasses the western side of the Spring Mountains including Stirling Mountain and Potosi Mountain, Mesquite Valley, the Northern side of the Kingston Range, the Nopah Range, the Resting Spring Range, the Last Chance Range and the Ash Meadows Spring area. However, the Salt Song Trail landscape is a multi state resource with a segment in the project vicinity.

Built-Environment PAA

The Built-Environment PAA primarily includes the project site (Solar Plant 1 and Solar Plant 2, the Common Area, and the Temporary Construction Area) as well as the Old Spanish Trail-Mormon Road Corridor in the Pahrump Valley from the Spring Mountains to the east and to the Emigrant Pass to the west. Discontinuous areas of this PAA include the NRHP-listed Old Spanish Trail/Mormon Road Historic District in Nevada and the Old Spanish Trail National Historic Trail (OSTNHT). The OSTNHT is a multi-state resource with segments on the project site.

[9] An archaeological landscape is a constellation of passively and/or actively managed natural features and material culture remains.

DATA COMPILATION FOR PROJECT AREA OF ANALYSIS

Record, File, and Database Searches

Identification of cultural resources in the PAA and analysis of the significance of those resources and the potential project-related impacts requires resource information specific to the project area and vicinity. Various repositories in California hold compilations of information on the locations and descriptions of cultural resources that have been identified and recorded in past cultural resources surveys. Consistent with the Energy Commission's Data Regulations, the applicant conducted background inventory research and provided the results as part of the HHSEGS Application for Certification (AFC) and in Data Responses to Energy Commission staff's Data Requests, Set 1D.

The applicant's literature and records search portions of the background research for archaeological resources attempted to gather and interpret archival evidence of the known archaeological resources in the applicant's project area of analysis, which was more narrowly defined and was universal across the sub-disciplines of cultural resources. The California source for the present effort was the Eastern Information Center (EIC) of the California Historical Resources Information System (CHRIS) in Riverside. The Nevada sources for the research were the Nevada Cultural Resource Information System (NVCRIS) of the Nevada State Historic Preservation Office (NSHPO) in Carson City, the Harry Reid Center for Environmental Studies (HRC) in Las Vegas, and the Southern Nevada District Office of the Bureau of Land Management (BLM), also in Las Vegas.

Energy Commission staff also conducted additional archival and literature research to supplement information provided by the applicant; partially due to the fact that staff's PAA was larger than the PAA presented in the AFC. This included reviewing documents obtained on the internet; subject-specific books from local venues, the Shoshone Museum, and the Nevada Historical Society Museum in Tonopah; books and manuscripts on file at the Pahrump Public Library, the California State Archives, Sacramento State University Library, and University of California-Berkeley Bancroft Library; historic photographs from the University of Nevada-Las Vegas; and photocopy and original documents provided by the Pahrump Paiute Tribe.

CHRIS Records Search

Methods

The applicant's background research on the archaeological resources in the applicant's PAA encompassed a number of separate efforts in both California and Nevada, the number and timing of which are not entirely clear. The cultural resources consultant to the applicant, CH2M HILL, conducted an in-person records search at the EIC on May 17, 2010 (CRTR 2011b: 48). The record search was limited to the area in California within a one-mile radius around the proposed facility site and the adjacent temporary construction laydown and parking area. CH2M HILL made a request to NSHPO on April 18, 2011, to provide the results of a database search of NVCRIS for the one-mile portion of the Applicant's PAA that extends into Nevada from the northeastern boundary of the proposed project, which is also the California-Nevada state border. CH2M HILL also conducted an in-person record search on this same area at the HRC on April 21,

2011, and sought archaeological resource information on the area from BLM staff, information which may not necessarily be found in the NVCRIS or the HRC. The applicant, in response to an advance draft of staff's second round data adequacy comments on the AFC, provided new information in Supplement B to the AFC (HHSG 2011c:25 and 26) on archaeological sites beyond the facility site in both California and Nevada. The source of much of the information is cited as largely having been the HRC. The searches provided information on the location and the character of known prehistoric and historical archaeological resources in the record search area and provided technical reports for previous cultural resources surveys that have taken place wholly or partly within 0.25 miles of the area subject to survey for the AFC and the technical reports for any previous archaeological excavations that have taken place anywhere in the record search area.

Results

The results of the applicant's record searches in California and Nevada indicate that six investigations were wholly or partially conducted in the Applicant's PAA between 1975 and 2005 (**Cultural Resources Table 2**). The combined results of these previous investigations in this area provided information on a total of approximately 548 acres, or 16.7 percent (CH2 2012a:19) of the approximately 3,276-acre area in California that encompasses the facility site and the adjacent temporary construction laydown and parking area.

CULTURAL RESOURCES Table 2
Previous Cultural Resources Investigations in the Records Search Area

Type of Investigation[10]	***Number of Investigations of Type***	***Date(s) of Investigation Reports***	***Document Identification Nos.***
Class II, Phase I motor and pedestrian surveys of Groundshakers Championship Desert Motorcycle Race course, CA and NV (N), and of Frontier 500 off-road vehicle race, NV (P)	2	September 1975, June 1982	5-84 (BLM), 5-1043 (BLM)

[10] N = negative survey results, P = positive survey, Resource ID No. = project area resource in CA, or n/a

Type of Investigation[10]	***Number of Investigations of Type***	***Date(s) of Investigation Reports***	***Document Identification Nos.***
Class II, Phase I pedestrian survey of Hidden Hills Ranch for proposed agricultural program, CA (CA-INY-2492)	1	October 1979	IN-0069 (EIC)
Class III, Phase I pedestrian survey of Old Spanish Trail-Mormon Road, National Historic Preservation Act Section 110 study, NV (NV-CK-3848)	1	July 1989	5-1950 (BLM)
Class III, Phase I pedestrian survey for electric transmission line pole replacement, CA (N)	1	June 2005	IN-0053 (EIC)
Class I, Phase I archival research for broader environmental resource assessment of parcels, CA and NV (n/a)	1	July 2005	IN-816 (EIC)

The record searches identified two archaeological resources in the Energy Commission regulatory record search area. Only one of these two resources is known to be on the facility site. That archaeological site, CA-INY-2496, is reported as a relatively small (10 x 20 m) scatter of chipped stone, a lithic scatter in the east-central portion of the proposed facility site (WESTEC 1979:12). The other resource identified in the subject record search area is the Old Spanish Trail-Mormon Road (NV-CK-3848). The resource is documented from the Las Vegas area, through Stump Spring roughly two and a half miles to the east of the proposed facility site, to a place on the California-Nevada border to the east-southeast of the site very near where the Old Spanish Trail Highway crosses the border.

Beyond the regulatory record search area but within the broader PAA, the applicant provided rather spare and disjointed bits of information on a number of other archaeological resources in Pahrump Valley (HHSG 2011c:25 and 26; CH2 2012a:14–16). Relatively complex prehistoric and historic archaeological deposits are noted in association with many of the major spring mounds[11] along the Pahrump Valley fault zone, such as Mound Spring and Bolling Mound, adjacent to former artesian-fed stream beds, such as the Bowman site, Manse Spring, and Stump Spring, and, like the Hidden Hills Ranch Spring site, on or partially embedded in the coppice dunes that shroud portions of the fault zone. The applicant notes other types of archaeological deposits in Pahrump Valley, such as rockshelters, cleared circles, roasting pits, rock art, and rock rings, but, despite staff's request for landscape contexts and complete archaeological descriptions of representative deposits (Data Request 109, CEC 2011h), the applicant declined to provide a substantive interpretative context for the archaeology of the broader PAA (CH2 2012a:14–16; ESH 2011a:8 and 9).The useable results of the record search efforts provide a site frequency for the proposed facility site and the adjacent temporary construction area of one site per 548 acres. The extrapolation of that number predicts a total of approximately six archaeological resources for the whole of that area. In consideration of the fact that the only type of archaeological resource that has been identified to date in the project area is a prehistoric lithic scatter (WESTEC 1979:9 and 12), the probability is rather high that those six resources would be predominantly of that type. Beyond the facility site, where the applicant's efforts to identify historical resources has been less intensive, it would be reasonable to anticipate relatively complex and potentially significant prehistoric and historical archaeological deposits along those portions of the Pahrump Valley fault zone where spring mounds, former artesian-fed stream beds, or coppice dunes are present.

Local Agency and Organization Consultation
California counties and cities may recognize particular cultural resources as locally historically important by ordinance, in general plans, or by maintaining specific lists. Consistent with the Energy Commission's Data Regulations, the applicant and Energy Commission Cultural Resources staff contacted local planning agencies and historical and archaeological societies to acquire information on locally recognized cultural resources specific to the vicinity of the project.

Local Historical Societies

The applicant's consultant, CH2MHill, contacted historical societies in the Pahrump, Nevada, and Sandy Valley, California areas, including the Pahrump Valley Historical Society, Goodsprings Historical Society, and the Nevada State Museum and Historical Society. They also sent letters and maps describing the project to these organizations, requesting information about historical features and structures near the project area and inviting comment on the project.

[11] A spring mound is a formation largely composed of $CaCO_3$ precipitates from spring water that combine in complex interactions with microbial, and plant and animal life to form a relatively durable mound that grows slowly over time.

Old Spanish Trail Association

CH2MHill also contacted the Old Spanish Trail Association (OSTA) as part of their organizational outreach. Staff also made contact with OSTA and met with Scott Smith and other representatives on December 1, 2011 at the project site. During the tour of the site, the group discussed both the visual and cultural impacts of the project to the Old Spanish Trail (OST). The OSTA members showed staff segments of a footpath they assert is part of the OST. OSTA prepared a report[12] on the history of the Old Spanish Trail and submitted it to the Energy Commission on April 30, 2012.

Native American Heritage Commission

The Governor's Executive Order B-10-11, executed on September 19, 2011, directs state agencies to engage in meaningful consultation with California Indian Tribes on matters that may affect tribal communities. The Energy Commission Siting Regulations require applicants to contact the Native American Heritage Commission (NAHC) for information on Native American sacred sites and a list of Native Americans interested in the project vicinity. The applicant is then required to notify the Native Americans on the NAHC's list about the project and include a copy of all correspondence with the NAHC and Native Americans and any written responses received, as well as a written summary of any oral responses in the AFC (CEC Regs 2007:App. B(g)(2)(D):87).

The NAHC is the primary California government agency responsible for identifying and cataloging Native American cultural resources, providing protection to Native American human burials and skeletal remains from vandalism and inadvertent destruction, and preventing irreparable damage to designated sacred sites and interference with the expression of Native American religion in California. It also provides a legal means by which Native American descendents can make known their concerns regarding the need for sensitive treatment and disposition of Native American burials, skeletal remains, and items associated with Native American burials.

The NAHC maintains two databases to assist cultural resources specialists in identifying cultural resources of concern to California Native Americans, referred to by staff as Native American ethnographic resources. The NAHC's Sacred Lands database has records for places and objects that Native Americans consider sacred or otherwise important, such as cemeteries and gathering places for traditional foods and materials. Their Contacts database has the names and contact information for individuals, representing a group or themselves, who have expressed an interest in being contacted about development projects in specified areas.

Both the applicant and staff requested information on the presence of sacred lands in the vicinity of the HHSEGS project area, as well as a list of Native Americans to whom inquiries should be sent to identify both additional cultural resources and any concerns the Native Americans may have about the proposed project.

[12] http://www.energy.ca.gov/sitingcases/hiddenhills/documents/others/2012-04-27_Jack_Prichett_OSTA_Cultural_Rsources_Report.pdf

Staff contacted the NAHC on April 25, 2011, and requested a search of the Sacred Lands File and a Native American contacts list. The NAHC responded in May, 2011, with a list of Native Americans interested in consulting on development projects in the project area. Staff sent letters to all of the NAHC listed tribes on May 25, 2011, inviting them to participate in a field trip to the proposed project area and encouraging tribes to provide additional cultural resources information to staff (see **Cultural Resources Figure 2** for general map of tribal government office locations and territories).

On behalf of the applicant, CH2MHill also contacted the NAHC on May 27, 2011, and requested a search of the Sacred Lands File and a Native American contacts list. The NAHC responded on June 1, 2011, with a list of Native Americans interested in consulting on development projects in the HHSEGS project area. Letters to tribes and individuals listed on the NAHC contact list were mailed or faxed by CH2MHill on June 7, 2011. Copies of the contact letters were provided in Appendix 5.3A of the HHSEGS AFC. A detailed summary table of the results of consultations with the individual Native American organizations on the NAHC contact list was also included. CH2MHill received a response from the Timbisha Shoshone that indicated they would discuss the project at the next tribal meeting. A second response was received from Bill Helmer, Tribal Historic Preservation Officer for the Big Pine Band of Owens Valley Paiute stating that the tribe would like to discuss the project with staff. Staff followed up with all NAHC listed tribes, including the two tribes that formally responded, via subsequent phone conversations and face-to-face meetings.

The NAHC's record searches of the Sacred Lands file, conducted by both CH2MHill and staff, did not indicate the presence of Native American cultural resources on or within one mile of the HHSEGS site. However, the Sacred Lands file only contains those resources that tribes are willing to publically identify and cannot be considered a comprehensive list of places and objects that Native Americans consider sacred or otherwise important.

Field Investigations

In support of the broader research effort to identify historical resources in a PAA, the Energy Commission's Data Regulations require applicants to conduct field surveys to both relocate and identify cultural resources in or near proposed project areas, where prior surveys are more than five years old. These prescribed surveys include pedestrian archaeological surveys and built-environment windshield surveys. Additionally, staff may ask applicants to undertake geoarchaeological investigations or conduct additional fieldwork to support CRHR eligibility evaluations of the archaeological resources present in a PAA.

For the present siting case, the applicant provided field survey information as part of the AFC and in a confidential Cultural Resources Technical Report (CRTR), and additional survey and geoarchaeological information in response to staff's Data Requests. **Cultural Resources Table 3** lists the field investigations consulted or conducted by staff for the present analysis. The field methods and results of these investigations are detailed below. This information was augmented by staff's independent research and ethnographic resource study.

CULTURAL RESOURCES Table 3
Cultural Resource Investigations by Staff
Consulted for the Present Analysis

Investigation Type	*Results*	*Report Reference*
Geoarchaeological and Evaluation Phase Archaeological Investigations	Documentation of near-surface stratigraphy of the project site	CH2 DR128
Initial Intensive Pedestrian Cultural Resources Survey of the Facility Site	One previously recorded prehistoric archaeological site revisited, and ten new prehistoric[1], one new historical, and one new indeterminate-age archaeological site found	CRTR 2011a
Intensive Pedestrian Cultural Resources Surveys of the Transmission Line and Natural Gas Pipeline Alignments	Not available	Not available
Intensive Historic Trails and Roads Survey	One previously recorded historic trail, one previously recorded historic road, and 6 new roads/trails.	CH2 DR125
Ethnographic Resource Study	Three ethnographic landscapes: 1. Salt Song Landscape 2. Pahrump Paiute Home Landscape 3. Ma hav Landscape	HHSEGS Ethnographic Report prepare by Energy Commission staff.
The Old Spanish Trail National Historic Trail: A Report on Cultural and Visual Resource in the Near Vicinity of the Proposed Hidden Hills Solar Energy System Plant, Inyo County, California	Old Spanish Trail National Historic Trail	OSTA 2012

Investigation Type	*Results*	*Report Reference*
Draft National Historic Trail Feasibility Study and Environmental Assessment	Old Spanish Trail National Historic Trail	NPS 2000b

[1] The technical report for this survey documents a total of 13 new archaeological sites. Energy Commission staff, on the basis of a field examination, determined that one of the newly recorded prehistoric archaeological sites (Temporary No. S-2) was actually the result of recent historic activity.

Archaeological Field Investigations

Geoarchaeological Research

The original *Cultural Resources* section of the AFC does not include a subsection on the geoarchaeology of that portion of Pahrump Valley in which the proposed project is sited (HHSG 2011c). Supplement B to the AFC, in response to staff concerns during data adequacy about the interpretation and documentation of resource integrity, provides general information on the present and past climates of the project area, narrowly focused geologic and geomorphic contexts, and local surface and near-surface hydrology. This information is the result of background research, the applicant's geomorphic reconnaissance, and data from unrelated geotechnical and paleontological investigations for the proposed project. Staff requested that the applicant provide supplemental geologic and geomorphic information for different portions of the project area of analysis to, variably, finalize research on some issues and to assess whether other issues would require further research. The applicant, in the context of responses to staff data requests, ultimately provided adequate information on various aspects of the project site. A geoarchaeological field investigation, done in conjunction with an investigation to support historic significance evaluations of prehistoric archaeological deposits on the project site (Lawson et al. 2012), was one such source of information. Additional information that staff believes is necessary to our understanding of the character of a number of cultural resources in the broader PAA, beyond the project site, has not yet been provided and is presently unavailable to staff.

Geoarchaeological Field Investigation

Methods

The primary purpose of the geoarchaeological field investigation of the proposed facility site was to help assess the likelihood that archaeological deposits would be found buried there. The focus of the investigation was the excavation of three backhoe trenches in the small alluvial fan sequences (Units Qa1, Qa2) (see the *Geomorphology* subsection, above) that blanket the northeastern portion of the facility site (Lawson et al. 2012:12 and 13). The floor of the basin to the west was not subject to excavation, because those sediments are thought to be of late Pleistocene age (see *Geomorphology* subsection, above). The three trenches on the fan sequences were oriented to be perpendicular to the local former or active direction of surface flow for precipitation runoff. The trenches were approximately three feet in width and were 150 to 300 feet in length. Trench excavation was routinely to a depth of five feet and is reported to have been monitored by one archaeologist. The trench monitor made careful observation of trench walls in an effort to discern stratigraphic characteristics such as soil horizons, man-made sedimentary deposits, contacts between natural

sedimentary layers, and variations in sediment composition. Three- to five-cubic-foot samples of trench fill were screened for every 50 feet of excavated trench. Profile drawings and photographic documentation of trench stratigraphy were also made every 50 feet.

Results

The information gathered as a result of the excavation of the three geoarchaeological trenches provides support of the interpretations of the geomorphology of the proposed facility site that have been made previously on the basis of surface observation (see *Geomorphology* subsection, above). Trenches 1 and 3 provide information on the relatively older, more stable alluvial fan surfaces of units Qa2 and Qa1, respectively. Trench 2 investigates the sedimentary profile of an active unit Qa1 ephemeral stream where it debouches onto the basin floor at the toe of that particular alluvial fan lobe.

Trench 1 was placed in the northeastern portion of the proposed Unit 2 heliostat field near the northernmost boundary of unit Qa2. The trench was excavated to a length of 150 feet. It was not excavated further because the monitor judged the excavated deposits to lack the potential for buried cultural remains. The initial 50–70 cm of the trench profile revealed a sandy, gravelly alluvium that displayed a great deal of variability along the trench in the depositional energy responsible for the observed sedimentary deposits. Individual depositional events were evident in sedimentary sequences that began with coarse gravels that rapidly changed to sands toward the top of each sequence, or fining-upward sequences. The profiles of multiple former stream channels are evident in the trench profile and cross-cut one another. No artifacts, anthropogenic features, fossils, or organic matter were found in the profile of this portion of a unit Qa2 alluvial fan lobe. The monitor notes the presence of a probable Pleistocene age deposit at 50–70 cm below the excavated surface. The description of that deeper deposit is unavailable.

Trench 2 was placed in the southeastern portion of the proposed Unit 1 heliostat field near the southwestern boundary of unit Qa1. The trench was excavated to a length of 300 feet in order to capture a more comprehensive sweep of stratigraphic information on a relatively broad unit Qa1 ephemeral stream channel and a low alluvial terrace associated with it. The trench revealed a profile that is characteristic of deposition in a stream environment, or fluvial deposition. Better sorted and more rounded gravels that are characteristic of stream channel deposits were observed in trench profiles, as were thicker fining-upward sequences where layers of fine sand and silt are more prominent and indicate stream channel and near-stream channel deposition. No artifacts, anthropogenic sedimentary deposits, fossils, paleosols, or organic matter were found in the profile of this portion of a unit Qa1 alluvial fan toe. What appear to be charcoal flecks were noted in the trench profile, and several of these were collected.

Trench 3 was placed in the northeastern portion of the proposed Unit 1 heliostat field in unit Qa1. The trench was excavated to a length of 150 feet. It was not excavated further because the monitor judged the excavated deposits to lack the potential for buried cultural remains. The upper approximately 1.4 m of the trench profile revealed a sandy, gravelly alluvium where multiple, moderately thick fining-upward sequences of gravel and sand, here thicker than analogous sequences in Trench 1, are thought to indicate

wider stream channels on the surface of this particular alluvial fan lobe. No artifacts, anthropogenic features, fossils, paleosols or organic matter were found in the profile of this portion of a unit Qa1 alluvial fan lobe. The base of this fan lobe unit terminates abruptly approximately 1.4 m below the present surface on an undulating surface of the late Pleistocene-age sediments of the basin fill (Qbf). The undulating surface appears to be consistent with a mid-Holocene period of marked erosion.

The results of the geoarchaeological field research support the interpretations of the geomorphology of the proposed facility site that had been previously made (see *Geomorphology* subsection, above), but are unable to negate the potential presence of buried archaeological deposits in the alluvial fans along its eastern margin. The identification of the strongly eroded, mid-Holocene contact between the Pleistocene-age basin fill and the overlying alluvial fan deposits well supports the interpretation of the fans as Holocene, most likely late Holocene, landforms. The applicant interprets the absence of artifacts, archaeological features, anthropogenic sedimentary deposits, or paleosols to indicate the absence of potential subsurface archaeological sensitivity (Lawson et al. 2012:13). Staff interprets that data differently. In consideration of the fact that the archaeological deposits that have been found to date on the surface of the proposed facility site are all relatively sparse scatters of chipped stone, staff would anticipate any buried archaeological deposits to be similar, and, therefore, difficult to discern in a backhoe trench profile. The difficulty of identifying buried archaeological deposits in Trenches 1 through 3 was undoubtedly compounded by the fact that only one of the trenches, Trench 1, fell inside the known cluster of archaeological sites centered in the northeastern portion of the proposed Unit 2 heliostat field (see *Prehistoric Archaeological Resources on the Proposed Facility Site* subsection, below), an area probably more likely to have such buried deposits. Staff believes that the alluvial fan sequence along the eastern margin of the proposed project site is young enough in age, post mid-Holocene, and has sedimentary portions, or facies, that are of low enough depositional energy to bury material culture remains and to preserve the original spatial associations among them. Staff interprets the subject alluvial fan sequence, absent finer resolution data, to most likely contain buried, intact archaeological deposits. The extremely small subsurface data set for the proposed facility site precludes a meaningful assessment of the potential frequency of these deposits.

Intensive Pedestrian Cultural Resources Survey

Archaeologists for the applicant conducted an intensive pedestrian survey on the site of the proposed facility in an effort to construct a more complete inventory of the cultural resources on which the construction and operation of the facility would have potential effects (CRTR 2011b). The results of the survey provide information on the location and the character of the cultural resources on the present surface of the facility site, and contributes to the analysis of the proposed project's potential direct physical effects on them.

Intensive pedestrian cultural resources surveys for the proposed project's transmission line and natural gas pipeline alignments are presently underway in Nevada. The applicant has made preliminary and incomplete draft results of these surveys available to staff as personal communications from the applicant's environmental consultants.

Methods

The methodology of the applicant's intensive pedestrian cultural resources survey reflected their attempt to comply with the Energy Commission's siting regulations (Cal. Code Regs., tit. 20, § 1701 et seq., app. B, subd. (g)). The requisite survey of built-environment resources, however, from the edge of the 200-foot buffer zone out to one half of a mile from the project site boundary was not an aspect of this survey and was conducted at a later date (CH2 2012a) (see *Built-Environment Field Activities* subsection, below). The survey of the HHSEGS facility site was conducted sporadically during March through June, 2011, over a total of approximately 19 field days (CRTR 2011b:1). The survey area was the entire proposed facility site, the construction laydown area adjacent to the western boundary of that site, and a 200-foot buffer area around both the facility site and the laydown area. The archaeologists for the applicant report that survey transect intervals varied from 10–15 m in width (CRTR 2011b:49-50) across the relatively flat expanse of alluvial sediments that characterize the vicinity of the proposed facility site. No explanation is available for transect interval variability. The visibility of the ground surface during the survey is reported to have been excellent. Visibility was approximately 90 percent or higher. Evidence of the subsurface structure of the local natural sedimentary deposits was limited to the odd rodent borrow and sporadic, shallowly incised ephemeral stream channels. Rodent borrow fill and exposed stream bank cuts were observed, when present. Survey crews navigated through the survey area with hand-held Trimble GeoXT submeter global positioning system (GPS) units. The units were loaded with survey area geographic information system overlays and overlays of previously recorded cultural resources. The actual survey transects were mapped in the field with the GPS units, as were the newly found and previously recorded sites. Notes were taken on and photographs were made of both newly found and previously recorded sites. Constituent site artifact and ecofact assemblages were also documented in this manner, but not collected. For the purposes of this survey, the definition of an archaeological site was any group of five or more artifacts or ecofacts on the same landform, where each specimen was no greater than 50 m apart. Archaeological features, whether isolated or associated with other features or with artifacts and ecofacts, were also documented as archaeological sites. Groups of five or more artifacts less than 50 m apart but spread across different landforms were split into separate archaeological sites by landform. Groups of four or fewer artifacts were documented as Isolated Occurrences (IOs).

Results

One previously recorded and 13 new archaeological sites and 49 IOs were found as a result of the intensive pedestrian cultural resources survey (**Cultural Resources Table 7**, see Inventory of Cultural Resources in the Project Areas of Analysis, below). The 14 archaeological sites were originally reported (CRTR 2011b:53 and 54) to include 12 prehistoric sites, one historical archaeological site, and one site of indeterminate age. Subsequently, staff determined, on the basis of field examination, that one of the newly recorded archaeological sites (site S-2) was primarily the result of recent historic activity and dropped it from further consideration. The archaeologists for the applicant also made the determination during the Phase II field investigation of a subset of the prehistoric sites (Lawson et al. 2012x) that archaeological sites S-10 and S-11 qualify as a single archaeological site under the definition in use for the present analysis. The

adjusted archaeological site count leaves a total of 12 archaeological sites, 10 of which are prehistoric, one of which is historic-period, and one of which is of indeterminate age. No ethnographic resources were identified in conjunction with this survey, nor were any intact structures found in the survey area (CRTR 2011b:53). The trails and roads that relate to the project area of analysis are discussed below as built-environment resources (see Built-Environment Field Activities, below).

Archaeological Resource Inventory of the Proposed Facility Site

Prehistoric Archaeological Resource Inventory

Prehistoric archaeological resources make up the bulk of the cultural resources inventory on the proposed facility site. The prehistoric archaeological *sites* (as distinct from prehistoric IOs of four or fewer artifacts) cluster in an area that ranges from the far southeastern corner of the proposed heliostat field for Unit 1 across the majority of the northeastern heliostat field for Unit 2 and into the proposed Common Area (**Cultural Resources Figure 3**). These sites are all relatively sparse (1 artifact/0.7–344 m^2) surface scatters of chipped stone, or relatively sparse lithic scatters. Half of the sites are scatters of nothing other than stone flakes, or debitage, 20 percent include debitage and stone cores from which flakes have been detached, and 30 percent of the sites include debitage, cores, and one to three flake tools. The debitage on these sites is predominately large (~ 3–7 cm), primary and secondary flakes that most likely represent the testing and initial reduction of surface cobbles to produce toolstone-quality flakes. Tertiary, or interior flakes are a minor component of the assemblages, when present at all. Typical cores appear to indicate flake detachment in multiple directions (multidirectional core), and the rare flake tools appear to largely reflect the use of unmodified, expediently-produced flakes. The reported material types include rhyolite, chert, welded tuff, and indeterminate igneous stone. The archaeological sites for which chert is reported as the most common material type cluster along the eastern boundary of the Common Area. The sites further to the west, out where the Unit 1 and Unit 2 heliostat fields are proposed, contain little or no chert.

The distribution of prehistoric IOs (N=31) mirrors, in part, the distribution of the prehistoric archaeological sites (**Cultural Resources Figure 3**). The majority (N=23) of the prehistoric IOs were found in a zone that subsumes the cluster of prehistoric sites in the east-central portion of the proposed facility site. The IOs in this zone are predominantly (N=21) unmodified and non-utilized flakes plus one edge-modified flake and one utilized flake. The balance of the prehistoric IOs (N=8) are spread out in a very sparse, narrow zone across the extreme southern end of the facility site, south of the proposed location of the Unit 2 power tower. This artifact group is again predominately (N=6) flakes, but also includes a fragmentary bifacial tool, and a fragmentary and a whole metate which were found together, the latter being the only artifacts found on the proposed facility site that were not chipped stone.

The inventory of prehistoric archaeological resources on the proposed facility site indicates a marginal and transitory use of the floor of Pahrump Valley. Although alluvial fan and eolian sand deposition along the eastern side of the facility site have probably buried archaeological deposits during the Holocene epoch and thus reduced the material signature of past human behavior on the surface of that area, the small number and extremely sparse character of the known prehistoric archaeological sites, and the

sparse distribution of the prehistoric IOs strongly suggest that the use of this area was quite infrequent and transitory. The prehistoric archaeological sites overwhelmingly appear to represent the fortuitous collection, assaying, and initial reduction of surface cobbles in search of toolstone-quality material, presumably for the production of expedient flake tools. The concentration of prehistoric sites and IOs toward the east-central portion of the proposed facility site most likely owes its location to the particular character of the outcrops of pre-Holocene alluvium immediately to the northeast of the facility site boundary. The outcrops are gravelly deposits that include Paleozoic era (ca. 542–251 mya) limestone gravels and cobbles, and rare chert nodules. These Paleozoic rocks presumably eroded out of and down the Spring Mountains, became incorporated into the alluvial fan deposits which were subsequently re-exposed along the Pahrump Valley fault zone, and eroded back out and over the facility site boundary. The distribution of the sparse smear of prehistoric IOs across the extreme southern end of the facility site may be related to the presence of desert pavements there in various states of development. The locations of the artifact group and the pavement area appear to roughly co-vary (**Cultural Resources Figure 4**). The alluvium in which the pavements have developed contains basalt and other volcanic rock from a former stream that may have once flowed north from Sandy Valley. The desert pavements, like the eroding outcrops of gravelly pre-Holocene alluvium to the east, appear to have served as convenient and incidental local toolstone sources. The collection and use of the chert nodules and the various igneous rocks found on the facility site appear to have most likely been incidental pursuits as people traversed the area on their way to other places, down from the Spring Mountains, through the mesquite woodland-shrouded sand dunes just up off of the basin floor to the east, to the former lake that is now Pahrump playa, and into the Nopah Range.

Historical Archaeological Resource Inventory

The historical archaeological component of the cultural resources inventory for the proposed facility site is quite limited. The historical archaeological resources include one archaeological site, an apparent 1960s refuse scatter, and 18 historical archaeological Isolated Occurrences. The one historical archaeological site was found in the near vicinity of the proposed Unit 2 power tower. It is a relatively small, sparse scatter of tin cans and bottle glass adjacent to a dirt road. The IOs are eleven pieces of historic refuse recorded as nine resources, and nine General Land Office (GLO) benchmarks dated 1933 and 1934. The historic refuse includes seven tin cans that range in date from approximately the 1880s to the 1960s, two hinged lid tobacco tins, a mule shoe, and an embossed bottle cap. These items are spread extremely sparsely across the eastern half of the proposed facility site and most likely represent incidental discards over the last approximately 130 years. The GLO benchmarks are all found along the dirt road that delimits the northeastern boundary of the facility site.

An Indeterminate Archaeological Resource

The archaeologists for the applicant found one archaeological resource the age of which is presently indeterminate. The resource is a relatively small cairn of 26 cobbles and boulders in the Common Area of the proposed facility site. No artifacts or other material evidence of human behavior was found in association with the cairn. There is no reliable evidence to establish a date or a function for the resource.

Intensive Pedestrian Cultural Resources Surveys of the Transmission Line and Natural Gas Pipeline Alignments

The results of intensive pedestrian cultural resources surveys for the proposed project's transmission and natural gas pipeline alignments are presently not available. The locations of these alignments, all of which are in Nevada, have been fluid since the August 2011 filing of the original AFC. Staff's consideration of any archaeological resources found along the alignments would, due to the limitations of the Energy Commission's jurisdiction, focus only on the effects that the construction and operation of the facility site in California would have on significant archaeological resources in Nevada. The effects that the construction and operation of the transmission and natural gas pipelines in Nevada would have on significant archaeological resources in Nevada would be beyond the Energy Commission's jurisdiction.

Summary of the Character of the Archaeological Resource Inventory for the California Portion of the Proposed Project Area

The archaeological resource inventory for the facility site and adjacent temporary construction area comports relatively well with the character of the inventory that one would anticipate on the basis of the results of prior investigations on the floor of Pahrump Valley. The extrapolation of the results of those previous efforts indicate a site frequency in the vicinity of the proposed project area of approximately one site per 548 acres with prehistoric lithic scatters as the only archaeological site type. The results of the intensive pedestrian cultural resources survey for HHSEGS documents a site frequency for the facility site and temporary construction area of one site per approximately 252 acres, or roughly twice the frequency that would reasonably have been anticipated, and prehistoric lithic scatters, at approximately 84 percent, as the predominate archaeological site type. Historical refuse deposits and indeterminate archaeological sites round out the actual cultural resources inventory at approximately eight percent each. At a relatively coarse level of resolution, the cultural resources inventory for the California portion of the proposed project area is relatively consistent with the reasonably anticipated character of that inventory. Staff believes, therefore, that the archaeological research efforts for this portion of the larger project area of analysis have produced results reliable enough to support an Energy Commission decision on the application for the project. Information on the cultural resources inventory in the broader PAA, outside of the proposed facility site and temporary construction area, has not yet been made available to staff.

Summary of the Character of the Archaeological Resource Inventory beyond the Proposed Facility Site in California and Nevada

The Archaeological Resources PAA extends well beyond the proposed facility site and temporary construction area in California and the different alternative routes of the transmission lines and the natural gas pipeline in Nevada that would serve the facility and distribute the energy that the facility would produce. The broad extent of the scope of the present analysis reflects the broad reach of the proposed project's potential visual effects. The applicant's reluctance during the present siting case to provide information on potential historical resources beyond the facility site precludes staff's ability to comment with a high degree of confidence whether and where the proposed project

may significantly degrade the visual integrity of archaeological resources further from the facility site. There may be archaeological resources on the more prominent peaks of the Nopah Range to the west of the proposed project and among the lower eastern reaches of that range. There may also be such resources on Mount Charleston and other prominent peaks of the Spring Mountains and along the western shoulder of the range above the proposed facility site. Information on the cultural resources inventory in these areas of the PAA have not yet been made available to staff. On the basis of staff's informal field reconnaissance of the facility site and of east to west transects across the central portion of Pahrump Valley, staff has been able to identify and initiate the documentation of what staff refers to as the Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape. The landscape is largely in Nevada adjacent and parallel to the northeastern boundary of the facility site in California. It has been identified by staff as an archaeological landscape and an historical resource under CEQA. The landscape appears to date from a presently undetermined point in prehistory through at least the early twentieth century and includes archaeological sites, springs, mesquite groves which aboriginal cultures have used and quite probably tended for millennia, and assemblages of flora and fauna unique to the variety of mesquite woodland association that is the focus of the landscape. The landscape, as presently bounded, encompasses the relatively complex prehistoric and historic Native American archaeological resources that are known along the Pahrump Valley fault zone, types of archaeological deposits found by staff during the reconnaissance of the landscape, and, in consideration of the spare documentation of the landscape to date, most likely other unknown types of archaeological deposits. Staff has been able to take this landscape into account and address its historic preservation under CEQA, and takes any archaeological resources in the Spring Mountains or the Nopah Range to be beyond the pragmatic scope of the present analysis.

Ethnographic Field Activities

Native American Consultation

Energy Commission Cultural and Visual Resources staff held a pre-filing Native American consultation and outreach meeting on August 2, 2011, in conjunction with the applicant and BLM staff. The meeting was attended by representatives of the Pahrump Band of Southern Paiute and the Las Vegas Paiute. The purpose of the meeting was to introduce the Energy Commission staff, present the project, explain the roles of the different agencies, talk about the visual resources and cultural resources analyses, and visit the project vicinity. Although a visit to the facility site did not occur, attendees could examine photos and photo simulations of key observation points (KOPs) in the vicinity of the project.

On December 2, 2011, Energy Commission staff met for a second time with representatives of the Pahrump Band, Las Vegas Paiute, and Timbisha Shoshone in Pahrump, Nevada. Also in attendance was Kathleen Sprowl of BLM's Southern Nevada District Office. The discussion was not limited to cultural and visual resources and a wide range of questions were asked about the project in general, including potential impacts to water. The group also visited the project site in the afternoon.

At the request of the tribes, a follow-up meeting with Energy Commission technical staff, including Cultural Resources, Visual Resources, Biological Resources, Water

Resources, Alternatives, and Soils specialists, occurred on January 19, 2012, in Shoshone, California, with representatives from the Pahrump Band, Las Vegas Paiute, Timbisha Shoshone, Lone Pine Paiute, and the Moapa, to discuss specific tribal concerns regarding several aspects of the project.

Several additional meetings were held to exchange general information with affiliated tribes and to gauge tribal interest in participating in further project-related ethnographic studies. Specific tribal government representatives and individual traditional Native American practitioners were invited, based on the May, 2011 listing of tribes interested in consulting on development projects in their ancestral territories, provided by the NAHC to Energy Commission staff.

General Meeting 1 was held on January 19, 2012, in Shoshone, California, and was attended by various Energy Commission staff technical experts in the areas of Water Resources, Biological Resources, Cultural Resources, and Planning, as well as representatives of management. Participating tribes included the Pahrump Paiute Tribe, Moapa Paiute Tribe, Las Vegas Paiute Tribe, Timbisha Shoshone Tribe, and the Lone Pine Tribe of Paiute and Shoshone. The tribal attendees were a combination of tribal cultural resources and environmental protection staff and several tribal elders. Staff provided the tribes with an overview of the proposed project and updates on how various natural and cultural resource studies were proceeding. Tribal attendees asked general and clarifying questions and made statements that expressed their concerns for how the project might impact their lifeways.

Specific concerns were expressed regarding the proposed project's water use; impacts to the water-related biomes, such as the local springs that support plants and animals in the nearby coppice dunes mesquite grove complexes; and mention was made that Paiute ceremonies, generally referred to as "Salt Song Trails," occurred or were centered in, around, and running through the project area. Additional concern was expressed regarding impacts to Indian trails, including the Old Spanish Trail, and possible impacts to on-site plants, animals, and cultural resources, including possible burial or cremation sites. Cultural Resources staff proposed that an ethnographic study be conducted. Tribes agreed that an ethnographic study would be one desired action to pursue. They also indicated that the Pahrump Paiute Tribe should be central to that study and that the other tribes could provide support to the Pahrump Paiute Tribe. However, participating tribes also requested exclusive follow-up meetings with Energy Commission Cultural Resources staff.

General Meeting 2 was held on February 11, 2012, at the Hidden Hills project site and in Pahrump, Nevada. Energy Commission staff ethnographer, Thomas Gates, met with various Pahrump tribal members as a group near the project site. The membership had assembled to get clarification and a better general understanding of the proposed project parameters. The ethnographic study and the confidentiality of information that the tribe might provide were two topics discussed. Several off-project cultural resource areas were visited, including a looted Pahrump Paiute cemetery.

General Meeting 3 was held on February 12, 2012, at the Hidden Hills project site and at Sandy Valley (an alternative project site). Mr.Gates, the Energy Commission

ethnographer, met with the Moapa Tribe cultural resources staff and committee members. One Moapa tribal council person also attended, as did Pahrump tribal representatives. General HHSEGS project parameters were discussed. Some Moapa participants are descendants of Paiute families that originated from the Pahrump Valley vicinity. Cultural values attached to the Sandy Valley area were discussed. Moapa Tribe staff reiterated their previous statements that the Moapa Tribe would support the Pahrump Tribe and was interested in reviewing the ethnographic report prior to finalization. They also reiterated concerns voiced at the first general meeting about impacts to water, springs, plants, and animals, and the Salt Song ceremonies.

General Meeting 4 was held on February 14, 2012, with the Owens Valley Indian Water Commission. Representatives from the Uta Gwaitu Paiute Tribe, Bishop Paiute Tribe, Big Pine Paiute Tribe, Fort Independence Paiute Tribe, Lone Pine Paiute and Shoshone Tribe, and Timbisha Shoshone Tribe participated. The general HHSEGS project, as proposed, was discussed and the ethnographic study concept was presented. Participants agreed that the project area was within Southern Paiute Territory (as contrasted with Owens Valley Paiute territory) and that the Pahrump Tribe was the most affiliated tribe to work with, but that some Southern Paiute families had ended up as tribal members in Owens Valley Paiute Tribes. Individual families were identified.

General Meeting 5 was held on May 12, 2012, with the Pahrump Paiute Tribe. A draft of the ethnographic report was generally reviewed and the Energy Commission project review process was discussed. Sections of the ethnographic report included in this analysis were identified by staff and the Pahrump Tribe as non-confidential and form the basis of staff's conclusions and recommended mitigation measures.

Since May, 2012, staff has continued to consult with the Pahrump Tribe on possible ways to mitigate the project's impacts on tribal cultural and religious practices and the traditional use of ancestral lands. Staff will continue to consult with the Tribes during the licensing process.

Ethnographic Study

Ethnographic Methods

An ethnography, at its best, takes years to complete. Ethnographers can spend a lifetime studying another culture and still find that their cross-cultural knowledge of their "second" culture is incomplete. Minimally, it is advised to spend at least one year in studying another culture so that one can learn about the various seasonal variations and adaptations. Academic and self-funded anthropologists may have such luxury. However, the merits of ethnography, when employed to understand project impacts to ethnographic resources, often require less than optimal study durations. One method, called "Rapid Cultural Assessment" (RCA) was developed in the 1930s to assist sociologists' understanding of American rural agricultural community responses to socioeconomic impacts ensuing from evolving environmental conditions.

The National Park Service (NPS) has developed similar methods for understanding ethnographic resources within the shortened time frames related to project review. The NPS method, called Rapid Ethnographic Assessment Procedures (REAP), was generally followed for this project-related ethnographic study. REAP consists of a

selection of ethnographic methods that relies on interview, observation, and research techniques to describe a way of life common to a group of people, including their knowledge, customs, beliefs, social habits, technology, arts, values, and institutions. REAP involves active participation of people in a cultural group to render representations of a way of life from a community's point of view. Unlike traditional ethnography, REAP focuses investigations and resultant descriptions on solving specific problems or issues that may arise as a result of proceeding with a development project (NPS 2007).

REAP's methods are:

1. Group meetings/interviews where the ethnographer explains the project to the group, answers general questions, and solicits immediate responses, fears, apprehensions, benefits, or other general perceptions from the participants concerning the project, the area where the project is being proposed, and the general connections of traditional people to the project area. Often issues of confidentiality are discussed. The ethnographer may be successful in scheduling follow-up activities with specific individuals to increase ethnographic understanding.

2. Areas worth further ethnographic inquiry are identified; a research design, including research/interview questions, is developed; and specific people are scheduled by the ethnographer and the group for follow-up interviews. Follow-up interviews should be conducted according to the protocols of documentation and confidentiality identified during the group meeting/interview. Interview notes, however recorded, should be vetted with the source individuals to verify accuracy and to gather additional nuanced information.

3. Follow-up interviews with the same or additional people often occur while both the ethnographer and the community begin to further think about the project, the project effects, and additional information that is necessary for fully identifying, evaluating, assessing effects, or otherwise considering impacts to ethnographic resources.

4. As Steps 1 through 3 are being conducted, a parallel archival "search, retrieve, and assess" process should be undertaken to provide supporting or conflicting information to what is being discovered through the interview process. In addition to archive, book store, and other informational repositories (e.g., the internet), the people themselves or other ethnographers with previous experiences with the same people, may provide source materials.

5. Field visits help the ethnographer triangulate between what people currently say, what people have written in the past, and what is actually or perceived to be in the project area as a potential ethnographic resource.

Research Design

Based upon these general meetings, an abbreviated research design was developed for the HHSEGS project ethnography that generated various research questions or directives. The following research design provided general guidance for preliminary archival research and allowed staff to prepare for interviews.

- Research specific Pahrump Valley Native American history and culture beyond what is generally provided in the CH2MHill Cultural Resources report prepared for the HHSEGS AFC.
- Determine what plants and animals that have Southern Paiute cultural significance are or may be located in the project area. Plants and animals determined to have attached Southern Paiute cultural values should be further studied to understand ethno-botanical and ethno-zoological details.
- Research the history of Southern Paiute water knowledge and use in the Pahrump Valley and surrounding mountains.
- Research and understand the importance of springs, mesquite groves, and the surrounding coppice dune environs in the project area for the continuance of Southern Paiute lifeways.
- Research and understand the Round dance, Harvest dance, and Cry ceremonies performed in the Pahrump Valley and specifically the ceremony held in 1933 at Hidden Springs Ranch. Determine to what extent these ceremonies are still practiced today and to what extent the proposed project would impact such ceremonies.
- Research and further understand the history, practices, and meaning of the Salt Song trail; deer and big horn sheep mourning songs; and Coyote and Wolf legends, with emphasis on ethno-geography and specific attention paid to the nature of the trail aspects of these songs and related ceremonies.
- Research the history of Southern Paiute horticulture in the project area from pre-contact to current times.
- Research and map, to the extent feasible, Native American trails located in and near the project area that are not necessarily “Salt Song Trails.”
- Understand to what extent the Old Spanish Trail is also a Native American trail.
- Particularly research the Native American slave traffic that occurred along the Old Spanish Trail.
- Inquire and document the importance of Charleston Peak, Spring Mountains, Kingston Mountains, Nopah Mountains, the Last Chance Mountains, and other surrounding landforms in general and as view- or auditory-sheds in relation to the project area and to other landforms.
- Research traditional and current Southern Paiute burial practices, including cremation.
- Inquire as to the interrelation of Paiute and Shoshone culture in general and specifically in project area.
- Research the history of tribal governments: Moapa, Las Vegas, Pahrump, Timbisha Shoshone, Lone Pine, Independence, Big Pine, Bishop, and Benton.

Interviews

Staff determined, based upon limited time, budget constraints, and the general attitude of most Native Americans who participated in the general meetings that an open-ended question/answer dialogue style of interviewing would be more effective than a formal interview style that would require protracted review of the research questions, the possible need to develop a formal questionnaire, and other methods of recordation. Instead, hand-written notes were taken by the ethnographer. These notes were then typed up within a few days and returned to the person interviewed for further review with instructions to make changes including deletions and additions. The ethnographer also asked interviewees to identify what information in the interviews should remain confidential.

Interviews were conducted with the following Southern Paiute and Shoshone individuals:

- Clarabelle Jim, Elder Pahrump Paiute Tribe
- Lorraine Jim, Elder Pahrump Paiute Tribe
- Cynthia Lynch, Elder Pahrump Paiute Tribe
- Richard Arnold, Traditional Religious Practitioner Pahrump Paiute Tribe
- George Ross, Elder Pahrump Tribal Member
- Vernon Lee, Moapa Tribal Member of Pahrump Paiute ancestry
- Juanita Kinlichine, Elder Moapa Tribal Member of Pahrump Paiute ancestry
- Lalovi Miller, Elder Moapa Tribal Member of Pahrump Paiute ancestry
- Philbert Swain, Elder Moapa Tribal Member
- Barbara Durham, Tribal Historic Preservation Officer for the Timbisha Shoshone Tribe and Timbisha Shoshone Tribal member

Follow-up interviews were conducted with Clarabelle Jim, Cynthia Lynch, and Richard Arnold.

An interview with Don Hendricks was conducted on May 8, 2012, in Pahrump. Mr. Hendricks is a retired nuclear physicist, formerly employed by the Atomic Energy Commission and the Environmental Protection Agency. Mr. Hendricks is also a respected local historian, archaeologist, and member of various local and state historic societies and associations. The purpose of this interview was to further verify conflicting written and oral history dates, people, and events.

Ethnographic Method Constraints

There were inherent constraints to the ethnographic methods described above. Five such constraints are identified and further described:

1. Confidentiality of sensitive Information;

2. Abbreviated time period in which to conduct thorough ethnography;

3. Language barriers in expressing and understanding information;

4. Seasonal prohibitions against divulging certain types of information; and

5. Some seminal archival information not obtainable (Isabel Kelley's 1934 field notes).

The confidentiality of Native American sensitive cultural information—key to obtaining critically important information necessary for the completion of a thorough cultural resources analysis—became problematic due to shifting comfort levels among contributing Native Americans in understanding how the information would be used. This fact initially inhibited staff's ability to collect pertinent information in a timely manner. Once information was presented in a completed study report, the Pahrump Paiute Tribe and Energy Commission staff came to an agreement on what could be shared publically. What was finally determined sensitive and not to be shared with the public is redacted in the publically available ethnographic report (Gates 2012).

The Southern Paiute culture, and particularly traditional cultural practices related to epistemology (belief systems), world view, and religion, are extremely complex to understand within the limits of a three-month study. One Pahrump Paiute stated:

> Admittedly and with all due respect, the abbreviated ethnographic approach being used in this project appears to be designed to collect only a limited amount of information. The open-ended interviews are good for collecting certain kinds of general data, but cause concern when trying to synthesize the data.

A Moapa Paiute stated a broader concern with language barriers to cross-cultural understanding:

> English language will never get to the bottom of such things like Salt Song Trails. When we speak our language to one another, we automatically know what the other is saying. Paiute language gets right to it. In English, we have to say it a bunch of different ways, and we still are not sure if the other person understands. With Paiute, it is either yes or no, do or not do. There is no ambiguity.

Well-documented in the literature and re-stated for this study by various interviewees is a general cultural prohibition against telling culturally significant and traditional stories outside of the winter period (Fowler 1971:21, Kelly 1964:120). The Pahrump Paiute winter time is generally defined as the months of November, December, and January. Interviews were conducted in February and March.

Finally, it was determined early in this study that Isabel Kelly conducted ethnographic research among the Southern Paiute in 1932. Her research was partially recorded in her personal field notes. However, only the eastern Southern Paiute (those Paiute residing in Utah and northern Arizona) were discussed in Kelly's seminal work *Southern Paiute Ethnography,* published in 1964. While staff was able to incorporate some comparative information from that ethnography into this report, Kelly's information for

the western Southern Paiute was not obtainable, although several efforts were made by Energy Commission staff to obtain copies of her field notes.

Constraints were either *surmountable*, *partially surmountable,* or *not surmountable* as described below.

1. A confidentiality agreement was struck between Energy Commission staff ethnographer and the Pahrump Paiute Tribe representatives that guaranteed confidentiality of information provided. *Constraint Surmounted*.

2. Rapid Ethnographic Assessment Procedures (REAP) were adapted to this ethnographic study. While REAP cannot replace the quality of long-term ethnography, it does provide some ability to include consideration of ethnographic resources in the Energy Commission environmental project assessment of HHSEGS, for which Energy Commission staff had only a few months to conduct independent research. *Constraint Partially Surmounted*.

3. The cultural resources staff author of the publically available ethnographic report does not speak or understand Southern Paiute, and there are few other non-Southern Paiute that speak the language. Four of the Southern Paiute interviewees spoke English as a second language. However, their English language skills were proficient enough to convey partial understanding and some interviews were followed up with second interviews to verify previously recorded information. However, information conveyed in this report is provided in the English written language only. *Constraint Not Surmountable*.

4. A prohibition prevents traditional stories, many of the stories holding embedded information sought for this study, from being told in entirety during the months that this research was conducted. Interviewees could tell pieces of stories or otherwise provide specific information without breaking the prohibition. In addition, some literature discovered through archival research further substantiated the fragments that were provided through interview. However, an exhaustive review of significant oral history was not possible. *Constraint Partially Surmounted*.

5. While previously recorded seminal ethnographic information was not obtained from Kelly's field notes, similar information was gathered from other sources, including a Southern Paiute section included in the *Smithsonian Handbook of North American Indians,* Volume 11, and written by Kelly and Fowler (Kelly 1982: pp. 368-397) that did rely on the field notes in question. *Constraint Partially Surmounted*.

Results of Ethnography

Attributes, Elements, or Features of Southern Paiute Lifeways

While a research design guided staff's initial inquiries, after interviews were conducted the information acquired showed consistent themes that grouped into seven attributes. Therefore the ethnographic report analysis divides Pahrump life-ways, and how those life-ways are intertwined with a landscape, into seven attributes: water, plants, animals, horticulture, trails, landforms, and ceremonies. It should be noted that there is crossover between categories. For example, trails are waterways, trails are songs, trails are

ceremony, trails are for hunting and gathering, and trails run through all of the landforms that allow Southern Paiute (and others) to travel among the mountains, valleys, gardens, plants and animals, and homes and camps. Likewise, any of the other attributes can be explained in terms of, or have overlaps with, the other attributes. The Pahrump Paiute world is one holistic phenomenon. This whole is segmented into attributes so that non-Paiute can understand something about the life-ways of a different people.

Paiute and Shoshone people from the various tribes consulted for this study continue to practice their traditional ways as best they can against the backdrop of a modern dominant society and the various developments that come with that modern society.

Ethnographic Landscapes

An ethnographic landscape is defined generally as a landscape containing a variety of natural and cultural resources that associated people define as heritage resources, as noted in this section's introduction. Ethnographic landscapes can have considerable overlap with what are called traditional cultural properties. Traditional cultural properties are synonymous with the term "place." Places and areas are types of cultural resources that can be synonymous with traditional cultural properties and ethnographic landscapes. The term ethnographic landscape will be used to generally refer to the types of resources that are considered in this report; however, staff, by using the term, ethnographic landscape, also intends that usage to mean an "area" or "place," per the CEQA definition of historical resource.

As a result of staff's ethnographic study, staff identified three overlapping ethnographic landscapes that the HHSEGS project could impact. They have as their contributing attributes, elements, or features the following: water, plants, animals, horticultural gardens, trails, landforms, and religious practices. All three landscapes include the entire project area within their boundaries and are within the ethnographic PAA. The three landscapes are:

1. Southern Paiute Salt Song Landscape

2. Pahrump Paiute Home Landscape

3. Ma-hav Landscape

Cultural Resources Tables 4, 5, and 6, below, provide a listing of contributing features, a description, and other relevant information for understanding the natural and cultural make-up of the three landscapes.

CULTURAL RESOURCES Table 4
Contributing Features of the *Salt Song Landscape* Related to the Hidden Hills Solar Energy Generating Systems Project Vicinity (Figure 4)

FEATURE	DESCRIPTION
Water	Puha, Spirits, Springs, Creeks, Flats, Washes, Creeks.
Plants	Puha, Spirits, Plants along the trail and in project vicinity. There are 364 plants related to the Salt Song Trail.
Animals	Puha, Spirits, Animals, Insects. There are 174 animals related to the Salt Song Trail.
Horticulture	Puha, Spirits, Springs Horticulture is a secondary aspect of the primary aspect of water, specifically springs and the activities that occur near springs.
Landforms	Potosi Mountain, Sandy Valley, Kingston Mountains, Nopah Range, Resting Springs Range, Lizard Mountain, Sterling Mountain, Pahrump Valley Floor including Playa.
Trails	Puha, Spirits, Humans, Animals. All Southern Paiute living and deceased participate in the Salt Song Trail. The trail is a path on the ground, a corridor on and above the ground, and an auditory sound scape.
Ceremony	Puha, various types of ceremonies related to funerals and memorials. Ceremonies require aesthetically compatible viewsheds, noise free space and foreign-odor free space.

CULTURAL RESOURCES Table 5[13]
Contributing Features of the *Pahrump Home Landscape* Related to the Hidden Hills Solar Energy Generating Systems Project Vicinity (Figure 1)

	DESCRIPTION
Water	**FEATURE**
Plants	(See Staff's Ethnographic Report for a full-list)
Animals	(See Staff's Ethnographic Report for a full-list)
Horticulture	Corn, squash, gourds, pumpkins, melons, sunflower, amaranth, winter wheat, various beans, and Devil's claw. Irrigation systems Garden plots
Trails	Lateral trails along the valley floor Lateral trails along the valley spring escarpments Lateral trails along the mountain side Vertical trails that connect the valley floor with the high elevations of the Spring Mountains Trails that connect various districts/tribes and the larger Southern Paiute Nations These trails include the Old Spanish Trail and the later and overlapping Mormon Road.
Ceremony	All of the ceremonies identified in this analysis and the Ceremony section of the Ethnographic Report for the Hidden Hills project. Some ceremonies are site specific and some ceremonies can be held based upon a consensus of the involved practitioners and affiliated families

[13] The contributing features that are characterized as landforms is omitted from this table because the landforms list for the Pahrump Paiute Home Landscape are numerous, and those landforms related to the project vicinity are best described in the Ma-hav landscape table below.

CULTURAL RESOURCES Table 6[14]
Contributing Features of the *Ma-hav Landscape* Related to the Hidden Hills Solar Energy Generating Systems Project Vicinity (Figure 5)

FEATURE	DESCRIPTION
Water	Stump Spring, Hidden Hills Ranch Spring, Browns Spring, Weeping Rock Seep, and other unnamed springs within the Ma hav Landscape boundaries as depicted on Figure 5. Edge of the Playa (Pahrump Dry Lake Bed, washes and creeks within the boundaries of the Ma-hav Landscape.
Plants	(See Staff's Ethnographic Report for a full-list)
Animals	(See Staff's Ethnographic Report for a full-list)
Horticulture	Horticulture gardens at Weeping Rock, Browns, Hidden Hills and Stumps Springs. The garden area at Hidden Hills can still be discerned today. The exact garden locations at the other springs would require further historic and archaeological investigation to determine exact locations
Trails	Trails that connected the springs, and connected the spring areas to other destination points such as the springs to the north (Mound, Manse, Pahrump), Sandy Valley to the south, the playa, Mule Springs to the east, the Trout Canyon, and Resting Springs to the west. Smaller paths in and around each of the spring areas. Tribal members assert that the project area is a traditional hunting and gathering area and that procurement activities do not necessarily follow pre-established routes

[14] The contributing features to the Ma-hav Landscape generally referred to as Landforms is omitted from this table, because landform features are cross referenced in the other contributing element types and particularly the water feature category.

FEATURE	DESCRIPTION
Ceremony	Hidden Hills Cry ceremony and Salt Song memorial; Burials and Pahrump Paiute Cemetery. It is highly probable that similar ceremonies occurred at the other Springs. Also John Stumper, being a renowned medicine man, conducted personal religious activities at or near Stump Spring.
Archaeology	Various resource procurement locations, seasonal occupation, village and homestead sites, including historic sites such as Tank Sharpe's still are located throughout the Ma-hav landscape. Archaeological information included in this staff assessment provides additional parameters for considering an archaeological district that encompasses the Ma-hav Landscape

Southern Paiute, Pahrump Paiute, and Ma-hav Ethnographic Landscapes Generally Described

The Salt Song Landscape, as described in **Cultural Resources Table 4**, encompasses portions of present-day southern California, southern Nevada, northeastern Arizona, and southwestern Utah (see **Cultural Resources Figure 4**). The boundaries encompass the Pahrump Valley and surrounding mountain ranges that collectively form the Pahrump Valley. The Salt Song Landscape is ubiquitous throughout the project area and exceeds it and the PAA in extent. Numerous bands of Southern Paiute participate in this landscape. Only such description of this song landscape as is relevant to assessing the effects of the HHSEGS project on the Salt Song Landscape is included here.

The Pahrump Paiute Home Landscape, as described in **Cultural Resources Table 5**, is a part of the Salt Song Landscape and ensues from and radiates out from and around the Spring Mountains. This landscape, extending from the western side of the Spring Range and including Pahrump Valley, Last Chance Range, Nopah Range, and the Kingston Mountains, and areas further to the north, west, and south, far exceeds the area of the project and the PAA. **Cultural Resources Figure 1** provides a general sense of some of the area mentioned. This landscape's largest extent is slightly larger than the area encircled by Chief Tecopa's 1873 homeland journey. It can be easily asserted that some portion of the eastern side of the Spring Mountains is more directly affiliated with the Las Vegas Southern Paiute, but it is not necessary for staff to specifically delineate the boundaries of the Pahrump Paiute Home Landscape because the project is on the west side of the Spring Mountains, and the west side is more directly affiliated with the Pahrump Paiute homeland. The Pahrump Paiute Home Landscape consists of numerous component landscape areas with multiple contributing

attributes, but it is not necessary, for the purposes of this document, to further describe and delineate all of the component landscapes.

The proposed project is within the Ma-hav Landscape as described in **Cultural Resources Table 6**. **Cultural Resources Figure 5** provides a delineation of the Ma-hav Landscape. It is the ethnographic landscape that most closely fits the project area and the one on which the project's impacts are most direct. Based upon the preponderance of the ethnographic information collected for this landscape, there are four specific justifications for the boundary delineations:

1. Geology: The area represents a unique geological surface covering of clay that uplifted, eroded, and flowed towards and contributes to the Pahrump Valley Dry Lake bed. The playa itself is not included because it is formed from other eroded deposits that surround the playa on all sides. This unique clay surface has supported specific plant and animal communities that are hunted and gathered by Pahrump Paiute affiliated with the Ma-hav area.

2. Watershed: The area represents a specific lower portion of the watersheds of the Trout Canyon Creek and its main tributary, the Pahrump Valley Creek. These two creeks collectively drain the southwestern portion of Mount Charleston. These watersheds are separate and distinct from watersheds that drain the northwestern slopes of Mount Charleston and that flow towards the springs north of the Ma-hav Landscape such as Mound, Manse, and Pahrump Springs. These watersheds provided a corridor for travel from the valley floor to the heights of Mount Charleston.

3. People: The area represents the closely related Pahrump Paiute families of the Lees, Weeds, Haskins, Browns, Howells, Bruces, and Toms. While these families are inter-related to other Pahrump Paiute families, and other non-Pahrump Paiute people, they tended to reside, or frequent, in and around the Ma-hav, Hidden Hills, and Charleston View areas.

4. Unique Character: The Hidden Hills springs produced less water than others in the area and so attracted non-Indian development later. The larger Pahrump Valley ranches were first established to the north around Ash Meadows, Pahrump Spring, Manse Spring and Mound Spring. As a result the Hidden Hills area was known to have a more unique set of people that differentiated themselves from the larger valley population to the north and near the city of Pahrump. In addition, specific esoteric cultural and religious knowledge was formulated, instructed, and practiced within this delineated landscape and nowhere else in the Paiute landscape. Finally this landscape and the Pahrump Paiute people that occupied it during the Spanish Trail and Mormon road periods were subjected to some of the first contacts and related hostilities ensuing from trail-side encounters.

Given that the land is a contiguous whole, this delineation is conservative. The Ma-hav Landscape boundaries could be drawn up to the crest of Mount Charleston by including the Trout Canyon and Pahrump Valley creeks. However, the upper reaches of the aforementioned creeks are included in the Pahrump Paiute Home Landscape.

Built-Environment Field Activities

The applicant's consultant conducted a windshield survey of the Calvada Springs subdivision in Charleston View, south of the project site, on December 29, 2011, and concluded that a majority of the residences within a one-half mile radius of the project site are mobile homes. Two permanent residences are located on Carpenter Avenue. Other permanent structures include barns, sheds, and other outbuildings. Original construction dates were unavailable, but a review of maps and aerial photos indicated that none were built prior to 1968 (CH2 2012a: p. 23).

The applicant's consultant also identified six trails/roads within one mile of the HHSEGS project site, and Energy Commission staff identified one additional trail/road, all possibly of greater age than 50 years. These resources are listed in **Cultural Resources Table 7**, below.

On December 2, 2011, Energy Commission staff visited the project site after meeting with representatives of the Pahrump Band, Las Vegas Paiute, and Timbisha Shoshone in Pahrump, Nevada. A Built-Environment specialist was in attendance. Staff visited the project site again on April 25, 2012. On the same trip Staff surveyed the Sandy Valley Alternative site.

SUMMARY OF CULTURAL RESOURCES LOCATED IN THE HHSEGS PROJECT AREAS OF ANALYSIS, COMPILED FROM ALL SOURCES

Cultural Resources Table 7 lists the cultural resources, identified by staff from the applicant's and staff's investigations, and their CRHR eligibility of record or as recommended by investigators. In the Impact Analysis section, below, staff presents descriptions of these resources and its determinations of their eligibility.

CULTURAL RESOURCES Table 7
Inventory of Cultural Resources in the Project Areas of Analysis
Prehistoric Archaeological Resources

Cultural Resource Type (Year of Initial Recordation)	Description	Location	CRHR Eligibility	Source of Objective Data
CA-INY-2492 (1979/2011)	Lithic scatter of 5 yellow and brown chert flakes, and 4 light brown flakes of igneous stone	E-central portion of project area	Ineligible	CRTR 2011
Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape	Landscape thematically focused on collection and processing of mesquite and other plant resources unique to the mesquite woodland-coppice dune association during the entirety of woodland's existence. Landscape elements include the archaeological deposits, the mesquite population, ancillary floral and faunal populations, and, the structural features of the faults, dunes, and aquifer discharge locales	Largely just to the NE of the project area in Nevada. Several alternate transmission line and gas pipeline routes traverse this proposed landscape	Assumed eligible under Criterion 1 and 4 (see "Evaluations of Archaeological Resources" subsection, below)	Spaulding 2012b

Cultural Resource Type (Year of Initial Recordation)	Description	Location	CRHR Eligibility	Source of Objective Data
S-1	Lithic scatter (1 piece/9.4 m^2) with 1 utilized flake, 12 flakes, and 3 pieces of shatter in a 10 m x 15 m area amidst 3 apparent recent pot-hunters' holes.		Ineligible	CRTR 2011
S-3	Lithic scatter of 6 flakes, and 2 cores, mostly in a 1 x 1 m area. Flakes include 4 primary, 1 secondary, and 1 tertiary flakes of red rhyolite and a yellowish red "welded tuff." Site on flat, undisturbed floor of the project area bolson.	E-central portion of project area	Ineligible	CRTR 2011
S-4	Original technical report describes site as lithic scatter of 41 flakes. Majority of flakes reported as a "light brown igneous medium grained material."	SE portion of project area	Ineligible	CRTR 2011; CH2 DR128
S-5	Lithic scatter of 5, "red and black banded rhyolitic material" flakes in a 50 x 50 cm area. Overall site dimensions 10 x 10 m. Field archaeologists note the flakes' association with a 5 x 10 m shallow depression that they tentatively interpret as a former spring or seep.	E-central to central portion of project area	Ineligible	CRTR 2011

Cultural Resource Type (Year of Initial Recordation)	Description	Location	CRHR Eligibility	Source of Objective Data
S-6	A 25 x 30 m lithic scatter. Surface assemblage (1 piece/53.6 m^2) includes 3 multi-directional cores of green chert and a coarse mudstone, 1 poorly described utilized basalt flake, 9 flakes and a fragmentary flake of limestone or mudstone. No subsurface assemblage.	E-central to central portion of project area	Ineligible	CRTR 2011; CH2 DR128
S-10 and -11[15]	"Large, widely dispersed lithic procurement site or quarry." Surface assemblage (1 piece/2.5 m^2) includes 3 flake tools, 9 cores, and over 150 flakes, the majority of which is said to be "light brown chert." Subsurface assemblage (variably, 0 pieces/m^3, 100 pieces/m^3, and 310 pieces/m^3) appears to have maximum depth of 10 cm and includes chert flakes	E-central portion of project area	Ineligible	CRTR 2011; CH2 DR128
S-23	10 x 10 m scatter (1 piece/5.3 m^2) with 19 secondary and tertiary flakes of a "light yellow to brown igneous material, likely a welded tuff."	E-central to central portion of project area	Ineligible	CRTR 2011; CH2 DR128

[15] Archaeological sites temporary numbers S-10 and -11 were recorded in the original intensive pedestrian survey as separate resources (Helton, Lawson, and Fergusson 2011). Subsequent work on the sites to support evaluations of their respective historical significance (Lawson, Spaulding, and Helton 2012) determined, relative to the applicant's project definition of an archaeological site (see *Intensive Pedestrian Cultural Resources Survey* subsection, below), that the two resources were actually one.

Cultural Resource Type (Year of Initial Recordation)	Description	Location	CRHR Eligibility	Source of Objective Data
S-AF-1	Lithic scatter, approximately 13 x 13 m, of approximately 25 chert flakes ranging from beige to light brown in color	Buffer area on Nevada side of E-central portion of project area	N/A	CRTR 2011
S-AF-2	4 m-diameter, 19 flake scatter (1.5 pieces/1 m^2) of material described as "caramel colored chert," surmised to have come from the same core.	SE portion of project area	Ineligible	CRTR 2011

Historical Archaeological Resources

Cultural Resource Type (Year of Initial Recordation)	Description	Location	CRHR Eligibility	Source
S-20	A 12-item scatter (150 m^2) of 1 "solder dot" can, 5 sanitary cans, 3 "soft top cans," and 3"-dia. bottle bases.	S-central portion of the project area	Ineligible	CRTR 2011

Archaeological Resources of Indeterminate Age

Cultural Resource Type (Year of Initial Recordation)	Description	Location	CRHR Eligibility	Source
S-8	22 x 33 in. rock cairn of 26 "fist- to soccer-ball-sized" stones.		Ineligible	CRTR 2011; CH2 DR128

Ethnographic Resources

Cultural Resource Type (Year of Initial Recordation)	Description	Location	CRHR Eligibility	Source
Salt Song Landscape	Ethnographic Landscape	General Location: Southeastern Utah, Southern Nevada, Northwestern Arizona, Southern California Specific Location: Corridor between Spring Mountains, Mount Charleston, Pahrump Valley, including Ma hav area, Playa and Nopah Range (**Figure 2**).	Recommended eligible under Criterion 1 at the regional level Recommended eligible under Criterion 3 at the regional level	HHSEGS Ethnographic Report

Cultural Resource Type (Year of Initial Recordation)	Description	Location	CRHR Eligibility	Source
Pahrump Paiute Home Landscape	Ethnographic Landscape	General location: area encompassed by the Chief Tecopa Journey around the Spring, Nopah, Resting Spring, and Providence Mountain Ranges Specific Location: Western Slopes of Spring Mountains, Pahrump Valley (**Figure 1**).	Recom-mended eligible under Criterion 1 at the regional level Recom-mended eligible under Criterion 2 at the regional level	HHSEGS Ethno-graphic Report

Cultural Resource Type (Year of Initial Recordation)	Description	Location	CRHR Eligibility	Source
Ma-hav Landscape	Ethnographic landscape	Ma-hav is an area of approximately 35 square miles that takes in the southeastern margins of the Pahrump Dry Lake bed, the washes that extend from the alluvial toes of Mt. Charleston down to the Pahrump Dry Lake bed, the spring areas in between that include Browns Spring, Hidden Hills Ranch Spring, Stump Spring, several unnamed spring discharge areas (including Weeping Rock Seep), the various vegetations including the Mojave Scrub, Shadscale Scrub, and the coppice dune mesquite woodland areas. The proposed project site is within the Ma-hav Landscape (**Figure 3**).	Recom-mended eligible under Criterion 1 at the local level Recom-mended eligible under Criterion 4 at the local level	HHSEGS Ethno-graphic Report

Historic-Period Built-Environment Resources

Cultural Resource Type (Year of Initial Recordation)	Description	Location	CRHR Eligibility	Source
The Old Spanish Trail[16]	The entire approximately 2,700-mile long trail	Extends from Santa Fe, New Mexico, to Los Angeles, California. Tracks/traces run through and near the project site.	Listed National Historic Trail, CRHR eligible	NPS 2000b
Old Spanish Trail/Mormon Road Historic District	Three segments in Nevada totally approximately 10 miles	Extends from the California-Nevada border east to Halfway Wash	NRHP-listed	BLM 2001
S-24	Historic road segment	Traverses the southeast corner of the project site	Potentially CRHR eligible (OST-MR)	CH2 DR125
S-25	Historic road segment	Runs north-south, clips a portion of the eastern boundary of the project site	Potentially CRHR eligible (OST-MR)	CH2 DR125
S-26	Trail/footpath	Bisects the project site (northeast to southwest)	Potentially CRHR eligible (OST-MR)	CH2 DR125
Track 1	Historic road	Parallels the California-Nevada border in the project site	Potentially CRHR eligible (OST-MR)	CH2 DR125

[16] Referred to throughout this document as the Old Spanish Trail/Mormon Road because these two resources come together on the project site.

Cultural Resource Type (Year of Initial Recordation)	Description	Location	CRHR Eligibility	Source
Track 4	Historic road	South of Tecopa Road (outside of the project site)	Potentially CRHR eligible (OST-MR)	CH2 DR125
Track 5	Historic trail/road	North of the project site, originating at Brown's Spring	Potentially CRHR eligible (OST-MR)	CH2 DR125
NOTE: 'Track' refers to historic transportation marks generally made by vehicles of the historic period.				

ANALYSIS OF IMPACTS TO CULTURAL RESOURCES

DETERMINING THE HISTORICAL SIGNIFICANCE OF CULTURAL RESOURCES

Under CEQA, "a project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment" (Pub. Resources Code, § 21084.1). Consequently, the Energy Commission, as a lead agency, must evaluate the historical significance of cultural resources by determining whether they meet several sets of specified criteria. Under CEQA, the definition of a historically significant cultural resource is that it is a "resource listed in, or determined to be eligible by the State Historical Resources Commission, for listing in the CRHR", or "a resource listed in a local register of historical resources or identified as significant in a historical resource survey meeting the requirements of section 5024.1 (g) of the Public Resources Code," or "any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California, provided the agency's determination is supported by substantial evidence in light of the whole record" (Cal. Code Regs., tit. 14, § 15064.5(a)).

In general, to be considered historically significant under the CEQA Guidelines, a cultural resource must meet the criteria for listing in the CRHR. These criteria are essentially the same as the eligibility criteria for the NRHP. In addition to being at least 50 years old,[17] a resource must meet at least one of the following four criteria (Pub. Resources Code, § 5024.1):

[17] *The Office of Historic Preservation's Instructions for Recording Historical Resources (1995) endorses recording and evaluating resources over 45 years of age to accommodate a potential five-year lag in the planning process.*

- Criterion 1, is associated with events that have made a significant contribution to the broad patterns of our history;
- Criterion 2, is associated with the lives of persons significant in our past;
- Criterion 3, embodies the distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic values; or
- Criterion 4, has yielded, or may be likely to yield, information important to history or prehistory.

Historical resources must also possess sufficient integrity of location, design, setting, materials, workmanship, feeling, and association to convey their historical significance (Cal. Code Regs., tit. 14, § 4852(c)).

Additionally, cultural resources listed in or formally determined eligible for the National Register of Historical Places (NRHP) and California Registered Historical Landmarks numbered No. 770 and up are automatically listed in the CRHR and are therefore also historical resources (Pub. Resources Code, § 5024.1(d)). However, even if a cultural resource is not listed or determined to be eligible for listing in the CRHR, CEQA allows a lead agency to make a determination as to whether it is a historical resource and, therefore, historically significant (Pub. Resources Code, § 21084.1).

The assessment of potentially significant adverse impacts to historical resources and the mitigation that may be required of a proposed project to reduce any such impacts depend on CRHR-eligibility evaluations.

California Register of Historical Resources Evaluations

Under CEQA, mitigation need only be developed for substantial project-related adverse impacts to historically significant cultural resources (historical resources). Consequently, staff seeks CRHR eligibility recommendations for those cultural resources subject to possible project impacts. The existing documentation for previously known cultural resources may include CRHR eligibility recommendations, and the applicant's cultural resources specialists often make CRHR eligibility recommendations for newly identified cultural resources they discover and record in their project-related surveys. Staff considers these prior CRHR eligibility evaluations and may accept them or conclude that additional information is needed before making its own recommendations.

When the available information on known or newly identified resources that could be impacted by the proposed project is not sufficient for staff to make a recommendation on CRHR eligibility, staff may ask an applicant to conduct additional research to gather the information needed to make such a recommendation, or staff may gather the additional information. For an archaeological resource, the additional research usually entails some degree of field excavation, called a "Phase II" investigation. For an ethnographic resource, the additional research may be an ethnographic study. For built-environment resources, the additional research would probably be archival. The object of this additional research is to obtain sufficient information to enable staff to validate or

make a recommendation of CRHR eligibility for each cultural resource that the proposed project could impact.

METHODS AND THRESHOLDS FOR DETERMINING SIGNIFICANCE OF IMPACTS TO HISTORICAL RESOURCES

Under CEQA, "a project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment" (Pub. Resources Code, § 21084.1). Staff analyzes whether a proposed project would cause a substantial adverse change in the significance of any historical resources identified in the Cultural Resources Inventory as CRHR- eligible, or as otherwise significant (Cal. Code Regs., tit. 14 § 15064.5(a)). The regulatory threshold for whether a proposed project would have a significant effect with respect to cultural resources is a finding that the project would materially impair the significance of one or more historical resources (Cal. Code Regs., tit. 14 § 15064.5(b)(1)). The CEQA Guidelines define material impairment, in part, as any project action that "demolishes or materially alters in an adverse manner those physical characteristics of a historical resource that convey its historical significance and that justify its eligibility for inclusion in the California Register of Historical Resources as determined by a lead agency for purposes of CEQA" (Cal. Code Regs., tit. 14 § 15064.5(b)(2)(C)). In order to assess whether a proposed project would materially impair the significance of a historical resource, one would therefore need to know and understand why that resource was eligible for inclusion in the CRHR. A resource's CRHR eligibility status has two parts, a value for which the resource is significant and integrity sufficient to convey that significant value (Cal. Code Regs., tit. 14 § 4852(c)). (Note that "significance" as used in relation to the determination of a resource's CRHR eligibility status is a much more narrowly focused technical use of the term than the broader sense of its use at, among other places, section 21084.1 of the Public Resources Code or section 15064.5(a) of the California Code of Regulations.) The significance component of a resource's eligibility status is determined, as noted in the Determining the Historical Significance of Cultural Resources subsection above, with reference to its potential associative, design or construction, or information values as set out in the CRHR's four significance criteria (Cal. Code Regs., tit. 14 § 4852(b)(1–4). A resource may be eligible under one or more of these values. The integrity component of a resource's eligibility status is determined with reference to "location, design, setting, materials, workmanship, feeling, and association" (Cal. Code Regs., tit. 14 § 4852(c). Which of these aspects of integrity are relevant in a determination of a resource's CRHR eligibility are dependent on the particular values for which that resource has been determined to be significant. The analysis of whether any of the potential impacts of a proposed project cross the threshold of a significant effect under CEQA, therefore, requires the consideration, primarily, of that project's impacts on each applicable aspect of integrity for each historical resource subject to any such impacts. Dependent upon the particular values for which a resource has been determined to be significant, the aspects of integrity under consideration may be mostly related to the characteristics of the resource itself, or they may also be related to the characteristics of the physical and visual contexts that envelope the resource and whether those contexts would retain the ability to convey the values for which the resource has been found to be significant.

The general procedure of staff's determination of the significance of project impacts to cultural resources, then, is to:

1. Establish the inventory of historical resources, a subset of the Cultural Resources Inventory;

2. Identify and consider the nature of each resource's significance relative to the CRHR's criteria;

3. Consider how subject resources' historical significance are manifested physically and perceptually, and assess the baseline integrity of those characteristics and contexts;

4. Assess, more specifically, those aspects of each resource's integrity that are critical to that resource's ability to convey its historical significance; and

5. Analyze whether potential project impacts would alter any historical resources to the extent that any such resource would no longer be able to convey its historical significance.

Assessment of Impacts and Recommended Mitigation

To identify construction-related impacts to cultural resources that would need to be mitigated, staff first identifies all historical resources and evaluates the potential project impacts to the significant cultural resources to determine if these impacts are substantial and adverse (see above). Staff must then recommend avoidance or other mitigation for substantial and adverse impacts to these historical resources. Staff also must assess whether the proposed project has the potential to impact as-yet-unknown buried archaeological resources and recommend mitigation for impacts to previously unknown but historically significant resources discovered during construction, if impacts to such resources cannot be avoided.

CEQA advises a lead agency to make provisions for archaeological resources unexpectedly encountered during construction, and a project owner may be required to train workers to recognize cultural resources, fund mitigation, and delay construction in the area of the find (Pub. Resources Code, § 21083.2; Cal. Code Regs., tit. 14, §§ 15064.5(f) and 15126.4(b)). Consequently, staff recommends that procedures for identifying, evaluating, and possibly mitigating impacts to archaeological resources discovered during construction be put in place through conditions of certification to reduce those impacts to a less than significant level or to the extent feasible.

Direct and Indirect Impacts

In the abstract, direct impacts to cultural resources are those associated with project development, construction, and operation (co-existence). Construction usually entails surface and subsurface disturbance of the ground, and direct impacts to archaeological resources may result from the immediate disturbance of the deposits, whether from vegetation removal, vehicle travel over the surface, earth-moving activities, excavation, or demolition of overlying structures. Construction can have direct impacts on historic built-environment resources when, for example, those buildings or structures must be

removed to make way for the proposed project or when the vibrations of construction impair the stability of historic buildings or structures nearby. New construction can have direct impacts on historic built-environment resources when it is stylistically incompatible with their neighbors and the setting, and when the proposed project produces something harmful to the materials or structural integrity of the historic buildings and structures, such as emissions or vibrations.

Generally speaking, indirect impacts to archaeological resources are those which may result from increased erosion due to site clearance and preparation, or from inadvertent damage or outright vandalism to exposed resource components due to improved accessibility. Similarly, historic buildings and structures can suffer indirect impacts when project construction causes obsolescence and demolition or creates improved accessibility, making vandalism or greater weather exposure possible.

Ground disturbance accompanying construction at a proposed plant site, along proposed linear facilities, and at a proposed laydown area has the potential to directly impact unknown archaeological resources. The potential direct, physical impacts of the proposed construction on unknown archaeological resources are commensurate with the extent of ground disturbance entailed in the particular mode of construction. This varies with each component of the proposed project. Placing the proposed project into this particular setting could have a direct impact on the integrity of association, setting, and feeling of nearby standing historic built-environment resources.

ANALYSIS OF IMPACTS TO ARCHAEOLOGICAL RESOURCES

Prehistoric Background

The prehistory of the eastern Mojave Desert is the narrative of how human populations have adapted to marked fluctuations in the local environment over the course of at least the last 12,000 years. The archaeological remains of the region's prehistory are relatively scarce. Sparse scatters of stone tools, chipped stone tool manufacturing debris, and isolated artifacts, resources that typically yield information of marginal value, account for 40–60 percent of the archaeological remains found in the Mojave and Colorado Deserts. A relative scarcity of intact buried archaeological deposits contributes further to the lack of information on the prehistory of the region (Lyneis and Macko 1986:52). The availability of water and the location of high-value resource patches in otherwise unproductive habitats appear to influence the distribution of human settlement and, consequently, of the archaeological sites that are on the desert landscape (Lyneis and Macko 1986:57; Sutton et al. 2007:230). The broad trajectory of cultural development in the Mojave Desert appears to be a steady decline in residential mobility as local populations come to occupy increasingly larger valley or basin-bottom base camps, in a few preferred locations, over longer periods of time, rather than working out of temporary camps in particularly productive environmental zones (Bamforth 1990:74).

Over the past seven decades, Mojave Desert archaeologists have developed and refined a broad sequence of approximately six artifact groups or assemblages, each with distinctive types of stone projectiles, that represent the material record of the peoples who once lived in the proposed project area (Bamforth 1990:72; Campbell 1936; Lyneis 1982; Rogers 1939; Sutton, et al. 2007; Warren 1984; Warren and

Crabtree 1986). Choosing what staff believes to be a cultural chronology applicable to the proposed project and acknowledging recent proposed refinements to the chosen chronology (Sutton, et al. 2007), the discussion here of the region's prehistory will rely primarily on Warren's 1984 chronology and Warren and Crabtree's 1986 chronology. Following Warren and Crabtree, the periods of the chronology below represent units of time during which particular artifact assemblages appear to prevail, rather than discrete, homogeneous past cultures.

Terminal Pleistocene Period (Prior to 10,000 B.C.)

The archaeological record of the Terminal Pleistocene Period in the Mojave Desert is particularly sparse. The most consistent evidence for human activity during this period are fragments of the characteristic fluted, concave-based, lanceolate spear or projectile point of the Clovis archaeological culture. The Clovis culture is a pan-Western Hemisphere archaeological phenomenon that manifests in diverse material patterns over North and South America. In the Mojave Desert, material culture assemblages that include Clovis projectile point fragments are typically sparse surface deposits (Lyneis and Macko 1986:41). The evidence from such deposits suggests only that human groups during this time were probably small in number, were highly mobile, and lived in small, temporary camps near what were then permanent water sources (Sutton, et al. 2007:234). It is unclear whether the Mojave Desert Clovis assemblages demonstrate a cultural continuity with the material remains of subsequent periods (Warren and Crabtree 1986:184).

Lake Mojave Period (10,000 to 5000 B.C.)

Lake Mojave Period artifact assemblages appear to represent a cultural phenomenon that is antecedent to subsequent cultural developments in the Mojave Desert (Warren and Crabtree 1986:184). Portions of archaeological sites or components that date to the Lake Mojave Period are typically sparse and vary little in assemblage composition (Bamforth 1990:73), although components that include extensive accumulations of residential debris have more recently been found (Sutton, et al. 2007:237). Lake Mojave components are most often found in the vicinity of high terraces above or on relict shorelines of what are now playas and along relict stream channels (Bamforth 1990:72; Lyneis and Macko 1986:41).

Lake Mojave Period assemblages include a relatively narrow range of stone tools and also represent a narrow range of site types. The index artifacts for the period are the local variants of the Great Basin stemmed series projectile point types—Lake Mojave and Silver Lake points. The balance of period assemblages may include bifaces, steep-edged unifaces, "small beaked gravers," "narrow concave scrapers," crescents, and occasional cobble-core tools and ground stone implements (Sutton, et al. 2007:234; Warren 1984:413). The assemblages primarily appear to represent temporary small camps and work stations. Infrequent accumulations of residential debris do indicate, however, that camps with longer use periods are also present.

The archaeological record of the Lake Mojave Period indicates that human populations during the Early Holocene were small, mobile groups practicing a hunting-and-foraging economy whereby groups shifted residency across the landscape among the most

productive environmental zones as the resources in those zones became depleted over time (Bamforth 1990:73; Lyneis and Macko 1986:41).

Pinto Period (5000 to 2000 B.C.)
The evidence of human activity found in Pinto Period archaeological sites indicates a behavioral continuity with Lake Mojave Period developments (Warren 1984:414). The Pinto Period witnesses the final desiccation of the Pleistocene pluvial lakes in the Mojave Desert and the adaptive transformation of local populations to the extreme aridity of the mid-Holocene Altithermal (see Antevs 1948). It is unclear whether the Pinto Period directly follows the Lake Mojave Period, or may represent a resumption of the desert's use after a hiatus during the worst of the mid-Holocene droughts (Warren and Crabtree 1986:184). Pinto Period components are typically surface deposits that are small in area and do not include midden deposits, constituent residential debris of ash, charcoal, and food and other organic residues, although larger components with broader ranges of artifacts and substantial midden deposits have more recently been found (Sutton, et al. 2007:238, Warren 1984:413– 414). Pinto Period components are generally found on the landscape in the same places as deposits of the Lake Mojave Period (Bamforth 1990:72; Lyneis and Macko 1986:41). The suggestion has been made that the components may actually overlap in time (Bamforth 1990:73; Sutton, et al. 2007:238).

The most important distinction between the artifact assemblages of the Pinto Period and those of the preceding Lake Mojave Period appears to be the relative abundance of ground stone implements or milling tools. More recent research has found milling tools to occur in moderate abundance in most Pinto Period deposits and, occasionally, in great frequency (Sutton, et al. 2007:238). The characteristic Pinto Period assemblage includes large and small leaf-shaped projectile points and knives, domed and elongated keeled scrapers, several forms of well-made flake scrapers, flat millingstones, and manos. Drills, engraving tools, and *Olivella* spp. shell beads also occur (Sutton, et al. 2008:238; Warren 1984:412; Warren and Crabtree 1986:187). The index artifact for the period is the stemmed, indented-base Pinto series projectile point, the Mojave Desert variety of which is markedly crude in form and manufacture (Warren 1984:411). A broad continuity in the chipped stone technology evident in both the Lake Mojave and Pinto Periods has been noted. Populations during these periods appear to make extensive use of toolstones[18] other than cryptocrystalline silica or obsidian, and they also make regular use of unifacial and bifacial core tool forms (Sutton, et al. 2007:238).

More recent research indicates that Pinto Period assemblages may reflect the emergence of a two-tier settlement pattern. The small temporary or seasonal camps that appear to have been the primary focus of Lake Mojave Period activity may have become more task-specific camps that were subordinate to more permanent residential base camps. The increase during the Pinto Period in the relative frequency of milling

[18] Toolstone is a type of stone used to manufacture stone tools. Generally speaking, tools that require a sharp edge are made using cryptocrystalline materials that fracture in an easily-controlled conchoidal manner. Cryptocrystalline tool stones include flint, chert, rhyolite, and obsidian. These materials fracture in a predictable fashion, and are easily resharpened.

tools suggests a corresponding increase in the reliance of local populations on plant resources (Sutton 2007:238–239).

Gypsum Period (2000 B.C. to A.D. 500)
Gypsum Period artifact assemblages, though scarce relative to earlier and later periods, appear to evidence a shift in the economy of local populations toward a much greater dependence on plant resources (Bamforth 1990:73; Warren 1984:419). Period components are ephemeral in character, relatively more scarce in the southern and eastern portion of the Mojave Desert, smaller yet more numerous than components of the preceding periods, and found in more diverse locations on the landscape (Sutton, et al. 2007:241).

Gypsum Period assemblages encompass a relatively broad array of artifact types. The index artifacts for the period include any combination of Gypsum (Gypsum Cave), Humboldt (Humboldt Concave Base), or Elko (Elko Eared, Elko Corner-notched) series projectile points (Sutton, et al. 2007:241; Warren 1984:414; Warren and Crabtree 1986:187). The balance of period assemblages may include leaf-shaped projectile points; rectangular-based knives; flake scrapers; T-shaped drills; occasional large scraper-planes; choppers; hammerstones; manos and millingstones; mortars and pestles; shaft smoothers; incised slate and sandstone tablets and pendants; fragments of drilled slate tubes; *Haliotis* spp. Rings; central California Middle Horizon bead and ornament types; *Olivella* spp. shell beads; and bone awls (Warren 1984:418). The greater presence of quartz crystals, paint, split-twig figurines, and rock art also indicates the elaboration of ritual activity during this period (Warren and Crabtree 1986:188–189). The influence of the Anasazi archaeological culture of the Southwest is apparent in the eastern Mojave Desert toward the end of the Gypsum Period with the introduction of Anasazi ceramic types to period assemblages, and evidence of the replacement of the atlatl with the bow and arrow, as the larger Gypsum, Humboldt, and Elko series dart points give way to smaller Eastgate and Rose Spring arrow point types in the subsequent Saratoga Springs Period (Warren 1984:414–415).

The relative scarcity of Gypsum Period data complicates discussions of period settlement patterns in the Mojave Desert. Available data indicates that the focus of Gypsum Period components was lowland concentrations of plant resources along streams and in the lake basins (Bamforth 1990:73; Sutton, et al. 2007:241). One such resource may have been mesquite. The introduction of the mortar and pestle during this period and the use of these tools in the historic period to process mesquite pods have been taken to indicate that mesquite was first used in the Gypsum Period (Warren 1984:419). Populations appear to have spent a substantial part of each year in residential base camps while dispatching task groups out to hunt (Bamforth 1990:73). The presence of shell ornaments in the assemblages of the period also indicates the establishment of relatively routine trade with the southern California coast (Warren 1984:419).

Saratoga Springs Period (A.D. 500 to 1200)
The artifact assemblages of the Saratoga Springs Period in the eastern Mojave Desert reflect the mixture of cultures that appears to have influenced the region.

Saratoga Springs Period assemblages encompass a broad, diverse array of artifact types, many of which appear to come from outside the region or reflect outside influences. The index artifacts for the period include Eastgate and Rose Spring projectile points. The core of the period assemblage includes millingstones and manos, mortars and pestles, incised stones, and slate pendants (Warren 1984:420). Other characteristic artifact types of the period include small triangular knives, scrapers, drills, hammerstones, choppers, pendants of green schist, and Pacific Coast shell ornaments, including *Olivella* Saucer beads, *Olivella* Barrel beads, and limpet rings (Warren 1984:367). Anasazi grayware ceramics of the Basketmaker III through early Pueblo Periods (Pecos Classification, see Cordell 1984:55–58) are a notable element of the Saratoga Springs Period assemblage as well.

The archaeological data for the Saratoga Springs Period appear to indicate that local populations were developing broader spheres of interaction with outside groups, perhaps even allowing settlements of outsiders, in the context of a general continuity in local settlement patterns. The basic settlement pattern for the period appears not to change markedly from the Gypsum Period through to the Protohistoric Period (see below). The size of residential base camps and seasonal population dispersions to acquire more remote resources may both have been in slow decline however. The overexploitation of large mammals, due, in part, to the introduction of the bow and arrow during this period and to a deteriorating climate, may have led to a shift in hunting emphasis to small animals and reinforced the primary dependence of local populations on plant seed resources such as mesquite (Bamforth 1990:74).

The Anasazi influence, presumably of the Virgin Branch (see Fowler and Madsen 1986:175–181), was marked in the eastern Mojave Desert during this period from at least A.D. 700 through A.D. 1150 (Warren 1984:373–373, 426–427). The distribution of Anasazi grayware ceramics, the key archaeological index of Anasazi influence, reaches from the lower Virgin River in southern Nevada into California as far west as the Cronise Basin in San Bernardino County. The primary focus of Anasazi influence in the vicinity of the proposed project area appears to have been the turquoise deposits in the area around Halloran Springs, roughly 30 miles southwest of the proposed project area. The sequence of ceramic types found at the turquoise mines in the area indicate that the period of Anasazi influence there was from approximately A.D. 700 to 900, during the Basketmaker III and Pueblo I Periods (Warren 1984:371–372). It remains unclear whether Anasazi peoples were actually in residence in the area (Warren 1984:422) practicing the Virgin Branch horticultural lifeway, in residence living on stores of provisions, or not in residence and managing the extraction of turquoise through proxy labor. The Anasazi influence over the eastern Mojave Desert ultimately terminates around A.D. 1150 (Warren 1984:426–427).

Protohistoric Period (A.D. 1200 to present)
The speakers of Numic languages appear to displace the local populations of the eastern Mojave Desert at the outset of the Protohistoric Period, and to decisively eradicate Anasazi influence in the region (Warren 1984:430).

The Protohistoric assemblage has been said to relate directly to the historic Paiute (Warren 1984:427). The characteristic index artifacts for assemblages of the more

northerly areas of the eastern Mojave Desert are Desert Side-notched projectile points and coarse, brownware ceramic types. The overall eastern Mojave assemblage strongly resembles assemblages across the northern Mojave Desert to Owens Valley and may derive from that region. Assemblages from the more southerly areas of the eastern Mojave Desert include Cottonwood Triangular projectile points, in addition to Desert Side-notched points, and the ceramic assemblage includes types representative of the Hakataya archaeological culture, a cultural unit of the Lower Colorado River and the Colorado Desert. Among the Hakataya ceramics in the Protohistoric Period assemblages of the eastern Mojave Desert are brownwares, buffwares, and red-on-buff wares (Warren 1984:427; Warren and Crabtree 1986:191).

Despite the apparent shifts in the local populations in the eastern Mojave Desert and the ebb and flow of outside influences during the Saratoga Springs and Protohistoric Periods, the basic economic milieu and the settlement patterns of the local populations continue, in the Protohistoric Period, to reflect the trends in desert adaptation that had been developing in the Mojave Desert for millennia. Among the final elaborations to the local economy of the populations in the Mojave Desert may have been the addition, during the late Saratoga Springs Period and into the Protohistoric Period, of small gardens in preferred areas, the produce from which may have supplemented local diets in a minor way (Lyneis and Macko 1986:41).

The influence of the Anasazi in the eastern Mojave Desert is supplanted by Hakataya influence from the Lower Colorado River and the Colorado Desert. Toward the end of the Saratoga Springs Period or the beginning of the Protohistoric Period around A.D. 1200, there is evidence of Hakataya influence or presence at the Halloran Springs turquoise mines lasting roughly a century. The Paiute have used the mines infrequently subsequent to the withdrawal of the Hakataya in about the fourteenth century (Warren 1984:372, 373).

Evaluations of Archaeological Resources

Evaluations of archaeological resources often require the execution of field research to gather the information necessary to adequately evidence whether and why particular resources possess historical significance. The most common purpose of evaluative archaeological field research, referred to as Phase II archaeological research in cultural resources management, is to record observations that establish the association of a resource with significant events, or that establish the resource as a potential source of significant historical information. This type of research focuses on the identification, documentation, and analysis of the information, the data sets that can be extracted from the material remains in archaeological deposits, and from the physical contexts of and the spatial associations among those remains.

Phase II archaeological research does not always require archaeological excavation. Archaeological deposits usually occur as either relatively thin, broad scatters of artifacts and ecofacts, or as layered, matrix-supported deposits of such materials. The evaluation of broad scatter-type deposits, solely on the basis of surface observation, is appropriate when it can be argued that they are almost entirely exposed at the surface, and that the landforms on the surface of which such deposits are found are older than the commonly accepted date of the initial human occupation of North America, or that

the exposed material remains indicate a light and transitory use of the ground surface. For archaeological deposits where such arguments cannot be compellingly made, excavation is necessary to identify and assess the spatial integrity of the data sets that any buried components of those deposits may contain.

Staff evaluations, below, of the archaeological resources in the PAA divide the adjusted total inventory of 12 archaeological resources found as a result of the intensive pedestrian cultural resources survey (see Intensive Pedestrian Archaeological Resources Survey subsection, above) and an additional archaeological resource identified by staff into two groups: those resources for which surface observations provide sufficient information to make recommendations of historical significance and those resources for which Phase II archaeological research has been necessary to inform such recommendations.

Evaluations of Archaeological Resources on the Basis of Surface Observation

On the basis of the results of the intensive pedestrian cultural resources survey (CRTR 2011b), several reconnaissance-level field surveys by staff, and numerous discussions among staff, the applicant's cultural resources consultants, and BLM Southern Nevada District Office staff (BLM staff), staff concluded that surface observation was sufficient for the evaluations below of four prehistoric archaeological sites, one historical archaeological site, one archaeological site of indeterminate age, and a prehistoric archaeological landscape.

Prehistoric Archaeological Resources

Individual Prehistoric Archaeological Sites

Site S-1

Site S-1 is a small prehistoric lithic scatter in the east-central portion of the proposed Unit 2 heliostat field. The artifacts were found in a relatively small (10 x 15 m) area on the surface of distal, Holocene-age sediments of a dormant local alluvial fan (Unit Qa2). The ground surface that supports the scatter is relatively level with a moderately dense lag deposit of pebbles and cobbles. The surface vegetation on the site is documented as Mojave Desert scrub (HHSG 2011a:fig. 5.2-3). The applicant reports the presence of creosote (*Larrea tridentata*), *Lycium* spp., and unspecified native grasses. Surface visibility across the site is reported to be nearly 100 percent. The only noted information related to the historic land use of the site and surrounding area is their location on the Hidden Hills Ranch, which has been in operation as a cattle ranch since the 1920s.

The actual spatial distribution and the character of the group of artifacts, the artifact assemblage that makes up site S-1 are presently unclear. The DPR 523A and C forms for the resource and one part of the revised technical report of the original intensive pedestrian cultural resources survey (CRTR 2011b:54,) state that the site is 10 m from north to south and 15 m from east to west. The sketch map of the DPR 523K form, however, depicts the artifact distribution to cover an area approximately 12 m from north to south and 11 m from east to west. The different available descriptions of the site artifact assemblage also do not match well. The applicant reports artifact material types differently in the revised technical report (CRTR 2011b) and on the DPR523 A form than

on the DPR 523C form for the resource. The revised technical report and the DPR 523A form state that the artifact assemblage of the site includes one utilized flake[19], twelve unmodified flakes, and three pieces of angular stone shatter[20]. Site artifacts are identified as being of "either a red and cream chert or a light brown igneous material." The DPR 523C form identifies the utilized flake as being of red rhyolite and eleven of the unmodified flakes as being simply of rhyolite. A note is made there that rhyolite at the site is a "deep red to a light red and yellow" color. No material type is given for one flake and the three pieces of shatter. The DPR 523C reports the utilized flake as a large (15 x 45 x 88 mm) primary flake with "one heavily chipped and used edge." The assemblage of moderately large (3–7 cm) flakes includes primary (N=6), secondary (N=3), and tertiary (N=3) flakes. Any patterns that may exist with regard to the differential distribution of artifact or material types are unreported.

The physical integrity of site S-1 appears to have been partially compromised. The applicant found evidence of what are described as "three small excavations" in unspecified locations on the site. The dimensions of one of the excavations was given on the DPR 523A and C forms as 60 x 77 cm at the surface and 10 cm in depth. The applicant notes that the unspecified number of flakes adjacent to this particular excavation appeared to have been arranged and no longer appeared to have been in situ. The balance of the site artifact assemblage did appear to the applicant to be in situ. The applicant states, apparently on the basis of the examination of the backfill from the three excavations and on the basis of a 10-cm-diameter and 10-cm-deep excavation by the applicant, that the subsurface sedimentary deposits at the site are devoid of artifacts.

On the basis of the available information, the artifact assemblage of site S-1 may represent one to several brief episodes during which people chose to stop and prepare one or several rocks for use as a source of flakes for tool production. The utilized red rhyolite flake in the site assemblage suggests that the production of expedient flake tools may have been the impetus for core preparation. The utilized flake may represent a discarded production failure, or its discard may have been incidental. . The light and transitory use of the site area that the material culture of the site indicates, and the facts that none of this material is of artistic value, nor provides information that would readily facilitate the placement of this activity in time or the association of it with significant events or persons, combine to indicate that the resource does not meet any of the CRHR criteria of historical significance. Staff therefore recommends that site S-1 is not eligible for listing in the CRHR.

Site S-3

Site S-3 is a small prehistoric lithic scatter in the east-central portion of the proposed Unit 2 heliostat field. The majority of the artifacts were found in an approximately one m square area on the surface of distal, Holocene-age sediments of a dormant local alluvial fan (Unit Qa2). The ground surface that supports the scatter is relatively level with a

[19] A utilized flake is a flake that has been detached from a core and used as a tool without further purposive modification to the flake.

[20] Shatter refers to small angular bits of stone that are produced as an incidental byproduct of chipping stone.

moderately dense lag deposit of pebbles and cobbles. The vegetation on the reportedly undisturbed surface is documented as Mojave Desert scrub (HHSG 2011a:fig. 5.2-3). The applicant reports the presence of creosote (*Larrea tridentata*), *Lycium* spp., and unspecified native grasses, although no creosote is clearly visible in the applicant's overview photograph of the site. Surface visibility across the site is reported to be nearly 100 percent. The only noted information related to the historic land use of the site and surrounding area is their location on the Hidden Hills Ranch, which has been in operation as a cattle ranch since the 1920s.

The actual spatial distribution and the composition of the group of artifacts, the artifact assemblage that makes up site S-3 are presently unclear. The DPR 523A form for the resource and one part of the revised technical report (CRTR 2011b:55,) report that the "majority of the artifacts were found in a one by one meter area." The DPR 523C form reports the dimensions of the flake scatter to be 15 m from north to south and 15 m from east to west. The revised technical report states that "all of the *flakes* [emphasis added] at this site were found in a very discrete concentration measuring less than" one meter square (CRTR 2011b:64). And, lastly, the sketch map of the DPR 523K form depicts the artifact distribution to cover an area approximately 5 m from north to south and 4 m from east to west. The artifact composition of the site is no clearer. The applicant reports the artifact composition of the resource differently in different parts of the revised technical report (CRTR 2011b:55, 63, 64) and, as well, on the DPR 523A and C forms for the resource. The site's artifact assemblage appears to include two stone cores and six to nine stone flakes. The cores are reported to be small (5 and 6 cm) artifacts of rhyolite that indicate multidirectional flake detachment. The number and character of the stone flakes is less certain. The revised cultural resources technical report and the DPR 523A form for the site report four primary flakes, one secondary flake, and one tertiary flake of red rhyolite and what appears to be a red and yellow welded tuff (CRTR 2011b: 55). The DPR 523C form for the site reports 7 primary flakes of rhyolite (N=3) and "igneous material" (N=4), and one secondary and one tertiary flake of "igneous material." The revised technical report does not provide descriptions of the flakes, but notes that the "available toolstone at this site consists of a few scattered cobbles of a yellow and red igneous material (CRTR 2011b:64).

Notwithstanding the variability in the applicant's description of the resource and outstanding concerns about the accuracy of artifact material type identifications, enough information exists to characterize, interpret, and evaluate site S-3. Site S-3 is a relatively small and discrete scatter of eight to eleven stone artifacts. The artifact assemblage includes what the applicant interprets to be two small, exhausted, multidirectional cores, and six to nine moderately large (4–9 cm) flakes, five to eight (83–89 percent) of which represent the initial removal of the weathered exterior cortex of two different, presently indeterminate types of cobbles. Any patterns that may exist with regard to the differential distribution of artifact or material types are unreported.

The artifact assemblage of site S-3 appears to represent one or two brief episodes during which people chose to stop and assess the value of two different types of rock for use as toolstone, and subsequently may have also sought to detach further flakes for use in tool production. The light and transitory use of the site area that the material culture indicates, and the facts that none of this material is of artistic value, nor provides

information that would readily facilitate the placement of this activity in time or the association of it with significant events or persons, combine to indicate that the resource, despite its apparent physical integrity, does not meet any of the CRHR criteria of historical significance. Staff therefore recommends that site S-3 is not eligible for listing in the CRHR.

Site S-5

Site S-5 is a small prehistoric lithic scatter in the northeastern portion of the proposed Unit 2 heliostat field. All of the artifacts on the site are reported to have been found in an approximately 0.5-m square area, and are on the surface of distal, Holocene-age sediments of an active local alluvial fan (Unit Qa1). The ground surface that supports the scatter is, with one exception, relatively level with a moderately dense lag deposit of pebbles and cobbles. The exception is a small (5 x 10 m) depression directly adjacent to the site that the applicant suggests may have once been a small spring or seep. The vegetation in the vicinity of the site is documented as Mojave Desert scrub (HHSG 2011a:fig. 5.2-3). The applicant reports the presence of creosote (*Larrea tridentata*), *Lycium* spp., and unspecified native grasses, although no creosote is clearly visible in the applicant's overview photograph of the site. Surface visibility across the site is stated to be nearly 100 percent. The only noted information related to the historic land use of the site and surrounding area is their location on the Hidden Hills Ranch, which has been in operation as a cattle ranch since the 1920s.

The available information on the artifact assemblage for site S-5 and on the spatial distribution of the artifacts in the assemblage is unclear. The actual apparent artifact distribution and the applicant's boundary for site S-5 do not match. The revised cultural resources technical report (CRTR 2011b:55) and the DPR 523A and C forms unequivocally state that the five flakes that make up the entire artifact assemblage for the site were found in a 0.5 m square area, yet the dimensions of the site are reported on the DPR 523C form to be 10 m square and are depicted on the DPR 523K sketch map as a circle approximately 10 m in diameter. The composition of the site's artifact assemblage is much clearer. The assemblage includes five moderately large (4–8 cm) secondary flakes of what is alternately described as a "red and black banded rhyolitic material" and a "red and black banded igneous material." The flakes represent part of the process by which the weathered exterior cortex was removed from the original cobble core.

The artifact assemblage of site S-5 appears to represent one episode during which people chose to stop and prepare a rock for use as a source of flakes for tool production. The light and transitory use of the site area that the material culture indicates, and the facts that this material is not of artistic value, and does not provide information that would readily facilitate the placement of this activity in time or the association of it with significant events or persons, combine to indicate that the resource, despite its apparent physical integrity, does not meet any of the CRHR criteria of historical significance. Staff therefore recommends that site S-5 is not eligible for listing in the CRHR.

Site S-AF-2

Site S-AF-2 is a small prehistoric lithic scatter in Clark County, Nevada, outside of and adjacent to the easternmost portion of the Common Area. The artifacts on the site are reported to have been found in a "four meter area," and are on the surface of mid- to distal, Holocene-age sediments of a dormant local alluvial fan (Unit Qa2). The identification of the landform context for the site is imprecise (CRTR 2011b:56, 69,70; IMACS 2011), but the site appears to be along the edge of and above an ephemeral stream channel that dissects the local fan surface. That surface appears to be relatively level with a lag deposit of pebbles and cobbles. The vegetation on and around the site is documented as Mojave Desert scrub (HHSG 2011a:fig. 5.2-3). The applicant reports the primary presence of creosote (*Larrea tridentata*). Low sagebrush (*Artemisia* spp.) and Indian ricegrass (*Achnatherum hymenoides*) are noted as present in the understory. Surface visibility across the site is unreported, though presumably high. The site is on land under the jurisdiction of the Bureau of Land Management's (BLM) Southern Nevada Field Office.

The available information on the artifact assemblage for site S-AF-2 and on the spatial distribution of the artifacts in the assemblage is unclear. The actual apparent artifact distribution and the applicant's boundary for site S-AF-2 do not match. The revised cultural resources technical report (CRTR 2011b:56) and Part A of the Intermountain Antiquities Computer System (IMACS) form state that the 19 flakes that make up the entire artifact assemblage for the site were found in a "four meter area," yet the dimensions of the site are reported on Part B of the IMACS form to be 4 m square with a calculated area of 12.5 square m and are depicted on the IMACS sketch map as a circle-like shape approximately 10 m in diameter. The composition of the site's artifact assemblage is much clearer. The assemblage includes 19 primary (N=16) and secondary (N=3) flakes of "caramel-colored" chert, all of which the applicant says appear to have been detached from the same core. The flakes would appear to represent the process by which the weathered exterior cortex was removed from the original chert core.

The artifact assemblage of site S-AF-2 appears to represent one episode during which people chose to stop and remove the weathered exterior cortex of a chert nodule, a process that would prepare the resultant core for later use elsewhere as a source of flakes for tool production. The light and transitory use of the site area that the material culture indicates, and the facts that none of this material is of artistic value, nor provides information that would readily facilitate the placement of this activity in time or the association of it with significant events or persons, combine to indicate that the resource, despite its apparent physical integrity, does not meet any of the CRHR criteria of historical significance. Staff therefore recommends that site S-AF-2 is not eligible for listing in the CRHR.

Multi-site Prehistoric Archaeological Resources: Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape (Pahrump Metapatch Landscape)

Technical Classification of the Landscape and Applicable Guidance

The Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape, which is adjacent and parallel to the northeastern boundary of the project

site, has been identified by staff as an archaeological landscape and historical resource under CEQA. The landscape appears to date from a presently undetermined point in prehistory through at least the early twentieth century and includes archaeological sites, springs, mesquite groves which aboriginal cultures have used and quite probably tended for millennia, and assemblages of flora and fauna unique to the variety of mesquite woodland association that is the focus of the landscape. Applying NPS guidance developed for the National Register Historic Places (NRHP) to the consideration of the landscape as a cultural resource under the parallel CRHR (NPS 1994, 1999, 2000), the combination of cultural and natural features that make up this composite resource would qualify the resource as a type of cultural landscape referred to as a "rural historic landscape" and would require technical evaluation of historical significance as a district (NPS 1999), more precisely, an archaeological district (NPS 2000).

Landscape Elements and Characteristics

Our knowledge of the character of the Pahrump Metapatch Landscape and the elements of which it is composed is severely constrained because no systematic survey of the landscape has been done to date. The records search for the present analysis revealed that no prior formal investigations have been undertaken across the portion of the Pahrump Metapatch Landscape within one mile of the proposed project site, and only two prior investigations have traversed the landscape in the vicinity of the proposed project: a 1982 reconnaissance survey for an off-road vehicle race and a 1989 intensive survey of the Old Spanish Trail (OST) from Las Vegas to the California border to facilitate the Nevada BLM's management of that resource. These two efforts led to updates of the records for the OST and a previously known archaeological site at Stump Spring (26CK301). No new sites were identified. The information that is presently available on the landscape is the result of Energy Commission staff's informal reconnaissance of the landscape in March and April of 2011 and draft information from the applicant on the results of intensive pedestrian surveys on two different transects through the landscape, received just prior to the publication of this analysis (Spaulding 2012d).

The Pahrump Metapatch Landscape is composed of both natural and cultural elements. The natural elements include what appears to be one of the relatively ancient populations of mesquite trees that falls within one mesquite woodland metapatch[21], the Pahrump metapatch, delineated in Clark County, Nevada (BLM 2006)(**Cultural Resources Figure 6**). The mesquite trees across broad swaths of this metapatch are the primary anchors of groups of coppice[22] dunes which, in turn, are a major structural element of the landscape. Local fault scarps and aquifer discharge points are other structural elements that shape the distribution of the mesquite trees across the landscape, and shape the inventory and the distribution of the balance of the floral and

[21] A "metapatch" is defined as a "collection of woodland patches separated by less than 2 km, and not separated by any major [geographic] barrier" (BLM 2006, p.41).

[22] "Coppice dunes" form as vegetation and air-transported sand interact to form sand mounds that vegetation anchors in place and out of which the anchoring vegetation continues to grow. The incremental growth of coppice dunes over time can lead to the formation of quite large sand dunes.

faunal associations that have been of import to Native American communities through time.

The frequency and the character of the archaeological deposits that make up the cultural elements of the landscape are unclear. Representative archaeological data for the landscape are presently unavailable. The applicant largely declined staff requests to consider the potential presence of theme-based, multi-property cultural resources or to provide primary contextual data to facilitate the evaluation of the historical significance of any such resources (CEC 2011h, Data Requests Nos. 105 and 121). What is presently known is that relatively robust archaeological deposits are usually associated with the points along the landscape from which springs emanate or did emanate in the past. These deposits appear to have higher artifact densities and a greater diversity of artifact types than deposits away from springs. Deposits of higher artifact density and greater artifact diversity most likely represent longer durations of land use around the springs, as well as a greater range of activity there.

Cursory staff observations of the landscape in the near vicinity of the proposed project site, an inter-spring area between Stump and Hidden Hills Ranch springs, document the presence of at least two additional types of archaeological deposits. One type is an interdunal lag[23], variably of fire-affected calcium carbonate ($CaCO_3$) tufa[24] and coarse-grained sandstone mixed with chipped flakes of chert and of fine-grained, toolstone-quality sandstone. Bifacial, edge-modified chert flakes were found to be an infrequent component of these deposits. The distribution of chert flakes was sparse and broad, subsuming multiple clusters of fire-affected rock. The chert appeared to have been worked using a hard-hammer technique. Another type of deposit is a relatively large (5–10 m-wide, 15–30 m-long) interdunal scatter made up almost entirely of small, what would appear to be pressure-flaked, late-stage, biface thinning flakes, all of chert and all of different colors of chert. No two flakes were typically found to be of the same material. The frequency of the flakes was roughly on the order of 12 pieces per square m. Presumably, the actual range of the archaeological deposits that represent the landscape is much broader. Clarification of this issue must necessarily await further research.

Staff does not believe that the prehistoric lithic scatters found on the proposed facility site bear a thematic association with the Pahrump Metapatch Landscape. The lithic scatters on the floor of the bolson and on the surface of the alluvial fans along the eastern margin of that floor appear to represent the incidental collection, assay, and initial reduction of toolstone-quality rock as people traversed the area on their way to other places. There is presently no demonstrable, necessary behavioral link between what appears to be the incidental acquisition of toolstone and the suite of resource use behaviors that most likely characterize human activity on this landscape. People may have acquired toolstone locally on the bolson floor or on the alluvial fans that they then

[23] An “interdunal lag” deposit is a deposit that is the result of the aerial erosion of a sand dune whereby the wind blows dune sand away leaving in its wake a heap or scatter of any materials larger than sand grains. Those materials “lag” behind the blown away dune sand.

[24] “Tufa” is a relatively porous deposit of $CaCO_3$ that slowly precipitates out of water in a number of surface and subsurface contexts.

later used to engage landscape resources, but there is presently no evident causal connection between the acquisition of those particular toolstones and the use of the landscape. Staff, consequently, does not consider the prehistoric lithic scatters on the proposed facility site to be contributing elements of the Pahrump Metapatch Landscape.

The Pahrump Metapatch Landscape is ultimately the result of a dynamic interaction among the natural elements of the landscape and the different Native American cultures that have evolved there. The tangible evidence of this interplay is the landscape characteristics that are part of its formal definition. Of the eleven landscape characteristics set out in National Register Bulletin 30 (NPS 1999:3–6), the landscape has the potential to possess six characteristics (land uses and activities, patterns of spatial organization, response to the natural environment, cultural traditions, vegetation related to land use, and archaeological sites). These characteristics would reflect and more precisely articulate the reciprocal manner in which the land has shaped local Native American cultures and, in turn, the manner in which successive and overlapping Native American cultures have shaped the land through time. There are a number of aspects of the landscape on which human action may have been more of a factor than is readily apparent. The shape of the individual mesquite patches within the landscape and their spatial distribution may, to some degree, be a function of cultural manipulation that reflects the ownership norms of the people who collected mesquite pods and may have tended the patches. The shapes of the individual trees may partially be the result of plant-tending techniques meant to maximize mesquite pod yield or facilitate easier harvesting. The information that would be necessary to develop meaningful discussions of these and other potential landscape characteristics is not presently available. Primary field research on the landscape would be necessary to acquire it. During the course of the consideration of the application for the proposed project, the applicant has repeatedly objected to engaging in this fieldwork.

Landscape Interpretation

The overarching behavioral theme that binds the Pahrump Metapatch Landscape into a discrete entity is the Native American use of the area to collect and process mesquite pods and other plant resources unique to this mesquite woodland-coppice dune association; to hunt the animal resources dependent on the association; and to access the scarce water resources that are coincident with it. The Native American use of this cultural landscape extends from the ancient point in time when the existence of the mesquite woodland and the presence of Native Americans first coincided, up through the early twentieth century. The landscape represents a local resource-rich zone in the midst of the relatively vast expanses of the resource-sparse Mojave Desert scrub and shadscale scrub associations that surround it. The landscape was undoubtedly of more than economic value to the native peoples who used it. As a desert floor area that yielded a disproportionately high amount of life-giving resources, the metapatch landscape can be surmised to have been deeply woven into the oral traditions, the mythology, the religion, and the ethno-geography of the peoples who once lived there.

The Pahrump Metapatch Landscape was one of a number of local, discontiguous resource zones that were, most likely, variable parts of the territorial configurations of different cultures here through time. The landscape was one resource island in a lateral and vertical resource archipelago scattered in a metaphorical sea of low resource-value

vegetation associations. The Spring Mountains and Mount Charleston have offered and still offer, among other resources, pinyon nuts, agave, and water. The Pahrump Valley playa, perennially to seasonally, from the terminal Pleistocene through the Holocene epochs, has been a critical focus of a suite of lacustrine[25] resources. And the Nopah Range undoubtedly offers resources of value as well. The variable and most likely significant role that the metapatch landscape played in different prehistoric-through-early-historic aboriginal territories has not been well investigated to date.

CRHR Evaluation of the Landscape

There is presently not enough information on the Pahrump Metapatch Landscape to make a formal determination on the resource's eligibility for listing in the CRHR. However, there is enough information to provide a sound rationale for assuming the eligibility of the landscape as an archaeological district under CRHR Criteria 1 and 4 and for proceeding directly to the analysis of the potential project-related impacts to this historical resource under CEQA.

The Pahrump Metapatch Landscape is most likely worthy of listing in the CRHR under Criterion 1, for its association with events that have made a significant contribution to the broad patterns of the local aboriginal prehistory and history of Pahrump Valley, and under Criterion 4 for its potential to yield information important to our understanding of that prehistory and history. Although the visual quality of the landscape's setting, feeling, and association relative to Criterion 1 and the spatial quality of the landscape's location and design relative to Criterion 4 are not entirely pristine, the landscape, nonetheless, presently retains enough of its historic character and appearance (integrity) to be recognizable as a historical resource and to convey the reasons for and the sense of its significance.

The provisional boundary for the landscape is the boundary delineated for the Pahrump Metapatch in the *Conservation Management Strategy for Mesquite and Acacia Woodlands in Clark County, Nevada* (BLM 2006)(**Cultural Resources Figure 6**). This boundary is meaningful because it relates the resource to a discontiguous series of mesquite woodland populations that can be conceptually unified largely on the basis of their association with the near-surface water sources along the Pahrump-Stewart Valley fault system. This boundary is provisional and would require significant future refinement. The periods of significance for the bounded landscape would be those periods from the terminal Pleistocene through the Holocene epochs, when the landscape was a key component of local aboriginal culture. Whether there were distinguishable, discrete periods when this was not the case or the landscape has always functioned in this capacity has not yet been deciphered.

Historical Archaeological Resources

Site S-20

Site S-20 appears to be a sparse and relatively small historic refuse deposit to the west of the proposed Unit 2 power tower, adjacent to a dirt road. The deposit rests on the

[25] Lacustrine**:** of, relating to, formed in, living in, or growing in lakes (Merriam-Webster On-Line Dictionary. 2012. http://www.merriam-webster.com/dictionary/lacustrine)

surface of non-Holocene, Quaternary-age sediments of Pahrump Valley basin fill (Qbf). The ground surface that supports the deposit is relatively level with a sparse lag deposit of pebbles overlying an apparent sheet of eolian sands. The boundary between the Mojave Desert scrub and the shadscale scrub vegetation associations on the facility site (HHSG 2011a:fig. 5.2-3) runs very close to site S-20. The applicant reports the presence of creosote (*Larrea tridentata*), *Lycium* spp., and unspecified native grasses. Surface visibility across the site is stated to be nearly 100 percent. The only noted information related to the historic land use of the site and surrounding area is their location on the Hidden Hills Ranch, which has been in operation as a cattle ranch since the 1920s.

The available information on the artifact assemblage for site S-20 and on the spatial distribution of the artifacts in the assemblage is spare. The only mention of the extent of the deposit or the distribution of the constituent artifacts within it is on the DPR 523C form for the site. The deposit apparently measures 10 m from north to south and 15 m from east to west. The description of the artifacts in the site assemblage are also somewhat vague. The deposit is reported to include one "solder dot can" or, presumably, matchstick filler can, five sanitary cans, three soft-top cans, and the embossed bases of three bottles which are undescribed. Without reference to artifact attribute data, the applicant states that the matchstick filler can dates to the 1950s and that the makers' marks on the bottle bases date to the late 1960s.

On the basis of the available information, the artifact assemblage of site S-20 appears to represent one or several episodes of roadside refuse disposal. The facts that none of this material is of artistic value, nor provides information that would readily facilitate the association of it with significant events or persons, combine to indicate that the resource does not meet any of the CRHR criteria of historical significance. Staff therefore recommends that site S-20 is not eligible for listing in the CRHR.

Indeterminate Archaeological Resources

Site S-8

Site S-8 is a small rock cairn in the west-central portion of the Common Area. The archaeological feature is on the surface of distal, Holocene-age sediments of a dormant local alluvial fan (Unit Qa2). The vegetation on and around the site is documented as Mojave Desert scrub (HHSG 2011a:fig. 5.2-3). Surface visibility across the site is unreported, though presumably high.

The subject cairn is an isolated archaeological feature. It is small (56 x 84 cm) and made up of 26 cobbles and boulders set in what appears to be three courses. The rock types are unreported but appear, on the basis of the photograph on the DPR 523A form for the feature, to be largely of igneous origin. The rocks in the photograph exhibit different degrees of mechanical and physical weathering, and different degrees of $CaCO_3$ accretion on the weathered cortex of each rock. The applicant notes (CRTR 2011b:55; DPR 523A 2011) that the lowest course of the cairn is "set into," or embedded in the surface of the ground. Archaeologists may cite the degree to which archaeological remains have become embedded in the surface on or in which they are found as a rough index of the antiquity of those remains. The implication here would be

that the cairn may be of some antiquity and not a product of more recent historic activity. No cultural materials were found on, in, or adjacent to the cairn, the association with which might have indicated a more definitive age for the feature.

The rock cairn that is site S-8 appears to represent a single event where someone built this feature. On the basis of the available information, it is presently not feasible to determine when the feature was built or for what purpose. As the feature cannot be associated with significant events or persons, possesses no discernible artistic value, and has no information to offer that may be important to prehistory or history, despite its apparent physical integrity, it does not meet any of the CRHR criteria of historical significance. Staff therefore recommends that site S-8 is not eligible for listing in the CRHR.

Evaluations of Archaeological Resources on the Basis of Phase II Archaeological Research on the Facility Site

Of the six prehistoric archaeological sites where staff deemed surface observation alone to be an insufficient basis to develop formal recommendations of historical significance, the applicant, BLM staff, and staff ultimately agreed to conduct Phase II archaeological research on all or part of five of them (CA-INY-2492, S-4, S-6, S-10/11, and S-23). The excluded resource, site S-AF-1, an archaeological deposit in the 200 ft. buffer zone for the original intensive pedestrian cultural resources survey, is just north of the northernmost portion of the Common Area, on BLM land in Nevada. BLM staff was not in favor of conducting Phase II archaeological research on either it or the portion of another archaeological deposit, site S-10/11, which laps over the east-central boundary of the HHSEGS Common Area, and the California border, also onto BLM land in Nevada. BLM staff preferred to establish the historical significance of lithic scatters such as these through a more inductive evaluative process. Given that the deposits were on BLM land in Nevada, staff agreed to drop them from our request for Phase II archaeological research.

Phase II Facility Site Methods

The methodology of the applicant's Phase II archaeological research structures part of the applicant's effort to comply with the subdivision of the Energy Commission's siting regulations that relates to the assessment of the potential effects of the proposed project on historical resources and to the subsequent development of measures to mitigate any significant effects (Cal. Code Regs., tit. 20, § 1701 et seq., app. B, subd. (g)(2)(E)). To assess the potential effects of the proposed project on historical resources, one must implicitly determine which of the cultural resources found in the project area of analysis as a result of archival and field research meet the regulatory definition of a historical resource. When one cannot reasonably demonstrate that an archaeological deposit is almost entirely exposed on the present ground surface and also rests on a landform that is older than the commonly accepted date of the initial human occupation of North America (ca. 15,000 before the present), or when the material remains on the exposed surface of an archaeological deposit indicate more than a light and transitory use of that place in the past, archaeological excavation is necessary to identify and to assess the spatial integrity of the potentially significant data sets which any buried components of that deposit, if present, may possess.

The methodology of the applicant's Phase II archaeological research primarily involves the use of small excavation units and backhoe trenches to inventory the presence and density of any subsurface material culture on the five subject sites and to assess the integrity of the spatial associations among those remains (Lawson et al. 2012). The initial effort on each site for this phase of research involved an intensive re-survey of the site surface of each site within the boundary established during the original Class III, Phase I intensive pedestrian cultural resources survey. Surface artifacts were mapped with a Trimble GeoXH, 2005 Series GPS. Additional site documentation for the re-survey included photography and site-specific descriptions of geomorphic context. Each of the five sites, relatively sparse (1 artifact/2.5–344 m^2) surface scatters of chipped stone, or relatively sparse lithic scatters, was excavated with the use of small shovel test probes (STPs) approximately 35 cm in diameter. The STPs were excavated in 20 centimeter levels to a depth of one m, or until an impenetrable layer was encountered. Excavated STP sediments were screened through 1/8-inch hardware cloth. Artifacts found were analyzed in the field and cast back into their respective STPs along with the excavated sediments after the completion of each probe. STP locations were mapped and STP-specific forms document each excavation. STPs were placed on the largest of the five archaeological sites, S-10/11, relative to a 30 to 35 m grid that was set across the site. On the balance of the sites, STPs were more subjectively placed near apparent surface artifact concentrations.

The backhoe trenches that were ostensibly excavated as a part of the Phase II archaeological research are more appropriately given consideration as part of the research on the geoarchaeology of the facility site. Discussion of the trenches and the results of that field effort may be found in Geoarchaeological Field Investigation, above.

Phase II Facility Site Results

Phase II archaeological research on the portions of the five prehistoric archaeological sites agreed upon as a result of consultation among staff, BLM staff, and the applicant led to the excavation of a total of 23 STPs. Eight of the STPs for four sites were negative, and 10 of the 15 STPs for the fifth site, site S-10/11, were also negative. The five STPs on site S-10/11 in which artifacts were found yielded a total of nine whole or fragmentary stone flakes in the first 10 cm excavated below the ground surface. Notwithstanding the facts that the subsurface excavations on the California portion of site S-10/11 represent a maximum subsurface sample of 1.442-cubic m and those on the four other sites represent a maximum 0.192-cubic-m sample for each, the excavations do evidence one aspect of staff's efforts to establish a factual basis relative to which staff can develop reliable recommendations on the historical significance of the subject archaeological resources.

CA-INY-2492

Site CA-INY-2492 is a small, extremely sparse prehistoric lithic scatter in the northeastern portion of the proposed Unit 2 heliostat field. The site was originally recorded in 1979. It was relocated and the documentation for it updated during the intensive pedestrian cultural resources survey for the proposed project. The artifacts on the site are reported to have been found on the surface of distal, Holocene-age sediments of an active local alluvial fan (Unit Qa1). The ground surface that supports the scatter is level with a moderately dense lag deposit, primarily of pebbles with some

cobbles present. The vegetation in the vicinity of the site is documented as Mojave Desert scrub (HHSG 2011a:fig. 5.2-3). The applicant reports the presence of creosote (*Larrea tridentata*), and *Lycium* spp. Rice grass (*Achnatherum hymenoides*) and Big Galleta grass (*Pleuraphis rigida*) are also noted on discontinuous sand sheets in nearby ephemeral stream channels. Surface visibility across the site is stated to be nearly 100 percent. The only noted information related to the historic land use of the site and surrounding area is their location on the Hidden Hills Ranch, which has been in operation as a cattle ranch since the 1920s.

The spatial distribution and the character of the surface artifact assemblage that appears to make up site CA-INY-2492 are presently unclear. The original USDA Forest Service Archaeological Site Survey Record for the site documents an approximately 10 x 20 m scatter of two chert or chalcedony cores and "numerous" flakes, none of which were thought to exhibit use-wear, that were interpreted to be the result of "cleaning and core reduction." The DPR 523C form for the site notes the dimensions of the deposit as being 55 m from north to south and 50 m from east to west. Any patterns that may exist with regard to the differential distribution of artifact or material types within the site area are unreported and poorly depicted. The sketch map on the DPR 523K form depicts the site, an assemblage of nine artifacts, as being approximately 45 m from north to south and 40 m from east to west with symbols that denote two flake concentrations, four individual flakes, and a trowel probe spread around that area. The uncertainty about the distribution of the artifacts across the site is not the only factor that complicates the interpretation of it. The descriptions of the character of the site artifact assemblage are inconsistent as well. The recent intensive pedestrian cultural resources survey found nine artifacts on the site, one core and eight flakes. The DPR 523A and C forms for the site state that the assemblage is made up of one brown chert core, one primary and one secondary yellow chert flake, two primary chert flakes of unreported color, and one primary and three secondary flakes of a "light brown igneous" material. The flakes range from approximately 3–5 cm in length. The interim Phase II report identifies one brown chert core that evidences flake detachment in multiple directions, a multidirectional core, two yellow chert flakes, and nine "rough grained reddish brown chert flakes" (Lawson et al. 2012:8).

Efforts were made during both the original intensive pedestrian cultural resources survey of CA-INY-2492 and the Phase II archaeological research on the site to identify and inventory any potential subsurface component that may be a part of that deposit. These efforts included the excavation of one trowel probe and two STPs. The small (10 cm in diameter, 10 cm in depth) trowel probe found no cultural material. The STPs were dug to depths of 74 and 85 cm, respectively, and the screening of probe sediments did not produce any artifacts. The probes were terminated at a tough layer of $CaCO_3$, or caliche. The texture of the sediments and the degree of sedimentary compaction were reported to be consistent throughout the profile of both probes, from the surface to the bottom. The sediment is reported to have been moderately compacted pinkish brown sandy silt with angular gravels.

Absent intrasite data on the spatial distribution of the surface artifacts that presently appear to make up site CA-INY-2492, the deposit can only be said to represent one to three episodes of the reduction of rock, ostensibly different kinds of chert, and the

preparation of formal cores for the detachment of flakes for stone tool production, most likely expedient stone tools. The site assemblage appears to indicate an overall light and transitory use of the site area. The facts that the artifacts are not of artistic value and do not provide information that would readily facilitate the placement of the site activity in time or the association of it with significant events or persons, combine to indicate that the resource, despite its apparent physical integrity, does not meet any of the CRHR criteria of historical significance. Staff therefore recommends that site CA-INY-2492 is not eligible for listing in the CRHR.

Site S-4

Site S-4 is a small prehistoric lithic scatter in the east-central portion of the proposed Unit 2 heliostat field. The artifacts on the site are reported to have been found in relatively small (10 x 15 m) area on the surface of distal, Holocene-age sediments of a dormant local alluvial fan (Unit Qa2). The ground surface that supports the scatter is level with a spare lag deposit of pebbles and cobbles. The vegetation in the vicinity of the site is documented as Mojave Desert scrub (HHSG 2011a:fig. 5.2-3). The applicant reports the presence of creosote (*Larrea tridentata*), *Lycium* spp., unspecified native grasses, and unspecified invasive weeds. Surface visibility across the site is stated to be nearly 100 percent. The only noted information related to the historic land use of the site and surrounding area is their location on the Hidden Hills Ranch, which has been in operation as a cattle ranch since the 1920s.

The available information on the character of the surface artifact assemblage for site S-4 is partially contradictory. The assemblage is made up of 41 flakes, of which 35 are primary flakes, 2 are secondary flakes, 2 are tertiary flakes, and 2 which have unspecified attributes. The primary flakes range from approximately 4–8 cm in length, while the secondary and tertiary flakes are smaller and range from approximately 3–4 cm in length. There are gross contradictions as to the material types—the rocks of which the flakes are made. The DPR 523A form for the site refers to the flakes as being primarily of a “light brown igneous medium grained material” with one flake being of a “salmon colored chert material.” The igneous material was reported to be present as “large untouched cobbles” on the site as well. The DPR 523C form for the same site refers to the flakes as being primarily of a “very poor quality chert material.” One tertiary flake of jasper is also noted. The form states that the chert flakes have “a lot of cortex with inclusions” and that the chert has numerous vesicles. The applicant’s interim summary of the results of the Phase II archaeological research (interim Phase II report) reports that the flakes are “primarily a light brown to reddish brown rough grained silicified mudstone or siltstone” or a stone that resembles “freshwater limestone or siltstone” (Lawson et al. 2012:5–6). The flake of “salmon colored chert material” recurs.

The artifact distribution pattern across the site is at least fairly clear. The different sources agree that the site has one small (2 x 2 m), primary concentration of 33 flakes, which the interim Phase II report states as all being of a “yellow, silicified mudstone.” The eight other flakes from the site were found sparsely distributed across the balance of the site area.

The Phase II effort to identify and inventory any potential subsurface component of the site was the excavation of two STPs. The probes were dug to depths of 60 and 75 cm,

respectively, and the screening of probe sediments did not produce any artifacts. Deeper excavation was precluded by the presence of what is reported to have been a tough layer of $CaC0_3$, or caliche. The initial 5 cm of the excavation is reported to have been unconsolidated, unspecified sediments with the balance of the subsurface sedimentary deposits being moderately compacted, pinkish brown sandy silt with angular gravels.

The surface artifact assemblage that presently appears to be site S-4 represents one primary and several other incidental episodes of the assay and initial reduction of rock available on the site, for use as toolstone. The one concentration of 33 flakes is the most unambiguous example of this. The contradictory information on lithic material types presently renders meritless any discussion of the implications that the artifacts may have for cultural behavior beyond this one site. The site assemblage indicates an overall light and transitory use of the site area. The facts that the artifacts are not of artistic value and do not provide information that would readily facilitate the placement of the site activity in time or the association of it with significant events or persons, combine to indicate that the resource, despite its apparent physical integrity, does not meet any of the CRHR criteria of historical significance. Staff therefore recommends that site S-4 is not eligible for listing in the CRHR.

Site S-6

Site S-6 is a moderately small, sparse prehistoric lithic scatter in the east-central portion of the proposed Unit 2 heliostat field. The artifacts on the site are reported to have been found on the surface of distal, Holocene-age sediments of a dormant local alluvial fan (Unit Qa2). The ground surface that supports the scatter is level with a lag deposit of pebbles and cobbles. The vegetation in the vicinity of the site is documented as Mojave Desert scrub (HHSG 2011a:fig. 5.2-3). The applicant reports the presence of creosote (*Larrea tridentata*), *Lycium* spp., and unspecified native grasses. Surface visibility across the site is stated to be nearly 100 percent. The only noted information related to the historic land use of the site and surrounding area is their location on the Hidden Hills Ranch, which has been in operation as a cattle ranch since the 1920s.

The spatial distribution and the character of the surface artifact assemblage that appears to make up site S-6 are presently unclear. The DPR 523C form for the site notes the dimensions of the deposit as being 25 m from north to south and 30 m from east to west. Any patterns that may exist with regard to the differential distribution of artifact or material types within the site area are unreported. The available descriptions of the composition and the character of the artifact assemblage are inconsistent. The DPR 523A form for the site at first details the assemblage as being eleven flakes, three cores, and a utilized flake. The form then proceeds to describe two cores, one of green chert and one of rhyolite, instead of three, and describes the utilized flake as being of basalt and having flaked edges, which would make the artifact an edge-modified flake, a formed tool, rather than simply a utilized flake. The form states that the flakes are of a poor quality, red rhyolite, a material which was observed to occur naturally on the site. The DPR 523C form for the site notes a light brown igneous core in addition to the others on the DPR 523A form, nine rhyolite flakes, and one orange and red chert flake fragment. The nine flakes are identified as three primary and five secondary flakes, and one tertiary flake. The interim Phase II report identifies nine flakes, one flake fragment,

three cores, and a utilized flake (Lawson et al. 2012:6–7,). The cores are all interpreted to indicate the detachment of flakes from multiple directions. The two cores that are in addition to the green chert core are described in the interim report to be “rough grained, silicified mudstone.” The flakes are stated to be “mostly secondary flakes and all are a poor quality silicified freshwater limestone or mudstone,” cobbles of which occur naturally on the site and which makes up the bulk of the worked lithic material on the site. The interim report describes the utilized flake as being of “dark basalt” with slightly rounded and worn, perhaps sand-blasted, flake scar edges. The applicant interprets this piece to have been brought onto the site from elsewhere, because the material, the dark basalt, is one that the applicant had not “observed at other [archaeological] sites in the HHSEGS,” notwithstanding the fact that the interim report describes “exotic lithologies” as being common among the larger clasts or rocks of the Qa2 alluvial unit (Lawson et al. 2012: 5) on which S-6 rests. Those lithologies are reported to include a “variety of igneous rocks, from volcanic (basaltic andesite, vesicular basalt) to ignimbritic (tuffaceous breccias), to plutonic (granites).

The effort made during the original pedestrian survey on site S-6 to identify and during the Phase II field effort to identify and inventory any potential subsurface component of site S-6 included the excavation of one trowel probe and two STPs. The small (10 cm in diameter, 10 cm in depth) trowel probe was excavated in the northern portion of the site during the original pedestrian survey of the proposed facility site. No cultural material was found. The STPs were dug to depths of 20 and 60 cm, respectively, and the screening of probe sediments did not produce any artifacts. Deeper excavation was precluded by the presence of what is reported to have been a tough layer of $CaC0_3$, or caliche. The initial 5 cm of the excavation is reported to have been unconsolidated, unspecified sediments with the balance of the subsurface sedimentary deposits being a moderately compacted, pinkish brown sandy silt with angular gravels.

Absent intrasite data on the spatial distribution of the surface artifacts that presently appear to make up site S-6, the deposit can only be said to indicate the assay and initial reduction of marginal toolstone quality rock that appears to be found as cobbles as part of the natural sedimentary lag on the site. The purpose of reducing the rock appears to have been to fashion lithic cores from which flakes could be detached for stone tool production, most likely expedient stone tools. The green chert material from which the one core was fashioned and the orange and red chert of the flake fragment may or may not have come from the onsite lag deposit. The applicant was of the opinion that the dark basalt material of the apparent edge-modified flake was exotic to the site and, therefore, that people brought the artifact onto the site from elsewhere. The site assemblage does appear to indicate an overall light and transitory use of the site area. The facts that the artifacts are not of artistic value and do not provide information that would readily facilitate the placement of the site activity in time or the association of it with significant events or persons, combine to indicate that the resource, despite its apparent physical integrity, does not meet any of the CRHR criteria of historical significance. Staff therefore recommends that site S-6 is not eligible for listing in the CRHR.

Site S-10/11

Site S-10/11 is a relatively large, sparse prehistoric lithic scatter that straddles the northern part of the northeastern boundary of the Common Area and the California border. The site was documented as two distinct archaeological deposits during the original intensive pedestrian cultural resources survey (CRTR 2012b) and was subsequently lumped into a single site during Phase II archaeological research due, apparently, to the discovery of three buried artifacts between the formerly distinct sites (Lawson et al. 2012: 9). The artifacts on the site are reported to have been found on the distal and midslope surfaces of an alluvial fan of Holocene-age sediments. These sediments appear to be primarily a mixture of eroded deposits from the western Spring Mountains bajada, and from paleospring tufa and eolian sand deposits from the Pahrump Valley fault zone. This sediment mixture emanates from that zone as a coalescing sequence of relatively small and active alluvial fans (Unit Qa1). The surface of the particular alluvial fan that supports site S-10/11 slopes down toward the west and transitions from a less than five percent slope on the Nevada portion of the site to a slope of less than two percent on the California portion of it. Several small ephemeral stream channels that traverse the site incise the surface of this fan. Chert cobbles are a noted constituent of the streambed loads in these channels. The fan surface away from the ephemeral stream channels has a moderately dense lag deposit, primarily of pebbles and cobbles. A relatively thin sand sheet drapes the southern portion of the site. The vegetation in the vicinity of the site is documented as Mojave Desert scrub (HHSG 2011a:fig. 5.2-3). The applicant reports the presence of creosote (*Larrea tridentata*), *Lycium* spp., and unspecified native grasses. The sand sheet across the southern portion of the site supports Rice grass (*Achnatherum hymenoides*), and Big Galleta grass (*Pleuraphis rigida*). Surface visibility across the site is stated to be nearly 100 percent. The only noted information related to the historic land use of the site and surrounding area is their location on the Hidden Hills Ranch, which has been in operation as a cattle ranch since the 1920s.

The spatial distribution and the character of the surface artifact assemblage that appears to make up site S-10/11 are presently unclear. The DPR 523C form for site S-10, the larger of the two original sites, notes the dimensions of that deposit to be 80 m from north to south and 50 m from east to west. Any patterns that may exist with regard to the differential distribution of artifact or material types within the site area are unreported and coarsely depicted. The sketch map on the DPR 523K form depicts the same site as being approximately 210 m from northwest to southeast and 81 m from northeast to southwest. The DPR 523C form for site S-11, adjacent to the southwest-central portion of site S-10, similarly notes the dimensions of that deposit to be 10 m north to south and 15 m from east to west, and the DPR 523K sketch map for that site depicts it as approximately 28 m north to south and 44 m from east to west. Within whatever the actual dimensions of the site are, the site artifact assemblage appears to be distributed into three large artifact concentrations and seven smaller ones. The smallest of the three large concentrations is at the extreme northwestern end of the site surrounded to the southeast by four of the smaller concentrations. All five of these concentrations are within approximately 30 m of what the applicant identifies on the map as a source for toolstone, a chert source associated with one of the ephemeral stream channels that courses through the site. The balance of the large concentrations

is found on the southeastern end of the site, and the balance of the smaller concentrations is found in the center of the site. The interim Phase II archaeological research report describes the large concentrations as having a variety of primary and secondary flakes and cores (Lawson et al. 2012:?). The smaller concentrations are reported to each have 10–20 flakes of various types, and 1–2 cores. The absence of intra-concentration descriptions of artifact assemblages and distributions constrains one's ability to interpret the behavior that the concentrations and the broader site represent. The uncertainty about the distribution of the artifacts across the site is not the only factor that complicates one's interpretation of it. The descriptions of the character of the site artifact assemblage are inconsistent as well. DPR 523 series forms document the observations of the original intensive pedestrian cultural resources survey on both site S-10 and S-11. The DPR 523A form for site S-10 notes the site to include 3 flake tools, 9 cores, and over 150 flakes, the majority of which are said to be of light brown chert. The DPR 523C form for that site states, alternately, that the assemblage is made up of 3 flake tools, 11 cores, 232 flakes, and 25 pieces of stone tool production shatter, all of which are noted to be of chert. The cores are relatively small and average approximately 7 cm in maximum dimension. The 232 flakes are reported to include 95 primary, 114 secondary, and 23 tertiary flakes. The primary and secondary flakes range in length from 2–7 cm, and the tertiary flakes range from 1–4 cm. The interim Phase II report describes the assemblage as including 3 flake tools, 1 core tool, 10 cores, and over 150 flakes, the majority of which are said to be of light brown chert. All of the cores are noted to indicate detachment of flakes in multiple directions, known as multidirectional cores. The observation was made that nodules of chert that appear to have eroded out of the Paleozoic carbonate rock of the Spring Mountains and become incorporated into the alluvial deposits of that range's bajada have subsequently eroded out of those latter deposits and are now found as cobbles in the dry channels of the ephemeral streams that traverse the site.

The interim Phase II report also provides further detail on the stone tools that were found (Lawson et al. 2012:10). The three flake tools that were found all appear to be utilized flakes, expedient tools not subject to formal shaping subsequent to their detachment as simple flakes from a core. Although the descriptive detail that would more securely support the interpretation of the tools is not available, the applicant interprets two of the tools (L x W x T[26] of 37 x 35 x 10 and 74 x 65 x 18 mm, respectively) to have been subject to light use along one tool edge, presumably on the basis of sporadic unifacial chipping along that edge. The interim Phase II report describes the third flake tool (L x W x T of 38 x 30 x 10 mm) as having "heavy chipping damage along one edge." This is presumably the same tool that the DPR 523C form for site S-10 describes as having "one good crushed edge." The core tool, for which dimensions and a detailed description are unavailable, is stated in the interim Phase II report as being an exhausted, or completely used core with "heavy chipping damage along one edge.

Efforts were made during both the original intensive pedestrian cultural resources survey and the Phase II archaeological research on sites S-10 and S-11 to identify and inventory any potential subsurface components that may be a part of those deposits.

[26] L = length, W = width, and T = thickness

These efforts included the excavation of 3 trowel probes and 15 STPs. The small, shallow (10 cm in diameter, 10 cm in depth) trowel probes found no cultural material. The STPs were laid out 30–35 m apart across the California portion (~ 86 percent) of site S-10/11, relative to an arbitrary grid devised for that purpose. The probes were dug to depths of 24–100 cm. Probes were terminated prior to 100 cm of depth only when rock or dense $CaCO_3$ deposits, known as caliche, inhibited further excavation. The texture of the sediments and the degree of sedimentary compaction varied somewhat throughout the profiles of the probes. The majority of STPs were placed on portions of the site with a gravel lag where the surface was very dry and moderately compacted. The excavation of other STPs on portions of the site with loose surface sediments found the loose sediments to extend down only about 10 cm before more compacted sediments were encountered. The sediment is reported to have been moderately to well compacted pinkish brown silt with mostly small and angular gravel.

The screening of probe sediments produced artifacts in five of the probes. The applicant notes that all of the excavated artifacts came from the uppermost 10 cm of fill in probes that had been placed on surface deposits of loose silty sand. The interim Phase II report lists these artifacts as seven flakes and two flake fragments. No further description of the artifacts is available.

Absent higher resolution data on the intra-concentration spatial distribution and character of the surface artifacts that presently appear to make up site S-10/11, the deposit can be interpreted primarily as a lithic procurement site focused on a particularly productive local source of Paleozoic chert cobbles, ultimately derived from the Spring Mountains. The site artifacts indicate the presence of perhaps seven segregated reduction loci[27] (SRLs) and three larger areas that most likely represent recurrent reduction episodes that occurred over a relatively long period of time. The presence of a number of cores, the high percentages of the enumerated primary (41 percent) and secondary (49 percent) flakes relative to tertiary (10 percent) flakes that appear to indicate a behavioral emphasis on cobble assay and the preparation of flake cores, and the spare representation in the site artifact assemblage of other types or classes of artifacts all support the interpretation of a behavioral focus on the procurement of toolstone-quality chert and the preparation of cores for subsequent use in the production of stone tools. Given the extremely rare (< 2 percent) incidence of stone tools on the site relative to the enumerated artifacts, those that were found, the core tool and the three flake tools, may represent pursuits on the site secondary to lithic procurement, but more probably represent cases of incidental or accidental discard of these specimens. The site assemblage, as a whole, appears to indicate an overall light and transitory use of the site area. More precise documentation of the constituent artifacts of the larger and smaller lithic concentrations and the patterns of artifact distribution within those, and lithic refit analyses of the discrete SRLs and of any SRLs identified within the larger lithic concentrations have the potential to yield more useful information to reconstruct the behavioral patterns that the composite artifact assemblage of the site represents, but staff does not believe that that information would

[27] A segregated reduction locus is a concentration of stone artifacts that "contains wastes from individual knapping events, produced wherever one or a couple [of] suitable cobbles were decorticated and/or reduced into rough cores or tool preforms" (Giambastiani 2005).

ultimately prove to be significant. The facts that the artifacts are not of artistic value and do not provide information that would readily facilitate the placement of the site activity in time or the association of it with significant events or persons, combine to indicate that the resource, despite its apparent physical integrity, does not meet any of the CRHR criteria of historical significance. Staff therefore recommends that site S-10/11 is not eligible for listing in the CRHR.

Site S-23

Site S-23 is a small prehistoric lithic scatter in the southeastern portion of the proposed Unit 1 heliostat field. The artifacts on the site are reported to have been found on the surface of distal, Holocene-age sediments of an active local alluvial fan (Unit Qa1). The ground surface that supports the scatter is level with a relatively sparse lag deposit, primarily of pebbles with some cobbles present. The vegetation in the vicinity of the site is documented as Mojave Desert scrub (HHSG 2011a:fig. 5.2-3). The applicant reports the presence of creosote (*Larrea tridentata*), *Lycium* spp., and unspecified native grasses. Surface visibility across the site is stated to be nearly 100 percent. The only noted information related to the historic land use of the site and surrounding area is their location on the Hidden Hills Ranch, which has been in operation as a cattle ranch since the 1920s.

The spatial distribution and the character of the surface artifact assemblage that appears to make up site S-23 are presently unclear. The DPR 523C form for the site notes the dimensions of the deposit as being 10 m from north to south and 10 m from east to west. Any patterns that may exist with regard to the differential distribution of artifact or material types within the site area are unreported and poorly depicted. The sketch map on the DPR 523K form depicts the site as being 15 m from north to south and 10 m from east to west with symbols that denote a flake concentration, a flake, and a trowel probe clustered in the center of that area. The available descriptions of the character of the artifact assemblage are inconsistent. The DPR 523A and C forms for the site states that the four secondary and fifteen tertiary flakes that make up the entire artifact assemblage are, respectively of a “light brown medium grained igneous material” and a “light yellow to brown igneous material, likely a welded tuff.” The interim Phase II report identifies the flakes as being of a “light brown coarse grained silicified mudstone,” cobbles of which occur naturally on and near the site (Lawson et al. 2012:11). The material is described there as extremely poor quality toolstone.

The effort made during the original pedestrian survey on site S-23 to identify and during the Phase II field effort to identify and inventory any potential subsurface component of site S-23 included the excavation of one trowel probe and two STPs. The small (10 cm in diameter, 10 cm in depth) trowel probe found no cultural material. The STPs were placed in areas of the site where a gravel lag was apparent. The probes were dug to depths of 66 and 90 cm, respectively, and the screening of probe sediments did not produce any artifacts. Deeper excavation was precluded by the presence of what is reported to have been a layer of cobbles. The texture of the sediments and the degree of sedimentary compaction were consistent throughout the profile of each probe, from the surface to the bottom. The sediment is reported to have been moderately to well compacted light brown silt with a moderate density of small, angular gravel.

Absent intrasite data on the spatial distribution of the surface artifacts that presently appear to make up site S-23, the deposit can only be said to indicate the reduction of marginal toolstone quality rock that appears to be found as cobbles as part of the natural sedimentary lag on the site. The purpose of reducing the rock appears to have been to detach flakes for stone tool production, most likely expedient stone tools. The site assemblage appears to indicate an overall light and transitory use of the site area. The facts that the artifacts are not of artistic value and do not provide information that would readily facilitate the placement of the site activity in time or the association of it with significant events or persons, combine to indicate that the resource, despite its apparent physical integrity, does not meet any of the CRHR criteria of historical significance. Staff therefore recommends that site S-23 is not eligible for listing in the CRHR.

ASSESSMENT OF PROJECT IMPACTS TO CRHR-ELIGIBLE ARCHAEOLOGICAL RESOURCES AND RECOMMENDED MITIGATION

The construction of the proposed project would cause a substantial adverse change in the significance of the Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape. The Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape (Pahrump Metapatch Landscape) is a constellation of what have been and, to a lesser degree, may still be passively and actively managed natural features and of material culture remains that staff, for the purpose of the present analysis, has assumed to be significant for the landscape's associative and information values. The landscape is most likely significant for its association with particular events and sequences of events that have made an important contribution to the broad patterns of the Native American prehistory and history of this portion of the eastern Mojave Desert (CRHR Criterion 1), and for the potential importance for the information that the landscape may be able to provide about the prehistory and history of Native American life in the region (CRHR Criterion 4). The construction and operation of the proposed facility site has the potential to indirectly cause physical damage to the landscape, which would degrade its value under Criterion 4, and would unquestionably degrade the landscape's value under Criterion 1 due to the stark visual intrusion the facility would have on it. The landscape must retain enough integrity of setting, feeling, and association to be able to convey its associative values if the proposed project is not to have a significant effect on it.

The *indirect* physical effect that the proposed project has the potential to cause on the Pahrump Metapatch Landscape is related to the magnitude of the project's potential drawdown on the local system of aquifers that underlie the proposed facility site in California and the adjacent landscape in Nevada. If the project's use of the local aquifer system were to result in an appreciable drop in the level of the water table, then previously documented local environmental stress would intensify on the mesquite woodland which is a fundamental component of the Pahrump Metapatch Landscape. The ultimate death of the woodland mesquite, which would be an indirect project effect, would compromise the integrity of the subject landscape under both CRHR Criteria 1 and 4. With respect to Criterion 1, the loss of the mesquite would compromise the landscape's setting, feeling, and association, aspects of the landscape's integrity that enable the resource to convey the associative values for which staff has, in part,

recommended that it be assumed significant. The loss of the mesquite would also ultimately lead to the physical destabilization of the coppice dunes which the mesquite anchor. There are most likely archaeological deposits embedded in those dunes. The loss of the mesquite and the consequent deterioration of the mesquite roots which presently act to stabilize the dunes would make the dune sand available for eolian transport or pluvial erosion, and could therefore reasonably be anticipated to lead to the damage and destruction of some of the landscape's archaeological deposits. Any such damage or destruction would compromise the landscape's location, design , and association, aspects of the landscape's integrity that enable the resource to convey the information values under Criterion 4 for which staff has, in part, also recommended that the landscape be assumed significant. Staff believes that the implementation of **BIO-23**, **BIO-24**, **WATER SUPPLY-6**, and **WATER SUPPLY-8** would reduce the potential indirect physical effect of the proposed project to a less than significant level. Any remedy for noncompliance with any of the above recommended conditions of certification would need to additionally take into account and mitigate for the damage done to the Pahrump Metapatch Landscape as a whole and for the damage done to any of the landscape's contributing elements, which would include, among other contributors, the mesquite population itself and any archaeological components of the landscape.

The presence of the proposed facility's two heliostat fields and the two, approximately 750 foot-tall solar power towers would be a stark visual intrusion that would profoundly and irreparably degrade the ability of the landscape to convey its historical significance under CRHR Criterion 1. The mass of the looming towers in particular, in combination with the operational glare from the solar receiver steam generators atop each tower, would compromise the setting, feeling, and association aspects of the resource's integrity, aspects critical to the resource's ability to convey its associative values under Criterion 1. Subsequent to the construction of the facility, one would no longer be able to experience the sense of the landscape as it was during its period of significance. The baseline presence of the roads and residences of the Charleston View community along the southwestern side of the landscape and of Nevada State Route 160 through the northeastern side of it has contributed somewhat to the visual degradation of the landscape, in those limited areas. There are broad expanses from within the landscape, however, where that degradation is not readily apparent, where dunes, fault scarps, and stream banks shield the viewer from both the sight and the sound of Charleston View and the highway. The presence of the solar power towers would significantly intrude on those remaining broad landscape expanses. The towers would loom over the very landscape features that presently shield the viewer from the modern world. Staff therefore concludes that the construction of the proposed project, its indefinite period of operation, and the indefinite period of the presence of the facility's infrastructure on the land would result in a significant impact on the Pahrump Metapatch Landscape, a historical resource; and would require mitigation under CEQA.

The significant effect of the proposed project on the Pahrump Metapatch Landscape may not be wholly mitigable if the project is constructed as designed in the proposed location. Given the indefinite period of both the proposed project's operation, a minimum of at least 30 years, and the long-term physical presence of the proposed power towers on the land, the effect of the towers' presence on the landscape can, in essence, be

considered permanent. Once the towers are present, the visual integrity of the landscape would be lost. Staff is unaware of any mitigation measures that would materially mitigate the loss of an entire landscape or a substantial portion of one. Staff believes that any suite of mitigation measures that could reasonably be argued to reduce the almost permanent loss of the entire landscape or a substantial portion of it to a less than significant level would have to provide compensation the benefits of which would provide returns to the public on a time scale that would be commensurate with the duration of the project's visual effects, and of a magnitude that would be commensurate with the magnitude of those effects. To substantively reduce the visual effects of the proposed project on the Pahrump Metapatch Landscape to a less than significant level, the applicant would need to provide for compensatory mitigation that attenuates the magnitude of the project's visual effects on the subject landscape over the entire span of time that the power towers are present there. As the applicant has been unable to date to acknowledge any effects of the proposed project beyond the boundary of the facility site or, consequently, to consider potential historical resources outside of that boundary, the applicant has provided no information or analysis on the subject landscape and has recommended no mitigation to reduce the proposed project's effects on it. Staff nonetheless concludes that the project's projected effects on the Pahrump Metapatch Landscape would be significant, and that, were mitigation measures to meet specific criteria, mitigation of these effects to a less than significant level would, in theory, be feasible. Mitigation that would meet such criteria has proven infeasible in this case (see Multi-resource Mitigation for the Degradation of Multiple Landscapes, below). Staff nonetheless does propose mitigation through two conditions of certification (**CUL-10**, and **CUL-11**) that while not reducing the project's effects to a less than significant level would ameliorate the loss of the Pahrump Metapatch Landscape's ability to convey its associative values.

Staff proposes mitigation measures through two conditions of certification (**CUL-10**, and **CUL-11**) that would, in part, compensate for the loss of the Pahrump Metapatch Landscape's ability to convey its associative values. Condition of Certification **CUL-10** provides for partial compensatory mitigation for the proposed project's visual effects to the Pahrump Metapatch Landscape by facilitating the delivery of a number of different programs through extant regional interpretive centers. These programs would encompass objectives to facilitate primary landscape research and the public interpretation of the landscape, and to preserve landscape archaeological assemblages, natural history collections, and the documentation related to primary research efforts. **CUL-10** would also function at a broader level as mitigation for the proposed project's direct visual effects to the Pahrump Paiute Home Landscape and the Ma' hav Landscape (see *Analysis of Impacts to Ethnographic Resources* subsection, below), and for both direct physical and visual effects to trail and road segments in the Old Spanish Trail-Mormon Road Northern Corridor (see *Analysis of Impacts to Historic-Period Built-Environment Resources* subsection, below) (see also the *Multi-Resource Mitigation for the Degradation of Four Historical Resources* subsection, below, for the complete discussion of the broader concept, the history of its development, and its proposed implementation.). **CUL-10** would emplace valuable programs dedicated to the interpretation and preservation of the significant aboriginal landscape that the proposed project, as well as other reasonably foreseeable renewable energy projects in Pahrump Valley, respectively, would and will permanently and irreparably cause to be lost as a

result of profound direct visual degradation. From a broader perspective, the degradation of the subject landscape would represent the loss of a significant piece of the anthropological mosaic of human life on our planet. Though only partial and incomplete compensatory mitigation for this loss, staff believes that the implementation of **CUL-10**, in combination with **CUL-11**, while not reducing the project's effects to a less than significant level, would ameliorate the loss of the Pahrump Metapatch Landscape's ability to convey its associative values, because it would foster the generation and interpretation of, and preserve knowledge about the landscape, and provide archaeological materials related to human life on the landscape to a public who may largely have never been aware of its existence, or its significance, prior to the irreversible loss of the relatively pristine whole.

Staff's proposed Condition of Certification **CUL-11** would seek to develop a comprehensive picture of the Pahrump Metapatch Landscape's associative values and attempt to re-create or to engender at least some sense of the experience of the landscape through description and interpretation. This type of mitigation would parallel the treatments routinely given to significant built-environment resources, such as buildings and bridges (Historic American Building Survey and Historic American Engineering Record documentation, respectively) prior to demolition, and increasingly given to significant landscapes (Historic American Landscape Survey documentation), under federal historic preservation programs, where such resources are subject to profound visual degradation or physical destruction. This form of mitigation does not serve to directly avoid or minimize the significant direct visual effects that the proposed project would have on the Pahrump Metapatch Landscape, and, as a sole mitigation measure, would not reduce those effects to a less than significant level. It would however serve to partially compensate local Native American communities and the public for their respective losses, and, in combination with **CUL-10**, would further reduce those effects.

Staff finds the proposed mitigation appropriate here, because staff knows of no direct way to effectively counteract the visual degradation that the proposed project would inflict on the landscape. **CUL-11** seeks to compensate, in part, for the permanent loss of the public's ability to experience a significant aboriginal landscape through the reasonably thorough documentation of the landscape's diachronic[28] composition and character, and the subsequent dissemination of this information among the public, to the people who would suffer the loss. **CUL-11** proposes to gather this information through the design and execution of a thoughtful program of primary field research.

The proposed field research would develop two primary avenues of inquiry. One direction of inquiry would encompass research on the geomorphology and the paleoenvironment of the ancient mesquite woodland-coppice dune association, and on the springs and seeps across the proposed landscape. This information is critical to the establishment of the chronology of the use of this area and of the age of related archaeological sites, and to the determination of the relative importance that the landscape may have played in the broader ecological milieu of Pahrump Valley over the last several millennia. The applicant's May 13, 2012 response to Data Request 105

[28] "Diachronic" means of or concerned with phenomena as they change through time.

(Spaulding 2012b), a technical memorandum that provides an initial scope for a study of the physiographic and biological contexts of a portion of the subject vegetation association adjacent to the proposed facility site, would serve as a useful point of departure for the development of a more formal research design for such an inquiry.

A second line of inquiry would entail the investigation of the archaeology of the landscape and would seek to establish the range of variability, the density, and the patterns of distribution of the archaeological deposits that typify the landscape. The overarching purpose for gathering and interpreting information on the associative values of the Pahrump Metapatch Landscape is not to provide further support to staff's assumption of historical significance of the subject landscape. Once assumed significant by the lead agency, the resource is considered significant under CEQA and treated accordingly. The purpose would rather be to attempt to provide the public with a sense, however diminished, of the experience that they would have had if the HHSEGS project did not exist.

Staff believes that the implementation of **CUL-10**, and **CUL-11**, while not reducing the proposed project's effects to the Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape to a less than significant level, would provide reasonable and feasible means to substantively reduce those effects. Staff therefore concludes that the project's effects to the subject landscape would stand as unmitigable were the application for the proposed project approved, and despite the implementation of **CUL-10**, and **CUL-11**.

Construction of the proposed facility has the potential to cause a substantial adverse change in the significance of buried archaeological resources across the eastern portion of the facility site on or in Holocene-age alluvial landforms Qa1 and Qa2 (see CH2 2012a, Figure DR101-1). Any construction excavation into these landforms has the potential to truncate or destroy archaeological resources buried beneath, but not evident from, the surface. The implementation of both **CUL-6**, a monitoring protocol for the landforms, and **CUL-7**, a discovery protocol, would reduce any potential significant effects that the inadvertent discovery of buried archaeological resources would cause to a less than significant level. The monitoring protocol of **CUL-6** provides for full-time archaeological monitoring of all construction-related ground disturbance on or in the Qa1 and Qa2 alluvial fans. Both a professional archaeologist and a member of a local Native American community would together conduct this monitoring. Upon the discovery of any buried archaeological resources, **CUL-7** sets out a discovery protocol that would provide for measured assessments of the age, integrity, and significance of cultural resource construction finds. The combination of both conditions of certification tailors the applicant's monitoring burden, on the basis of geoarchaeological research done in conjunction with the review of the AFC, down to only the portion of the proposed facility site that has a demonstrable potential to harbor buried archaeological resources, and provides a protocol for the treatment of any such resources upon their discovery.

The construction of the proposed project and the fulfillment of staff's recommended conditions of certification may cause effects to cultural resources which cannot be adequately analyzed prior to the approval of the application, because it may not be feasible to acquire information of sufficient detail. The reasons for the lack of access to

key information vary. The proposed project would not be far enough along in design to be able to identify, with any degree of certainty, either whether project construction would require the use of offsite construction fill, or the one or several sources from which that fill would come. Construction also may require the use of an offsite disposal site for fill generated on the facility site. Whether and where the use of such a site may be necessary are presently unknown as well. Each of these types of project effects, both direct and indirect, have the potential to damage the physical and visual integrity of archaeological resources. Staff proposes **CUL-8** to take these types of effects into account.

In the event that the construction or operation of the California components of the project require the acquisition or disposal of sediments, soil, or gravel (construction fill) from any non-commercial borrow or disposal site, in California or elsewhere, **CUL-8** would require the applicant to develop an inventory of the cultural resources for the portions of any such site where physical damage or visual intrusion to such resources may occur, and to engage in consultation with staff on the resolution of any significant effects to historical resources. The construction fill would have to come from or be disposed of at non-commercial borrow sites where it would be feasible to mitigate any significant effects to historical resources to a less than significant level through the use of relatively routine mitigation measures. For example, archaeological resources found to be significant on the basis of their information value would need to be wholly mitigable through data recovery. Built environment resources found to be significant on the basis of their associative, or design and construction values would need to be similarly mitigable through a formal heritage documentation protocol equal or analogous to the Federal Historic American Buildings Survey (HABS), Historic American Engineering Record (HAER), or Historic American Landscapes Survey (HALS) programs. If historical resources on a proposed non-commercial borrow site were found not to be mitigable to a less than significant level, the use of that site would be precluded, for that purpose, because stakeholders would never have had an opportunity under CEQA to provide comment on the character of the proposed project's effects on such a resource, whether any significant effects to such a resource were mitigable, and, if so, what the range of appropriate mitigation measures might be. The implementation of **CUL-8**, by virtue of its design, would ensure that the applicant's use of a non-commercial borrow or disposal site would not result in an unmitigable impact to a historical resource.

ANALYSIS OF IMPACTS TO ETHNOGRAPHIC RESOURCES

Ethnographic Background

Ethnography fulfills a supporting role for other anthropological disciplines, while providing contributions on its own merits. It supports archaeology by providing a cultural and historic context for understanding the people who are associated with the material remains of the past. By understanding the cultural milieu in which archaeological sites and artifacts were manufactured, utilized, or cherished, this additional information can provide greater understanding for identification efforts, significance determinations per the National Historic Preservation Act (NHPA) or CEQA; eligibility determinations for the NRHR or CRHR; and for assessing if and how artifacts are subject to other cultural resources laws, such as the Native American Graves Protection and Repatriation Act.

In addition, ethnography's own merits include providing information on ethnographic resources that tend to encompass physical places, areas, or elements or attributes of a place or area. Ethnographic resources have overlap with and affinity to historic property types referred to as cultural landscapes, traditional cultural properties, sacred sites, and heritage resources.

General ethnographic backgrounds for the Western Shoshone and Southern Paiute were provided by the applicant in the AFC (HHSEGS 2011a, Section 5.3: 14-15). With this information as a starting point, staff conducted an ethnographic study to identify Native American concerns and as a basis for determining the significance of related resources and potential mitigation for impacts to those resources.

Nine distinct tribal governments were consulted regarding an ethnographic study for this project. Tribes were invited to participate based upon a list of affiliated tribes provided by the Native American Heritage Commission (NAHC). The nine invited tribal governments represent three different cultural affiliations. From west to east, these affiliations are: Owens Valley Paiute, Timbisha Shoshone, and Southern Paiute (consisting of the Pahrump Paiute, Las Vegas Paiute, and the Moapa Paiute. Of the nine tribal governments, the Pahrump Southern Paiute participated fully, the Moapa Southern Paiute and Timbisha Shoshone participated in supporting roles, and the remaining six tribes provided limited input due to their greater distances and relationships to the project area. **Cultural Resources Figure 1** is a map of the general locations and territories of the participating tribes. The map also includes a historic journey taken by a Pahrump Paiute leader, Chief Tecopa, and his son that, in part, helps to define Pahrump Paiute ancestral territory.

Southern Paiute

The "Southern Paiute" represents a population of people that traditionally reside in a large swath of land that has, as its general boundaries, the Black Mountains to the east, the eastern Mojave Desert to the west, the Colorado River and the Grand Canyon to the south, and the southeastern plateaus of the Rocky Mountains to the east. The northern boundary takes in the southern third of present day Utah and the lower quarter of present day Nevada. The Pahrump and Moapa Tribes are the Southern Paiute residing in the western extent of Southern Paiute territory. The Chemehuevi people to the immediate south of Pahrump and living along the lower Colorado River are also Southern Paiute and share many cultural traits with those Southern Paiute to the north and east. Chemehuevi did not participate in this ethnographic study because they were not listed by the NAHC and therefore were not invited to participate. In addition, the more eastern Southern Paiute Tribes, located in Utah and Northern Arizona, were not invited to participate although they recognize the Spring Mountains as their common place of origin and participate in some of the ceremonial practices in common with the Moapa and Pahrump Southern Paiute.

A written record of Paiute tribes in 1873 was the result of a federal commission. In the fall of 1873, Major John Wesley Powell and G. W. Ingalls were commissioned by the U.S. Department of the Interior to determine the extent of Paiute Indians (Numic) dwelling throughout the Great Basin who had not yet been moved to reservations (Fowler 1971:97–120). In all, the two commissioners documented 83 separate tribes.

Powell made one trip as far as Las Vegas, where he collected information on the Paiutes of that area. Powell documented a "Chief of Alliance", named To-ko'-pur (Chief Tecopa), who represented one tribe, as well as the alliance of seven additional tribes (**Cultural Resources Table 8)**. Each of the additional tribes had "Chiefs." The following table provides Powell's grouping of seven tribes into one alliance. Powell suggested that all Southern Paiute of southeastern California, southern Nevada, northwestern Arizona and southern Utah be relocated to the Moapa Reservation (Fowler 1971:116).

CULTURAL RESOURCES Table 8
Seven Tribes Allied Under Chief Tecopa

TRIBE	LOCALITY	CHIEF
No-gwats	Vicinity of Potosi	To-ko'-pur
Pa-room'-pats	Pa-room Springs	Ho-wi'-a-gunt
Mo-quats	Kingston Mountains	Hu-nu'-na-wa
Ho-kwaits	Vicinity of Ivanspaw	Ko-tsi'-an
Tim-pa-shau'-wa-go-tsis	Providence Mountains	Wa-gu'-up
Kau-yai'-chits	Ash Meadows	Nu-a'-rung
Ya'-gats	Armagoza	Ni-a-pa'-ga-rats

Powell's 1873 Las Vegas journey report counted a total of 240 individual Southern Paiute within the alliance lead by Chief Tecopa (Fowler 1971:104–105). Powell provides further clarification by stating that a number of Indians who acknowledge a common authority and encamp together is a "Tribe". Powell also adds that any collection of "tribes" that acknowledge allegiance to a head chief would be designated as a "nation" (Fowler 1971:50). Hence, all of the seven tribes with allegiance to Chief Tecopa were considered a nation.

Today, the terminology has changed, with the alliance or nation, now called a "tribe" and each of the contributing localities referred to as "districts." The entire alliance is now referred to as the Pahrump Tribe. The nomenclature was partly confused when anthropologist Isabel Kelly chose to combine the above Tecopa alliance with four other localities, (Las Vegas, Colville, Indian Spring, and Cottonwood Island) and then chose to call the entire group the "Las Vegas Tribe." Some ethnographers have then come to falsely associate the currently recognized Las Vegas Tribe with this larger conglomerate or to consider Pahrump Paiute as Las Vegas Paiute.

That the Pahrump and Las Vegas Southern Paiute are two distinct groups is further confirmed by a document produced by the Inter-Tribal Council of Nevada:

> Centered around Las Vegas, Red Rock, and Mt. Charleston were the Pegesits who lived as far east as present-day Hoover Dam. On the western edge of Nevada were the Pahrumpits. They lived in Pahrump Valley and on the western slopes of the Spring Mountains (Inter-tribal 1976:11).

Pahrump Paiute Tribe

The Pahrump Paiute Tribe, located in Pahrump, Nevada, is not a federally recognized tribe, but is recognized as an established tribal entity by the State of California and is informally recognized by federal land management agencies that operate within the Tribe's traditional territory. Over the years, Pahrump Paiute individuals have been intermittently recognized by the federal government. The Tribe currently consists of approximately 100 tribal members. The membership generally resides in the nearby Las Vegas, Pahrump, Charleston View, and Tecopa/Shoshone areas, although some tribal members live a considerable distance beyond the tribal territory. The tribe is led by a chairperson and is based in Pahrump, Nevada. While the Pahrump Paiute Tribe has no reservation, they do assert an ancestral territory. They are the primary tribe affiliated with the area in which the project is proposed. The tribe's primary foci are maintaining their unique cultural identity, protecting important cultural resources that are in harm's way of various federal, state and local projects, and attaining federal recognition. The tribe's cultural expertise resides within its membership.

Moapa Paiute Tribe

The Moapa Band of Paiute Indians, located in Moapa, Nevada, is a federally recognized tribe. It currently consists of approximately 300 members. Some tribal members are closely related to Pahrump tribal members or are from the Pahrump Valley and continue to bury some of the Moapa members that are related to the Pahrump Valley in the Chief Tecopa Cemetery (formerly known as the Pahrump Indian Cemetery). The tribe occupies a 71,954-acre reservation near Moapa, Nevada. A reservation of 2 million acres was originally established in 1874; however, two years later, the reservation was reduced to 1,000 acres. In the 1980s, the reservation was expanded by an additional 70,000 acres. The reservation is located along the lower flood plains of the Muddy River. The tribe governs per a constitution that was adopted in 1942. An elected tribal council presides over several tribal businesses (travel center, fireworks store, and a tribal farm) and various tribal departments and committees, including a cultural committee. The tribe has been impacted by surrounding development, such as the nearby coal-fired Reid Gardner Power Station. Tribal elders and cultural staff also assert that decades of bomb testing at Nellis Air Force Range immediately to the west and northwest of the reservation have contaminated their reservation and ancestral lands (Kinlichine 2012; http://www.moapapaiutes.com/about_us.htm).

Las Vegas Paiute Tribe

The Las Vegas Tribe of Paiute Indians of the Las Vegas Indian Colony is a federally recognized tribe. It consists of approximately 71 members who occupy a 3,800-acre reservation generally referred to as "Snow Mountain" and located several miles north of Las Vegas. Pahrump Paiute and Las Vegas Paiute are closely related to one another and to some of the Moapa Tribe membership. Isabel Kelly identified both Pahrump and Las Vegas under the Las Vegas Paiute Tribe; however, both tribes have continuously maintained their distinct identities and function independently. The Las Vegas Tribe's

original reservation was a 10-acre plot of land located in downtown Las Vegas and deeded to the tribe in 1911 by a private ranch owner. The 10-acre plot is still part of the reservation. The tribe has a constitution adopted in 1970 and is governed by a tribal council. The tribe has several businesses, including an extensive golf resort, gas station, and two smoke shops. Recent issues that involve the tribe's concern are on-going desecration of tribal cultural sites, including graffiti of sacred sites in the Red Rock area, a popular tourist destination for visitors to Las Vegas. The Tribal staff cultural resources expertise resides within the Tribal Environmental Protection Office ((http://lvpaiutetribe.com; http://en.wikipedia.org/wiki/Las_Vegas_Tribe_of_Paiute_Indians_of_the_Las_Vegas_Indian_Colony).

Shoshone

The Shoshone people reside in a swath of land immediately north of, the Southern Paiute territory. Their western-most boundaries are in the Coso Mountains and on the eastern slope of the Inyo Mountains in California. The eastern end of their territories is in the areas of northwestern Utah and southern Idaho. The Shoshone in the western side of this swath of land are referred to as Western Shoshone.

Timbisha Shoshone Tribe

The Timbisha Shoshone Tribe, California, is a federally recognized tribe. It currently has approximately 306 tribal members and occupies a 7,914-acre reservation, comprised of several parcels in and around Death Valley National Park, including a 314-acre parcel near Furnace Creek, California. Some reservation parcels are located in Nevada, near Lida, Scotty's Junction, and Death Valley Junction. The Tribe also has several areas that are co-managed with the NPS or the BLM. The Tribe's main office is in Bishop, California. The Tribe was originally represented in the 1863 treaty of Ruby Valley. However, that treaty did not result in any specific representation for the Timbisha Shoshone, who fought for and eventually achieved federal recognition in 1983. However, the Tribe did not receive a land base until 2000 with the passage of the Timbisha Homeland Act. The Tribe holds general elections; it is led by a chairperson and holds monthly meetings. The Tribe's cultural resources programs are managed by a Tribal Historic Preservation Office (THPO). The Timbisha's ancestral territory abuts the Pahrump Paiute Tribe's ancestral territory in the vicinity of Ash Meadows, Eagle Mountain, and the Black Mountains. (Field Directory, 2004:156; http://www.timbisha.org/index.htm; Durham 2012).

Owens Valley Paiute

The Owens Valley Paiute are a distinct group of Paiute that reside in the Owens Valley and have the Owens Valley as an ancestral territory, including the valley's defining flanks, the eastern flanks of the Sierra Nevada, and the western flanks of the Inyo and White Mountains. The Mono Lake area provides the northern boundary of their territory. The Owens Valley Paiute are represented by five separate tribes. All of the tribes are members of the Owens Valley Indian Water Commission. Of the five tribes, two (Lone Pine and Big Pine) have some tribal members with cultural affiliation to the Timbisha Shoshone and Pahrump Paiute people that historically co-existed in the Ash Meadows area.

Lone Pine Paiute Shoshone Tribe
The Lone Pine Paiute Tribe of Lone Pine, California, is a federally recognized tribe. It currently has approximately 425 tribal members and occupies a 237-acre reservation near Lone Pine, California. The Tribe is governed by a general council and holds monthly meetings. Some Lone Pine Paiute Tribal members are of Timbisha Shoshone descent. Cultural resources affairs are provided by the tribal Environmental Protection Program. (Field Directory 2004:111; http://lppsr.org/).

Fort Independence Paiute Tribe
The Fort Independence Paiute Tribe is a federally recognized tribe. It consists of approximately 136 tribal members and occupies a 580-acre reservation near Independence, California. The Tribe has recently attained National Historic Preservation Act, Section 101(d)2 tribal historic preservation status. (Field Directory 2004: 94, http://www.fortindependence.com/native.aspx)

Big Pine Paiute Tribe
The Big Pine Paiute Tribe of the Owens Valley is a federally recognized tribe. It consists of approximately 403 tribal members and occupies a 279-acre reservation near Big Pine, California. The Tribe has a constitution and is governed by a Tribal Council and a General Council. The Tribal Council holds monthly meetings; the General Council meets quarterly. At least one Big Pine Paiute Tribe family shares a tribal affiliation with the Pahrump Paiute. The Big Pine Tribe's cultural resources program is maintained through a THPO (Field Directory, 2004:66; http://www.bigpinepaiute.org; Jim 2012).

Bishop Paiute Tribe
The Paiute-Shoshone Indians of the Bishop Community is a federally recognized tribe. It consists of approximately 1,040 tribal members and occupies an 875-acre reservation near Bishop, California. The tribe meets bi-monthly and is governed by the Bishop Indian Tribal Council. The Paiute-Shoshone Indians of the Bishop Community share a tribal affiliation with the Paiute-Shoshone. The Bishop Tribe's cultural resources program is maintained through a THPO. (Field Directory, 2004:69; http://www.bishoppaiutetribe.com/).

Utu Utu Gwaitu Paiute Tribe
The Utu Utu Gwaitu Paiute Tribe (formerly the Benton Paiute Tribe) is a federally recognized tribe. It consists of approximately 138 tribal members and occupies a 162-acre reservation near Benton, California. The tribe has a constitution and is governed by the Utu Utu Tribal council. The Tribal Council holds monthly meetings; the General Council meets annually. The Utu Utu Gwaitu Paiute shares a tribal affiliation with the Paiute. (Field Directory, 2004:63).

Evaluation of Ethnographic Resources: Three Ethnographic Landscapes

The National Park Service Brief 36 (NPS 2000a) provides the following definition of a cultural landscape and lists four types. A cultural landscape is:

> …a geographic area (including both cultural and natural resources and the wildlife or domestic animals therein), associated with a historic event, activity, or person exhibiting other cultural or aesthetic values. There are four general types of cultural landscapes, not mutually exclusive: historic sites, historic designed landscapes, historic vernacular landscapes, and ethnographic landscapes.
>
> An ethnographic landscape is defined as "a landscape containing a variety of natural and cultural resources that associated people define as heritage resources. Examples are contemporary settlements, religious sacred sites, and massive geological structures. Small plant communities, animals, subsistence and ceremonial grounds are often components." Examples include a section of a river where a Native American culture lives, travels, and fishes; or an upland mountain area where tribal people hunt, gather, camp and travel extensively during part of the year.

Ethnographic landscapes are understood and documented by conducting ethnographic research that identifies the contributing elements or attributes of the landscape. Contributing elements can include both cultural and biological resources, climate and landforms, subsistence, religion, economy, and the built environment. Surrounding the HHSEGS project site, staff has identified three ethnographic landscapes, discussed below.

Southern Paiute Salt Song Landscape
This landscape is eligible for the CRHR under Criterion 1 at the regional level for its broad contributions to the unique historic events that shape Southern Paiute understanding of the landscape, its mapping through song and movement, and the conveyance of the deep oral tradition through the generations for the unborn, living, and deceased.

This landscape is also eligible for the CRHR under Criterion 3 at the regional level for its contributions to the production and retention of the salt songs, whose high artistic value would have been degraded without the landscape—songs sung during a ceremony that moves a group of living people and the deceased through a landscape are most aesthetic and culturally appropriate sung <u>in</u> the landscape, in contrast to being sung for a studio recording or transcribed into musical notation and then heard, read, or duplicated by others.

Pahrump Paiute Home Landscape
This landscape is eligible for the CRHR under Criterion 1 at the regional level for the broad contributions to the unique historic events that shape Pahrump understanding of their homeland and their ongoing traditions and history that have allowed them to survive, and, during particular periods of their existence, flourish in a place that many non-Pahrump would consider harsh, inhospitable, or vastly in need of improvements.

This landscape is also eligible for the CRHR under Criterion 2 at the regional level for its association with the life and times of Chief Tecopa, the first Pahrump Paiute chief who sustained, advocated for, and guided his people through the pressures of a rapidly

changing world brought on by the intrusions of other cultures. The transformational role and exemplary association of this leader with his homeland and his people endures into modern times, passing from generation to generation into the present.

Ma-hav Landscape
This landscape is eligible for the CRHR under Criterion 1 at the local level for its broad contributions to the unique historic events of the Pahrump Paiute Home Landscape. in that it provides a unique marginal, or fringe, cultural milieu that spanned the interaction of the first contacts between Pahrump Paiute and non-Pahrump Paiute foreigners, such as the Mexican traders; American explorers, trappers, and traders; the American and Mormon miners and homesteaders; and later American ranchers and businessmen who came to call the Pahrump Valley either a wayside curiosity or their new home (see **Cultural Resources Table 9**, below).

This landscape is also eligible for the CRHR under Criterion 4 at the local level of significance for its potential to yield ethnographic information important to the prehistory and history of the Ma-hav area and also for its potential to specifically yield prehistoric archaeological information from archaeological remains known to exist or potentially exist in the Ma-hav Landscape.

The Ma-hav Landscape contains burials and at least one known cemetery. Normally, cemeteries are not eligible for the NRHP. However, the burials and cemetery are considered as contributing features of the Ma-hav landscape and lend a sense of longevity to the landscape. Rather than render the landscape ineligible, this actually increases the qualifications for eligibility.

The Pahrump Paiute feel that their lifeways have been trodden upon, stolen, lost, forgotten, rejected, belittled, infringed upon, and otherwise dismissed. In the face of this treatment, Pahrump Paiute continue to practice as much of their traditional ways as is possible within the dominant society. They feel like it is still within their reach to maintain their cultural identities and ensuing obligations as traditional Pahrump Paiute while participating in the dominant society. The Pahrump Paiute see federal recognition and a tribal land base, including at a minimum, greater tribal involvement in land management planning processes, as critical steps to ensure their tribal longevity.

Integrity

Southern Paiute Salt Song Landscape
The Southern Paiute Salt Song Landscape has been visually and physically compromised by significant modern developments, such as the presence of numerous large cities, towns, military installations, energy generating facilities, mining infrastructure, and other infrastructure, such as transportation and transmission corridors. In addition, auditory and olfactory characteristics and nightscapes have been compromised. The Spring Mountains are surrounded on several sides with incompatible intrusions to traditional religious and cultural practices. To the east/southeast lies the sprawling Las Vegas metropolis. To the north lies Nellis Air Force Base and Nevada Test Site. And to the east/northeast lies the town of Pahrump. Across and through this terrain are several major highway corridors and transmission lines. However, in one

major area, lying to the south/southeast where the proposed project and its alternative site are proposed, the landscape is remarkably and relatively unmarred.

In addition, Southern Paiute traditional singers have an obligation to continue the singing tradition lest they void their obligations to the deceased and ultimately to themselves, their descendents yet to be born, and their very identity and continuance as a people. No amount of landscape alteration can prevent them from continuing this tradition. However, increased infrastructural intrusions increase the burden and challenges to traditional practitioners to continue traditions vital to their community and related heritage. They consider their landscape to remain aesthetically pleasing despite intrusions due to the beauty, balance, and sustenance by which they are provided a unique identity, handed down through generations and originally provided to them in a pact with their creator.

The Southern Paiute Salt Song Landscape maintains integrity of association, feeling, setting (from the perspective of the traditional practitioners), and location.

Pahrump Paiute Home Landscape

The Pahrump Paiute Home landscape has been compromised by the same modern developments, such as the sprawling town of Pahrump. Water used for agriculture has significantly lowered the water table, resulting in declines of associated plant communities and related animal habitat and population viability. Private property rights have restricted access to important hunting and gathering grounds. The tribe does not have a land base that would preserve intact their cultural traditions, except for which they would otherwise be able to take their cultural destiny into their own hands. However, sufficient land is in federal ownership, such as the U.S. Forest Service lands in the Spring Mountains, the U.S. Fish and Wildlife Ash Meadows Wildlife Area, and designated BLM wilderness areas in the Nopah and Kingston Mountain Ranges, as well as BLM front-country lands that encircle the Pahrump Valley, that allow the Pahrump Paiute some continued access to traditional hunting and gathering grounds. Because this landscape is intricately tied to Pahrump Paiute identity as a distinct people, no amount of environmental alteration of their lands would deter them from protecting and maintaining their landscape the best that they can. Indeed, one main reason for Pahrump Paiute application for federal recognition is to attain greater leverage in protecting what is their perceived birthright to exist in their homelands, including standing in issues related to the Native American Graves Protection and Repatriation Act.

The Pahrump Paiute Home Landscape maintains integrity of association, feeling, setting (from the perspective of the Pahrump Paiute), and location.

Ma-hav Landscape

The Ma-hav landscape has been primarily compromised by the establishment and workings of the Hidden Hills Ranch and perhaps, marginally, by the operations of the Front Site Gun Range located in the northeast portion of the landscape. However, these historic and recent alterations are minimal compared to other component landscapes that contribute to the Pahrump Paiute Home Landscape. Areas of the Ma-hav landscape are in BLM ownership and subject to federal management. One specific area

(Stump Springs) is protected as an Area of Critical Environmental Concern (ACEC) for its association with Pahrump Paiute cultural values. The Pahrump Paiute People affiliated with the Ma-hav landscape live as close to the landscape as is possible, given that the land is in private ownership by non-Pahrump Paiute people. The Ma-hav Landscape maintains integrity of association, feeling, setting (from the perspective of the Pahrump Paiute), and location.

Periods of Significance

Southern Paiute Salt Song Landscape
The period of significance for the Southern Paiute Salt Song Landscape spans from the time of primordial instruction, just after the great flood and Coyote's creation of the Southern Paiute, up to the present.

Pahrump Paiute Home Landscape
The period of significance for the Pahrump Paiute Home Landscape spans from the time of Coyote's creation of Southern Paiute up to the present. From an archaeological perspective, the earliest dates would liberally be sometime between 10,000 years B.C. and the ethnographic present. A conservative archaeological perspective would be from 600 years ago to the ethnographic present. A historically documented time period of significance would be from the time of Chief Tecopa's leadership (circa 1840s) to the present. It can be assumed that Chief Tecopa inherited his leadership from one of his male relatives, but the historical record does not provide sufficient information regarding Chief Tecopa's preceding lineage to support an earlier documentable date for this landscape. Upon Chief Tecopa's death, his leadership was passed on to his son, Tecopa Johnny.

Ma-hav Landscape
The period of significance for the Ma-hav Landscape is provided in the following timetable.

Cultural Resources Table 9
Ma-hav Landscape Chronology

Time	Specific Places, People, and Events
Beginning of Time	The area is flooded. Primordial animals abide on Mount Charleston to wait out the residing waters. Coyote releases first humans from a basket.
Time of Animal Instruction to First Humans	Coyote provides instruction to his adopted daughter concerning menses, childbirth, and becoming a woman at Ma-hav.
Period of Pahrump Paiute occupation	Pahrump Paiute occupy the Springs area as a part of a permanent or seasonal encampment and horticultural place.

Time	Specific Places, People, and Events
1776–1830	Pahrump Paiute hear of Spanish, Mexican, and early American traders (Escalante, Garcés, Armijo, Jedidiah Smith, Peg-Leg Smith) who travel, trade, and raid along some of the Paiute trade routes closer to the Colorado River.
1815	Chief Tecopa born at Manse Spring. He will become a leader of various tribes or “districts” that today collectively identify as the Pahrump Paiute.
1829–1848	Mexican traders move goods between New Mexico and California and engage in the Indian slave trade. Some travel the old Spanish Trail between Resting Springs and Mountain Springs.
1840s–1890?	John “Stomper” Pete, a Southern Paiute Medicine Man, occupies Stump Springs. There is also anecdotal information of a Southern Paiute family with the last name of Stump that occupied the Stump Springs in subsequent years.
1844	John C. Fremont travels between Resting Springs and Mountain Springs and overnights at or near Stump Springs. Fremont retaliates upon possible Pahrump Paiute for the killing of most of the Hernandez Party.
1849 –1875	Many emigrants, including gold miners, Mormons, and military personnel, travel through Stump and other nearby springs, en route to Utah or California. Early homesteaders begin to settle the various valleys by establishing homesteads on or near springs, including springs in Pahrump Valley.
1849–1930s	Several diseases are introduced to the Pahrump Paiutes as well as other Native American populations. Many young and old die. Alcohol is introduced to the Pahrump Paiute causing social disarray. There is a time of famine. This happens throughout the Pahrump Valley, including Ma-hav.
1860s	Miners pass through the area to begin harvesting timber in the Spring Mountains, to be used for the development of mining infrastructure. The first reported mill is established in the Spring Mountains in 1875 by the Brown brothers.

Time	Specific Places, People, and Events
1860–72	Charlie, a Pahrump Paiute man and the Tribal War Chief, establishes one of the first Indian Ranches in Pahrump Valley, the Ma-hanse (now named Manse Ranch). He is sometimes referred to as “Mormon Charlie” or “Ash Meadows Charlie.” Chief Tecopa also establishes a ranch at Bolling Mound Spring. John B. Yount is born in Oregon. Charlie is involved in the 1865 assault and robbery of gold prospector Charles Breyfogle at Stump Springs.
1872	Wagon roads connect Stump Springs, Mountain Springs, Charlie’s Ranch, and other Pahrump Valley Springs. One road runs through the Hidden Hills area. Other ranches become established by Indians and whites at some of the larger springs such as Ash Meadows, Pahrump, and Manse.
1873	Chief Tecopa is encouraged by the U.S. government to make his circular journey to convince his and neighboring tribes to move to the newly established Moapa Reservation. The Paiute and Shoshone from the Armagosa River refuse to go. Many Pahrump Paiute are enticed or force-marched to Moapa reservation. Some hid and remained; others escape and return.
1874–1915	Lee brothers move to area, and Phi Lee buys the Resting Spring Ranch. Phi marries Sally “Mopats,” a Paiute woman and has several children, including Dora, Robert, Robert “Bob,” Dick, Clara, Gus, Bert, and Cub. Phi and Sally have a seasonal camp at Ma-hav. “Bob” Lee resides at an area of Hidden Hills near Weeping Rock Springs and raises his son Robert (1910?). Cub Lee homesteads in Mesquite (Sandy) Valley. Bob Lee is at Hidden Hills as a small boy and sees two Indian-constructed fireplaces at Hidden Hills.
1877	Joseph Yount purchases Manse Ranch from the Jordan brothers.
1880	Queho is born.
1900?	Albert Howell, Pahrump Paiute and later informant to anthropologist Julian Steward, lives with his Pahrump Paiute wife Mary at Ma-hav where they maintain a small farm. The Howells have a daughter-in-law named Anna Tecopa. John Howell, the first black to live in the area, is a freed slave from North Carolina. John works in the mines and marries a Southern Paiute from Las Vegas. They have a son, Albert.

Time	Specific Places, People, and Events
1904	Chief Tecopa dies; the Chief's son, Tecopa Johnny, inherits his father's leadership role.
1905	Chief Tecopa's Cry ceremony held at either the Pahrump cemetery or Ma-hav or at both places.
1910s?	Dora Lee marries Gallant Brown, and they live at Ma-hav near Dora's brother, Bob Lee's place. Dora and Gallant have several children, Steve, Earnest, William, and Gallant Jr., who are raised in the Ma-hav area.
1900–1920	Many more ranchers and farmers move into the Pahrump Valley and begin to develop large crop lands, which require greater amounts of water. Many Pahrump Paiute provide the labor required for the flourishing ranches of the Valley, including Chief Tecopa's son Charlie, who is killed in 1911 by another ranch hand, Joe Lake, while both are working for the Manse Ranch. Pahrump Paiutes claim that Charlie Tecopa (Paiute) was shot by John Yount east of Manse Ranch, and John Smith (Paiute) was shot by John Yount and was buried where he was shot.
1911	Las Vegas Reservation established through a 10-acre land donation made by Helen Stewart.
1915	John Yount, son of Joseph Yount, sells his Trout Creek Property to Phi Lee, and he and his Pahrump Paiute wife Sally "Mopats," move to Ma-hav and rename the place Charleston View (not the Charleston View of today). John makes improvements.
1916	It is reported that the Yount Ranch (at Ma-hav) was irrigated by means of windmills that pumped from three shallow wells. Water was within 6 to 15 feet below surface.
1921	George Rose receives patent on 179 acres to the east of the Bob Lee homestead and north of the Yount Ranch.
1922	John Yount files fee patent and becomes owner of Yount Ranch at Ma-hav.

Time	Specific Places, People, and Events
1920–31	"Tank" Sharp (Libby Scott's son), whose family is from Mound Spring and Manse Ranch area is one-quarter Pahrump Paiute and a friend of John Yount. Tank operates a still and bootlegs alcohol from the hills around Yount Ranch. Joe Hudson, a non-Indian, killed Tank, and Oscar Bruce, a Pahrump Paiute from Mound Spring perhaps living near Bob Lee's place, retaliates by killing Joe Hudson. Other bootleggers operate out of the Ma-hav area.
1926	William Wilson receives patent for 160 acres immediately south of the Yount Ranch.
1920s	John Yount purchases Wilson and Rose's properties.
1932–33	Susie Yount, John Yount's first wife, dies and a Cry Ceremony is held at Yount Ranch. John Yount allows the ceremony. Hundreds of Indians attend ceremony and camp out at the Yount Ranch near the orchard.
1930s?	Bob Bruce and Susie Howell die and are buried at the Ma-hav cemetery.
1930s–Present	Archaeologists accumulate evidence of southern Great basin/Mojave desert occupations that reach back to 12,000 years B.P. When inland seas covered some of the area. There are numerous archaeological sites throughout the Mesquite dunes including at Hidden Hills Ranch.
1935–1940	John Yount has a second common-law wife named Sally Belle, who is white. John dies. Belle attempts to sell property to Roland Wiley and becomes embroiled in inheritance problems with Younts. Eventually Wiley buys out heirs. Before Wiley arrives at property, Sally Belle illegally sells property to Louise Kellog. Wiley and Kellogg have a legal battle and Wiley wins. Wiley evicts Kellog.

Time	Specific Places, People, and Events
1940–1990	Wiley buys additional property. Wiley evicts numerous Pahrump Paiute families from his properties. Including Dora Brown. Dora establishes Dora's Place at Browns Spring In 1941. Wiley holdings become the largest private property holdings in Pahrump Valley. Wiley establishes the Hidden Hills Ranch (dude ranch), has guests living in teepees and digging for Indian artifacts, constructs an airplane runway, attempts to grow crops, taps springs and messes up water flow, builds Cathedral Canyon tourist attraction. Wiley hires Al Carpenter as the Hidden Hills caretaker.
1940s–Present	Pahrump Paiute families, Lees, Browns, Weeds, Howells, Bruces, and Toms and their descendents continue to live near Hidden Hills after being forced out. These are some of the families that are tribal members of the federally unrecognized Pahrump Paiute Tribe. The Ma-hav Pahrump Paiute Cemetery continues to be used and maintained by Pahrump Paiute.
1951	The mushroom cloud from the detonation of an atomic bomb can be seen from the Hidden Hills ranch.
1975	Queho is buried at Hidden Hills Ranch.
1987–Present	Pahrump Tribe files for federal recognition with the U.S. Department of Interior. The filing was posted in the Federal Register on Dec 10, 1987. The petition for federal recognition remains pending.
1989	Roland Wiley dies, and Wiley estate is established
2006	Hidden Hills Caretaker, Al Carpenter dies. Hidden Hills Ranch is vandalized and looted.
2006	Stump Spring Area of Critical Environmental Concern is established by the BLM for protection of the cultural resources located at and near the spring.
2011	Bright Source proposes Hidden Hills Solar Energy Generating Systems on Wiley Property and has lease option with Wiley Estate.

A historic time period that can be documented in the literature, including oral histories collected for staff's ethnographic study, starts with John "Stomper" Pete's occupation of Stump Springs, circa 1840–1890, up to the present.

All CRHR-Eligible Ethnographic Resources Subject To Potential Project Impacts

Staff has identified three ethnographic landscapes that the HHSEGS project would impact, the Southern Paiute Salt Song Landscape, the Pahrump Paiute Home Landscape, and the Ma-hav Landscape. The contributing features, integrity, and periods of significance for these resources are discussed above.

Quotes from Recent Tribal Interviews Concerning Perceived HHSEGS Impacts

> The project impact is huge. That does not mean that a traditional ceremony can be held and then the land and spirits will understand once and for all. Confusion will increase and multiply over time and that will accumulate in the burden that singers and other people will take on year after year.
>
> Bomb testing in the area has contaminated a lot of the desert around Moapa. We are at risk if we go gather plants. There is also the local coal plant that causes environmental problems. So we go to Pahrump Valley (and other areas where Southern Paiute are from) to gather because we think that it is a cleaner environment.
>
> Area is also important for Fox Trail songs. Which is a song that follows the fox, who travels from spring to spring. Putting a high tech facility in the midst of the ceremonial song trail is an invasion of Indian religion. The project area is a religious area. There is not only what the project mirrors and towers will do to the salt song prayers and people but also there will be long term impacts from more people and activity over the course of the project. What actual impacts would be to the Salt Song Trail and if those impacts can be mitigated are something that only certain practitioners can answer. Those answers can only be provided by medicine men or song practitioners. It is suggested that the ethnographer talk with Larry Eddy (Chemehuevi Elder) or Richard Arnold (Pahrump Paiute Singer).
>
> There is a real concern about environmental justice and how Southern Paiute people are being disproportionately and adversely impacted by the proposed project. When our cultural landscape is impacted significantly, such as will happen with the proposed solar project, lifeways are changed forever and [that] does not allow our people to complete their journey to the afterlife as described in our Salt Songs.
>
> An impact to the song trails would impact all Southern Paiute that need or rely on the Salt Songs trails and related ceremonies.

ASSESSMENT OF PROJECT IMPACTS TO CRHR-ELIGIBLE ETHNOGRAPHIC RESOURCES AND RECOMMENDED MITIGATION

Staff has assessed the impacts of the proposed HHSEGS project on the three ethnographic landscapes as significant, but it is anticipated that none of the recommended mitigation measures would reduce impacts to a less than significant

level. However, the project's impacts to the Ma-hav landscape and the Pahrump Paiute Home landscape would be somewhat reduced with the project's implementation of **CUL-10**. However, because the Salt Song Landscape corridor, where traditional singers visualize the landscape as they sing their deceased ancestors to the other side, will be physically blocked should the project be constructed, and because this corridor blockage would create spiritual, emotional, and physical imbalance among the living in not being assured that their deceased relatives have been transported to the afterlife, and would raise doubts for the living as to their own spiritual passage upon death, Staff's recommendation that the Salt Song Landscape is CRHR-eligible is based on the evidence of continuous ancestral use, the continued investment of tribal lives in the use of this landscape, and its integrity. Energy Commission staff cannot recommend any mitigation that would ameliorate project impacts to the Salt Song Landscape.

The construction of the proposed project would cause a substantial adverse change in the significance of the three ethnographic landscapes. The presence of the heliostat fields and the 750 foot tall solar power towers would be a stark visual intrusion that would profoundly and irreparably degrade the ability of the landscapes to convey historical significance under CRHR Criterion 1. In particular, the mass of the looming towers, in combination with the operational glare from the solar receiver steam generators atop each one, would compromise the setting, feeling, and association aspects of the resources' integrity, aspects critical to the resource's ability to convey its associative values under Criterion 1. Subsequent to the construction of the facility, one would no longer be able to experience the sense of the landscape as it was during its period of significance.

Salt Song Landscape

Direct Impacts

The Salt Song Landscape and associated practices require a specific landscape, and that landscape, a linear corridor, totally encompasses the proposed project area. The cultural practices associated with this landscape have endured for at least a millennium and are ancient enough that most Southern Paiute do not know of its specific historical origins except to say that the practices, and places where the practices are conducted, were provided to Southern Paiute at the time of creation. The project is proposed to be placed in the midst of this corridor. Siting the project in its proposed location would result in a physical impact to the Salt Song Landscape trail and its contributing features, in that the project footprint and infrastructure would blemish, mar, and otherwise damage, destroy, and alter the trail corridor. In the course of project construction some natural waterways would be removed, damaged, or altered. New water flow patterns, with newly introduced water sources, would be created. The project would also damage, remove, and otherwise destroy plants and animals that are contributing features to the landscape in the vicinity of the trail corridor. Unprecedented and continuous human activity would occur in a place otherwise considered to be comparatively tranquil.

Many of the impacts during construction would endure for the operational life of the project. The washing of heliostat mirrors and establishment of project roads would cause further alteration to the natural course of ground and surface water flow. Dew would accumulate in differential amounts depending on project extent of infrastructure.

Alteration to water accumulation and flow would change surviving plant characteristics. Contributing feature plants and animals would be removed and or fenced out from the project footprint, subject to harm up to and including death. The heliostat mirrors would not only cause alteration of the water flow and plant and animal life, but traditional cultural and religious practitioners believe that the heliostats would also diminish the power of the songs and add confusion to the songs and souls on their journey to the afterlife, given the large number of heliostats, approximately 170,000, that would be utilized in Solar Plant 1 and Solar Plant 2.

Indirect Impacts

Construction would also have indirect impacts to the deceased that travel the trail, to the traditional singers that guide the deceased along the trail, and to the surviving relatives. Funeral ceremonies have occurred adjacent to the proposed project site in the past and are likely to occur in the future. A year after burial, Salt Song Singers in conjunction with grieving relatives, undertake the Salt Song Ceremony, which occurs in various places within the project boundaries and in adjacent areas. The project would become a physical barrier to those who travel the Salt Song Trail. In addition, the construction of the project would irreparably damage and alter, through physical, visual, and auditory impacts, the ability of the Salt Song Singers to fulfill their spiritual obligations to the deceased to move them from their places of death through the landscape and on to the afterlife.

As the uncertainty of Salt Song Singers to fulfill their obligations is increased, so also is there a correlating increased impact to grieving families of the deceased. Grieving families would be uncertain if their deceased have been properly ushered to the place of afterlife. Additionally, although the Salt Song Trail is a Southern Paiute institution, the segment that runs through, across, and within the Pahrump Valley is within Pahrump Paiute ancestral territory and, therefore, is under their watch. Should this segment of the trail be impacted, it would further adversely affect the Pahrump Paiute in that they would be perceived by other Southern Paiute to have had a role in allowing the impact to occur. There are indirect cause and effect links between impacts to ethnographic landscapes and impacts to people whose lifeways and related sense of cultural well-being rely upon and ensue from such landscapes.

Mitigation

The direct, indirect, and cumulative adverse impacts of the proposed project on the Salt Song Landscape are significant and unavoidable if the project is constructed as designed and in the proposed location. Given the extended period of both the proposed project's operation (a minimum of at least 30 years) and the physical presence of the proposed facilities, including the heliostats and power towers, the effect of the project's presence on the landscape must be considered permanent. Staff is unaware of any suite of mitigation measures that would reduce the loss of a substantial portion of the Salt Song Landscape's integrity and spiritual context, particularly one that provides the means by which the Southern Paiute deceased travel from their places of birth and death to an afterlife. The applicant has provided no information or analysis on this or any of the other ethnographic landscapes, and has recommended no mitigation to date to reduce the project's impacts on these significant resources.

Although it is not possible to avoid or substantially reduce the direct adverse impacts this project, as proposed, would cause to this resource, there may be alternatives that would allow the project to proceed in some fashion, while still offering some protection to the resource and its associative values. This could include selecting a much reduced footprint, changing the proposed infrastructure to a technology that does not rely on solar power towers, or mitigating for the loss of plants and animals that are otherwise not considered or protected, because they are not among those recognized as endangered, in the conditions of certification recommended in the **BIOLOGICAL RESOURCES** section of the HHSEGS **FSA**, but that are significant to the Pahrump Paiute and integral to their traditional and spiritual practices and beliefs. It is likely, however, that construction of the proposed project in any configuration, at the proposed location, would result in the complete disruption of the existing ecosystem and habitat within the facility footprint, conditions that would have to be maintained for the life of the project. Appropriate rehabilitation of the site would need to be revisited at the time of closure; however, return to the drainages; plants, animals, supportive ecosystem, and topography that existed prior to construction is not reasonably feasible.

Staff has consulted with the Southern Paiute to explore the possibility of mitigation measures that would at least partially mitigate the loss of this landscape's ability to convey its associative values and to compensate for the impacts to those who pass away, those responsible for facilitating the passage of death, and those who grieve during a time of transition. There is not another resource that can replace the Salt Song Landscape. By Southern Paiute reckoning, the creator provided a specific set of instructions in relation to a particular landscape and the transference of knowledge from the creator to the Southern Paiute concerning matters of life and death is non-negotiable. There are no rules by which tribal religious leaders can modify, delete, or add to the religious prescriptions provided them in a solemn pact with the creator. To do otherwise is to invite chaos, particularly as the rules and practices at hand are those pertaining to relations between the living and the deceased. No conditions of certification to address impacts to this resource are recommended at this time.

Pahrump Paiute Home Landscape

Direct and Indirect Impacts
The project site is wholly within the boundaries of the Pahrump Paiute Home Landscape. The Pahrump Paiute Home Landscape overlaps with and is a contributor to the Salt Song Landscape.

In addition, a number of the indirect impacts identified for the Salt Song Landscape and all of the indirect impacts identified for the Ma-hav Landscape also apply to the Pahrump Paiute Home Landscape. However, because of relative scale, the HHSEGS project would have a smaller visual impact on the Pahrump Paiute Home Landscape.

Mitigation
Although impacts to the Pahrump Paiute Home Landscape might be mitigable if it were a stand-alone resource, the direct, indirect, and cumulative impacts of the proposed project on the Pahrump Paiute Home Landscape are only mitigable to less than significant by mitigating for the Ma-hav Landscape to a level of less than significant.

CUL-10 would function at a broader level as mitigation for the proposed project's direct visual effects to the Pahrump Paiute Home Landscape.

Ma-hav Landscape

Direct Impacts
The project site is wholly within the boundaries of the Ma-hav Landscape. The Ma- hav landscape overlaps with and is a contributor to the Pahrump Paiute Home Landscape and the Salt Song Landscape. Therefore, some of the direct impacts identified for the other two landscapes would also apply to the Ma-hav landscape.

Indirect Impacts
Water usage would increase during the period of construction. It is possible that increased water drawdown from the local aquifer would potentially impact the adjacent spring areas of the Ma-hav landscape. Reduced water in the spring areas could degrade plant and animal habitats. Many of the impacted plant and animal habitats and populations are contributors to the Ma-hav Landscape. Animals that no longer can frequent the project site and that have a capability to self-relocate would move into adjacent areas of the Ma-hav Landscape, further increasing competition for habitat and other life-sustaining resources that also may be in decline due to overall water decreases.

Some of the Pahrump Paiute horticultural areas in the Ma-hav Landscape can still be identified. However, as spring areas are potentially reduced and vegetation types are also potentially reduced, it is possible that soils would erode quicker and it is even more possible that horticultural areas would erode away or be covered over with soil types not conducive to horticultural fertility. The spring areas of the Ma-hav Landscape, adjacent to the project site, have been and continue to be locales for tribal ceremony, including burial in and near the Tribal cemetery. It is likely that burial ceremonies would occur in the future, despite the fact that the burial area and related access is on or near private land and that the cemetery has been vandalized in the past. A large solar field with large solar power towers, adjacent and within view of the ceremonial area of the Ma-hav Landscape would visually and auditorily intrude on the areas where Pahrump Paiute are accustomed to conducting very solemn ceremonies.

Mitigation
There may be alternatives that could allow the project to proceed in some fashion, while still offering some protection to the resource and its associative values. This could include selecting a much reduced footprint, changing the proposed infrastructure to a technology that does not rely on solar power towers, or mitigating for the loss of plants and animals that are otherwise not considered or protected in the conditions of certification recommended in the Biological Resources section of the HHSEGS Final Staff Assessment (**FSA**), but that are significant to Pahrump Paiute and integral to their traditional and spiritual practices and beliefs. Conditions of certification that would monitor possible water level decreases and related impacts to spring reliant vegetation are recommended in the both the Biological Resources Condition of Certification **BIO-24** and Water Supply Conditions of Certification **WS-2** and **WS-6** of the FSA.

Visual Resources Condition of Certification **VIS-6** would require an Interpretive Area be placed somewhere in the Pahrump Valley in Inyo County to compensate for the visual intrusion that the project would impose on scenic values by highlighting the natural and cultural visual resources in the project vicinity, including the Wilderness Areas, National Recreation Areas, named peaks and the Old Spanish Trail-Mormon Road. This way-side Interpretive Area would also direct visitors to places where more in depth interpretive resources about the Ma-hav landscape could be experienced. Cultural Resources Condition of Certification **CUL-10** has been added to expand the interpretive scope to include information on the traditional Pahrump Paiute land management, usage, and history of the Ma-hav Landscape. One (or several) selected extant Interpretive Facility (different from the "Interpretive Area" envisioned in **VIS-6**) would be provided with a traditional Pahrump Paiute horticultural garden, that to the extent feasible would be watered by a natural spring and that would include a sampling of traditional plants to demonstrate, to the general public, the ethno-botanical uses and knowledge base of the traditional tribal peoples who were adapted to the desert environment over at least a millennia. Development of the ethnographic elements of a (or several) interpretive facility would be implemented in direct consultation with the Pahrump Paiute Tribe, including all stages of planning, construction, and management, to the extent that the Pahrump Paiute Tribe is comfortable in participating.

ANALYSIS OF IMPACTS TO HISTORIC-PERIOD BUILT ENVIRONMENT RESOURCES

Historic-Period Background

The border region of southeastern California and southern Nevada has long been a travel corridor in the American West, with a climate and terrain that has made travel and settlement in the area challenging. The history of this travel can still be seen across the Pahrump Valley (see **CULTURAL RESOURCES Figures 7 and 8**).

Old Spanish Trail-Mormon Road
The Old Spanish Trail (OST) has gone by many names, including the Camino de California, Camino de Santa Fe, and Camino de Nuevo Mexico, depending on one's destination (NPS 2000b:5). Various groups of people used the OST in historic times, including explorers, trappers, prospectors, and immigrants; however, the primary use appears to have been for trade. The OST was primarily a horse and burro trail, but in places it follows trails used by the Native Americans, which would have originally been footpaths. Later the Mormons traveled parts of the OST primarily by wagon; therefore, traces in the western half of the OST that joined up with the Mormon Road were transformed into a wagon road beginning in 1847 (NPS 2000b: 5).

Various portions of the OST were explored by different groups. The exploration of the OST in historic times began in the Spanish Period as their interest in the exploration and settlement of the present-day American southwest intensified.

Spanish Period
By the middle of the sixteenth century, Spain had emerged as the premier naval and military power in Western Europe with colonies in North and South America and a trading network throughout the Pacific. The Spanish colonization of California was

achieved through a program of military-civilian-religious conquests. Soldiers secured areas for settlement by suppressing Indian and foreign resistance and establishing fortified structures called presidios. Civilians established pueblos (e.g., towns) and Spanish priests led the religious conquest effort by establishing missions and converting the Indians.

Don Francisco Vazquez de Coronado led the first excursion by European peoples through the southwest in 1540 (Steiner 1999:1). As part of this expedition Gárcía López de Cárdenas, a lieutenant of Coronado, first ventured up the Colorado River, but only came as far as the south side of the Grand Canyon (CRTR 2011b:24; Steiner 1999:4–5). While Coronado failed to find the riches he originally set out for, his expedition spurred Spanish settlement in the American Southwest.

In the late 1770s, Antonio Maria de Bucareli, the Viceroy of New Spain, "legitimized Spain's claim to Alta California by making it the new *Provincia de California* with a provisional capitol at the Presidio at Monterey." (Steiner 1999:6). Bucareli's plan was to use the missions to colonize the new province. Despite the abundance of rich farmland, the missions that had been established were not geared towards sustaining large populations. As such, supplies were imported from the Provinces of New Mexico and Sonora to the east. Small supply ships and the lack of reliable overland supply routes initially hampered growth in California. Bucareli realized that it was necessary to establish a direct supply route between New Mexico and California in order for California to flourish (Steiner 1999:8). The OST would eventually be that route.

Spanish priests, or padres, played a key role in the establishment of the OST. They began the colonization of the American southwest in the late sixteenth century, long before Bucareli's decree, motivated by their mission to convert the native peoples to Christianity and extend the influence of the Catholic Church. The first church in New Mexico was built in 1598, and the padres were followed by settlers, who colonized land suitable for agricultural activities. The provincial capital of Santa Fe was founded in 1610, and by the eighteenth century, this area was considered politically stable and productive. The Spanish were less successful at colonizing what is now northern Arizona and were only able to extend their sphere of influence to the areas south of the Gila River and along the Santa Cruz River south of present-day Tucson. The Spanish explored the coast of present-day California in the mid-sixteenth century, but it was not until the incursion of Russian and British explorers into what are now Alaska, British Colombia, Washington, and Oregon in the 1750s that serious attempts were made by the Spanish to colonize Alta California (Steiner 1999:4–6).

The Spanish continued to explore the Southwest region through the seventeenth century. Father Eusebio Francisco Kino followed Coronado's route, travelling north to southern Arizona. He explored the courses of the San Pedro and Santa Cruz rivers north to the Gila River and was the first European to the see the ruins of Casa Grande in 1694. He also explored what is now the United States-Mexico border from south of Nogales to Yuma, Arizona (Steiner 1999:9–10).

Father Francisco Garcés picked up where Father Kino left off when the Jesuits were expelled from New Spain in 1767. Father Garcés was the resident missionary at the

Mission San Xavier del Bac, near present day Tucson, Arizona. Father Garcés made five important entradas, or explorations, during his tenure there. His first two entradas, in 1768 and 1770, brought him as far north as the Gila River. His third entrada, in 1771, brought him again to the Gila River where he retraced Father Kino's route to Yuma then south along the Colorado River to the Sea of Cortez. On each of these explorations, Father Garcés ministered to the local peoples and established friendly relations. He also accompanied Captain Juan Bautista de Anza on his expedition from the Presidio at Tubac, Arizona to the Presidio of Monterey in 1774, and went as far as the Mission San Gabriel. This expedition proved that an overland route was possible between Sonora, Mexico, and Monterey, California. While waiting for de Anza to return at the Yuma Crossing, Father Garcés continued to explore along the banks of the Colorado River and into the Mojave Desert, which provided more valuable information on the region (Steiner 1999:10–12).

Father Garcés's most important entrada was in 1776, when he and two Native American guides set out north towards the Colorado River. They had reached the Mojave villages by February 28, where they were shown items by the natives that had come from the coast. Father Garcés convinced several of the Mojave natives to guide his party across the desert. They set off on March 4 and crossed the Mojave Desert via Indian trade routes, surviving only because their guides knew where to find water. Presumably they stopped at Paiute Spring, Rock Spring, Marl Spring, and Soda Spring, which would later become critical stops along the extreme southern alternative route of the OST. Once they reached the sink of the Mojave River they followed it to Cajon Canyon and descended into the Los Angeles basin, reaching Mission San Gabriel and Los Angeles on March 26, 1776 (Steiner 1999:12–14).

Initially Father Garcés intended to continue on to San Luis Obispo; however, he was denied troops and supplies and was unable to continue his journey. Instead he explored other parts of California up to Tulare Lake in the San Joaquin Valley, crossed over the Tehachapi Pass, and retraced his route to the Mojave Villages and Colorado River in May. Recognizing the significance of the Native American desert trails and the impact they would have on the Spanish goal of establishing an overland route from Santa Fe to the coast, Father Garcés continued his journey east to try to reach Santa Fe. He and his guides began near present-day Needles and travelled to Kingman, Arizona, Peach Springs, detoured to the Grand Canyon, and to the Hopi pueblo of Old Oraibi, part of the present-day Hopi Reservation. Spanish priests had not previously been welcomed there, and Father Garcés's experience was no different. He did, however, meet a member of the Zuñi tribe there who confirmed that the New Mexican missionaries had made it as far west as Old Oraibi. This confirmed for Father Garcés that an overland route from Santa Fe to the coast was possible. However, he did not continue to Zuñi Mission, and others received credit for discovering this route (Steiner 1999:14–16).

Father Garcés returned to the Mission La Purisima Conception at the Yuma Crossing on the Colorado River and continued working among the Quechan people. In July 1781, the Quechan revolted against the Spanish and killed all of the men, including Father Garcés (Steiner 1999:16). Some of the routes that Father Garcés traveled would later become part of the western portion of the OST (NPS 2000b:6).

In the 1760s and ‘70s, there were three official Spanish-sanctioned expeditions into Ute country (southwestern Colorado and southeastern Utah); the first two were led by Juan Maria Antonio Rivera and the third by Francisco Atanasio Dominguez and Father Sivestre Velez de Escalante (NPS 2000b:6).

In 1822, Mexico achieved independence from Spain, and California became an outpost of the Mexican Republic.

Mexican Period

The first Europeans known to have entered present-day Nevada were fur trappers: As early as the 1820s, British and American mountain men, fur traders, and entrepreneurs were venturing into California. In 1825-26 Antoine Robidoux built Fort Uncompahgre (a.k.a. Fort Robidoux), near present-day Delta, Colorado, which acted as a centralized trading area. Trappers and traders traveling to and from the Fort used routes that would later become part of the OST. Peter Skene Ogden of the Hudson’s Bay Company and Jedidiah Strong Smith of the Rocky Mountain Fur Company. In 1826, both men crossed into Mexican Territory looking for the San Buenaventura River and beavers. Smith and his party explored an impressive amount of Nevada and were the first non-Indians to cross the Great Basin. Trade connections between Santa Fe and Los Angeles developed quickly along what came to be called the Old Spanish Trail. Jedediah Smith first traversed the route in 1826, traveling down the Virgin River to the Colorado River and then on to California. Although west of the lower Colorado River, Smith’s party traveled a similar route as Garcés, which would later be named the Mojave trail or road.

Antoine Robidoux, Peter Skene Ogden, Jedediah Strong Smith, Antonio Armijo, William Wolfskill, and George C. Yount explored and documented the OST route throughout the Mexican Period in the Mohave Desert Region. Early mountain men such as Jedediah Smith, in addition to trapping and trading, also dabbled in contract map-making for the United States. Wolfskill and Yount first established the Northern Route of the OST in 1831 (NPS 2000b:7).

In 1829–1830, Mexican trader Antonio Armijo successfully established a route from New Mexico to Los Angeles. He traded New Mexican goods for horses and mules. His accounts reportedly took him south of present day Las Vegas on his way to the Amargosa River. It is likely that he passed somewhat south of the project area, but perhaps through the project alternative area near present day Sandy Valley. Armijo came down the Virgin River to the Colorado River below the Grand Canyon and then journeyed across the desert reaches to the Mojave River. He followed the Mojave River to the Cajon Pass and then on to Los Angeles. Armijo crossed the Colorado River at the Crossing of the Fathers, which was discovered by Fathers Dominguez and Escalante in 1776 (NPS 2000b:7). After Armijo paved the way, annual trading expeditions between New Mexico and Los Angeles became routine. During this time a number of routes were developed. Many travelers avoided the Colorado River below the Grand Canyon. After descending out of the Utah Mountains by way of the Virgin River, travelers cut across the desert, establishing a direct route to the Mojave River.

The primary use of these routes was for commerce and immigration. A less well-documented activity during this period was slaving. Beginning in the Spanish Period,

Paiutes were often captured by Ute and Navajo raiders and sold as slaves in New Mexico or California.

American Period
By the 1840s, there was a steady migration of American settlers into California. Unable to stop the incursion, the Mexican government granted citizenship to all who would pledge to follow Mexican law. Many of these foreigners received land grants on which they established grazing and commercial operations. One example of this is the New Helvetia Rancho granted to John Sutter in 1839 in what is now the City of Sacramento.

War broke out between the United States and Mexico in May 1846, with some decisive battles occurring in California. The American victory over Mexico was formalized in February 1848 with the signing of the Treaty of Guadalupe Hidalgo, and Mexico ceded all its land holdings above the Gila and Rio Grande rivers to the United States. California was admitted as the thirty-first state in the Union on September 9, 1850

In 1848, Brigham Young, leader of the Church of Latter Day Saints, or Mormons, in Utah, had established a church policy of settlement, which included a series of settlements for several hundred miles both north and south of Salt Lake City and a port on the Pacific coast. This policy would aid immigration and ensure control over the Great Basin (Reeder 1966:216). By 1849, Young had established plans for the State of Deseret, encompassing the Great Basin, the Colorado River drainage, and most of present-day southern California, but, when California became a state in 1850, the land east of California was divided into the two territories of New Mexico and Utah, which would ultimately thwart Young's plans for a Mormon port in southern California. Young continued to seek a route to a port and plan for the settlement of a colony in present day southern California, and so the Mormon Road was established. In early 1851, Mormon settlers left Salt Lake City bound for California. They arrived in southern California in June of that year, where they purchased the San Bernardino Rancho (Reeder 1966:205). "The main route to this burgeoning Mormon Center became known as the "Mormon Corridor," or the "Mormon Road" (BLM 2001:5). A one-mile-square town site was laid out, which essentially marked the California end of the Mormon Road. San Bernardino County was established in 1853. The population of this new settlement grew steadily in the early 1850s and in 1856, it was said that it had grown to 3,000 people (Reeder 1966). Brigham Young and other Mormon leaders built what later became known as the "Mormon Fort" (a.k.a., Las Vegas Mission) in 1855, located in present-day Las Vegas, Nevada. The Fort was strategically located half-way between the settlements in southern Utah and the San Bernardino Mission in southern California along the Mormon Road. This part of the Mormon Road overlapped with the OST between New Mexico and California. The Mormon settlements were officially abandoned in February 1857, under the direction of Brigham Young, although a few settlers remained to tend the fields and continue to operate way stations.

Agriculture

The Pahrump Valley has a number of artesian wells conducive to farming. Some of the earliest homesteads were established by Pahrump Paiute, with the assistance of some Mormon families that stayed on in the Ash Meadows, Pahrump, and Las Vegas areas. Southern Paiute were horticulturalists prior to European contact. As non-Indian

populations increased, cattle ranching quickly became a mainstay after Europeans settled in the valley in the mid-1860s. In addition to cattle, several crops were grown, including alfalfa, cotton, sugar beets, and wine grapes.

In the 1860s-70s Charlie, a Pahrump Paiute man and the Tribal War Chief, establishes one of the first Indian Ranches in Pahrump Valley, the Ma-hanse (now named Manse Ranch). In 1877 Joseph Yount purchased Manse Ranch. In 1902, one of Joseph Yount's sons, John B. Yount, acquired the land that would eventually become the Hidden Hills Ranch, another of the early ranches, which was located approximately 10 miles south of the Manse Ranch. In the late 1930s Roland Wiley buys the Yount Ranch from Sally Belle, John Yount's common-law wife. Wiley's holdings grow over subsequent decades as he buys surrounding property. In 1940 the Hidden Hills Ranch comprised 2,474 acres (see HHSEGS 2011a: table 5.3-3 for location). Wiley establishes the Hidden Hills Ranch as a dude ranch where guest live in teepees and dig for artifacts. Agricultural activities include a small orchard that was established near the complex of buildings that included the family home.

During the first two decades of the 20th Century large farming and ranching enterprises, such as the Yount Ranch, were established and flourishing throughout the northern portion of Pahrump Valley. Many of these ranches relied on the valley's abundant (but dwindling) water sources and Paiute laborers.

Evaluation of CRHR Eligibility of Individual Historic-Period/Built-Environment Resources

Old Spanish Trail-Mormon Road

The Old Spanish Trail Recognition Act of 2002 (Act) designated the Old Spanish Trail (OST) as a National Historic Trail. The Act defines the Old Spanish National Historic Trail as "an approximately 2,700 mile long trail extending from Santa Fe, New Mexico, to Los Angeles, California, that served as a major trade route between 1829 and 1848…, including the Armijo Route, Northern Route, North Branch, and Mojave Road" (16 USC 1241) and refers to maps in the National Park Service's "Old Spanish Trail National Historic Trail Feasibility Study," (Feasibility Study) dated July, 2001 (NPS 2000b). The OST, as documented by the Act, is located to the south and just outside of the HHSEGS project site, but within the HHSEGS built-environment PAA. While the OST and Mormon Road diverge in Nevada, with the Mormon Road turning north and the OST continuing east, in California they are recorded as occupying the same general area. The Mormon Road linked the settlements in southern Utah to the San Bernardino Mission in southern California. The Mormons used the OST in the project area as an alternate to the northern Emigrant Trail (BLM 2001:5).

In 2001, the Nevada Office of Historic Preservation listed segments of the OST in Nevada on the NRHP calling it the Old Spanish Trail-Mormon Road Historic District (OST-MR District). The OST-MR District was found significant under NRHP Criteria A and D in the areas of transportation, exploration/settlement, and archaeology/historical, with a period of significance of 1844-1857. The OST-MR District includes approximately 10 miles of the OST-MR, just a small portion of the 2,700-mile-long trail. The study that resulted in the nomination was restricted to the historic route in Nevada, as it was

mapped by John C. Fremont. The OST-MR District is defined by the extant wagon traces (6–7-foot-wide) plus a 20-foot-wide corridor on either side, described as the "pitch zone" where travelers discarded trash and goods along the way. Archaeological finds have been made in the OST-MR District (NPS 2001:11). The OST-MR District includes three segments, all in Nevada, with a total of five contributing sites and four non-contributing sites. The Stump Spring segment, the nearest to the California-Nevada border, is described as beginning on the two-track road near Stump Spring and travels generally southeast towards the border.

In 2010-2011 the Old Spanish Trail association (OSTA), their consultant(s), volunteers and stakeholders performed field and historic research in six states (CA, UT, NV, AZ, NM and CO) in order to prepare a Multiple Properties Documentation Form (MPDF) and nominations to the National Register of Historic Places (NRHP) for six segments of the Old Spanish National Historical Trail. The MPDF and NRHP nominations were prepared by the OSTA, their consultant(s), volunteers and stakeholders under contract to the New Mexico State Historic Preservation Office. The project is being funded by the Bureau of Land Management (BLM), National Park Service (NPS) and NM Historic Preservation Division (HPD). The MPDF and the NRHP nominations were submitted as Drafts for review by the NM HPD, BLM, and the NPS in August 2011. After these documents are finalized each of the six nominations will be sent to their respective SHPOs for review. At this time there is no schedule for the completion of these documents; however, it is known that the draft NRHP nomination for the Emigrant Pass segment recommends this segment as eligible at the State Level for listing on the NRHP under Criteria A and D.

The OST is a large and complicated resource that has not been fully documented through survey. "It [the OST] was never a single, clearly defined route, but was a composite of traces that separated and converged according to the dictates of terrain and potable water (Steiner 1999: ix)." It is logical that there would be a single, narrow trail or road through those areas of difficult terrain, such as mountain passes; however, in open, flat lands such as the project area, it is unlikely that travelers would travel the same perfectly straight path between springs. Rather, circumstances such as availability of water, forage (e.g., food for the animals), terrain and climate, the presence of friendly tribes and the absence of hostile tribes, could take them on a more southerly or northerly route. "Over time, travelers sought easier, shorter routes, and numerous variant trails developed along the Old Spanish Trail Northern Route corridor (NPS 2001:13)."

While many have endeavored to trace a single route for the OST, or even a main route with some alternates, it seems more appropriate to call the resource a corridor, as it is referred to by the Feasibility Study. The Northern Route of the OST, as documented in the Feasibility Study, is located in the HHSEGS built-environment PAA (16 USC 1241:15):

> [The] combined North Route [of the OST-MRNC] followed Virgin River and Dry Lake Valleys southwest to Las Vegas (Big Springs) and Blue Diamond (Cottonwood) Spring, crossing the Spring Mountains at Mountain Springs. The trail entered California by way of the Pahrump Valley.

Because the resource is best described as a corridor and because the Northern Route is located in the HHSEGS built-environment PAA, the OST and the Mormon Road are discussed together here and are referred to as the Old Spanish Trail-Mormon Road Northern Corridor (OST-MRNC).

The project site lies within the OST-MRNC. Documented and previously determined NRHP-eligible portions of the OST-MR are located within close proximity to the project site, and traces on the project site have not been adequately studied to determine whether or not they are contributors to the OST-MRNC. Known elements and features within the OST-MRNC to date include the Northern Route[29] of the Old Spanish Trail National Historic Trail (as designated by the Old Spanish Trail Recognition Act of 2002), Track 4 (CH2MHill DR125), Steiner's Apx Trace (OSTA 2012), S-24 (CH2MHill DR125), S-26 (CH2MHill DR125), Track 5 (CH2MHill DR125), Central trace (OSTA 2012), and Northern trace (OSTA 2012). While not all of the traces on the project site have been ground-truthed, it is clear that the project site lies squarely among all of these tracks and traces and, therefore, within the OST-MRNC, a regionally and nationally significant travel and trade corridor that aided the exploration and shaped the development of the southwestern United States.

Staff has concluded that there is a high probability that these tracks and traces, although not formally included in the Act, would be CRHR eligible under Criterion 1 as part of the Old Spanish Trail National Historic Trail.

The OSTA has documented approximately seven miles of the mule trace defining the OST from Emigrant Pass east to the community of Charleston View. Based on the locations of the springs just over the border in Nevada, OSTA has hypothesized that branches of the route are located on the HHSEGS project site. Other traces or segments of the OST-MR have been proposed, based on travel accounts, from just south of present-day Pahrump, to the north of the project site, and to the south of the project site within the built-environment PAA (see **CULTURAL RESOURCES Figure 8**). Many individuals and organizations have studied, searched for, and documented portions of the trail in California near and on the project site. As such, many possible traces have been proposed as "The" Old Spanish Trail. Based on the various studies, traces in the vicinity of the project area could cross the California-Nevada border as far north as Pahrump, Nevada; as far south as Charleston View, California (a.k.a. Calvada Springs), south of the project site; and at locations in between, which could traverse the project site.

The applicant's consultant identified two traces of the OST-MR in the HHSEGS built-environment PAA, which were given temporary site numbers, Track 4 and S-24. It is also possible, although not identified by the applicant, that S-25, S-26, Track 1, and/or Track 5 are associated with the OST-MR. In particular S-25 and Track 4 appear to line up with the study done by the OSTA. These resources are discussed below.

[29] Note: This overlaps with Track 4 (CH2MHill DR125) and Steiner's Apx Trace (OSTA 2012).

S-24 (Historic Road Segment)
Temporary Site S-24 was recorded and evaluated by the applicant's consultant. This resource consists of a historic road segment connecting the old Nevada State Route 16 to the Tecopa Pass Road. Historically it connected either Hidden Hills Ranch Spring and/or Browns Spring to the OST-MR just 0.5 mile south of the project site. It was measured at approximately 8,250 feet in length and is approximately 20 feet wide. The segment of this road located within the built-environment PAA was noted as being graded in the modern era. Some historic and modern debris was observed along this segment, including one flat-top, steel Coors can; a green glass Coke bottle; and an Owens-Illinois maker's mark dating to 1944. One segment of the road, which is located within Charleston View in an area of desert pavement, was described as ungraded and in fair condition. It is bounded by two modern roads. This segment is 10 feet wide and appears to have two tracks that are approximately 2 inches deeper than the surrounding desert pavement. The segment is short, measuring less than 20 feet and is bound by two modern roads. This road bed has no remaining desert pavement. A large pit approximately six feet in diameter is located next to this small segment and appears modern.

S-24 is depicted on the 1910 USGS 30-minute Ivanpah map and the 1956 USGS 15-minute Horse Thief Springs quadrangle map. This road also appears to be the road discussed in archival sources that led into and out of the Hidden Hills Ranch in the 1930s. Its construction consists of a shallow grade in the natural landform. The 1910 Ivanpah map shows that S-24 crosses another road, which runs through Stump Springs. S-24 then turns southwest, approximately 0.5 mile south of the HHSEGS project area.

The applicant's consultant states that the segment of S-24 within the HHSEGS built-environment PAA no longer retains sufficient integrity to be eligible as a contributing element to the overall OST-MR. Staff agrees that S-24 would not be eligible under NRHP Criterion A (equivalent to CRHR Criterion 1) due to the alterations that have occurred during maintenance, which included being graded with modern equipment. However, staff disagrees with the applicant's conclusion with regards to NRHP Criterion D (equivalent to CRHR Criterion 4). The history of the OST-MR is incomplete; therefore, any traces and tracks that are discovered are potentially eligible under Criterion D (and CRHR Criterion 4) for data potential. Despite the fact that some segments have been maintained or upgraded, they still retain integrity of location, feeling, and association which can add to the historical knowledge of the route(s) of the OST-MR. The applicant's consultants confirmed this: "The current graded road appears to be situated on the remnants of an historical wagon road…. (Lawson and Spaulding, 2012, S-24 Historic Road Segment DPR 523L)." Also, based on the width of the modern, graded part of S-24 (approximately 20 feet) versus the width of the ungraded part of S-24 (approximately 10 feet), subsurface artifacts associated with the road may be present on either side of the ungraded segment, in the "pitch zone." Staff recommends that S-24 is potentially eligible as a feature or element of the OST.

S-25
Temporary Site S-25 is a road that connects the Hidden Hills Ranch to Sandy Valley. The segment recorded within the project site measures 4,025 feet in length and is 20

feet wide. Its construction consists of a shallow grade in the natural landform. The applicant notes that the road does not appear on the 1910, 1912, and 1942 USGS Ivanpah 30-minute quadrangle maps, but does appear on the 1956 15-minute Horse Thief Springs USGS quadrangle map. As such the applicant has suggested that a construction date range of 1942 to 1956 is appropriate.

The road, in its modern form, was primarily used by Roland Wiley to access his Hidden Hills Ranch from the Arrowhead Highway between Las Vegas and Los Angeles. It connects the ranch to Sandy Valley. It is said that Wiley regularly graded the road to maintain his access. It was an alternate route to the pass at Mountain Springs prior to the construction of Nevada Highway 160. The applicant's consultant states that the road could have been considered eligible for the NRHP and CRHR as part of the Hidden Hills Ranch because of its association with Wiley. However, as the Hidden Hills Ranch is no longer extant, there is no longer that association for the road, so the road has therefore lost integrity as an element or feature of the Hidden Hills Ranch. Staff also agrees that on its own the road is not individually eligible for either the NRHP or the CRHR. However, evidence suggests that portions of this road are associated with the OST. As is the case with S-24, the fact that some portions have been maintained or upgraded does not change the fact that it still retains integrity of location, feeling, and association which can add to the historical knowledge of the route(s) of the OST-MR. As such it is a potential historical resource under CEQA.

S-26
This recorded site is a single, ephemeral trail or footpath that measures approximately 35 to 40 cm wide. The width and location of the trail led the applicant's consultant to the conclusion that it is a prehistoric trail possibly connecting nearby Hidden Hills Ranch Spring and/or Browns Spring to the northeast with a village site to the southwest. Additional evidence suggests that this is also a possible segment of the OST-MR. Staff has recommended that S-24 would be eligible under NRHP Criterion A (equivalent to CRHR Criterion 1) and under Criterion D (and CRHR Criterion 4) for data potential. The history of the OST-MR is incomplete; therefore, any traces and tracks that are discovered are potentially eligible with those traces showing a high degree of integrity even more valuable. This trace appears to have retained integrity of location, feeling, and association which can add to the historical knowledge of the route(s) of the OST-MR. Because it has not been significantly altered there is a higher potential for the discovery of subsurface artifacts associated with the road may be present in the "pitch zone."

Track 1
This is a narrow road paralleling the California-Nevada border within the HHSEGS built-environment PAA. It is approximately 2 miles long with a southern terminus at S-24. There is evidence that it may be associated with the OST and later early surveys of the California-Nevada border. Staff agrees that Track 1 would not be eligible under NRHP Criterion A (equivalent to CRHR Criterion 1) due to the alterations that have occurred during maintenance, which included being graded with modern equipment. However, the history of the OST-MR is incomplete; therefore, any traces and tracks that are discovered are potentially eligible under Criterion D (and CRHR Criterion 4) for data potential. Despite the fact that some segments have been maintained or upgraded, they

still retain integrity of location, feeling, and association which can add to the historical knowledge of the route(s) of the OST-MR. Staff recommends that Track 1 is potentially eligible as a feature or element of the OST.

Track 4
Track 4 has been identified as a segment of the OST-MR as documented by the NPS in 2001. The applicant's consultant initially discerned it as a single route during remote imagery analysis; however, two track portions were observed along portions of the route. It is an approximately 5.5 miles long, and 6 foot wide portion of the OST-MR starting at Stump Spring and trending southwest. It passes south of the project site, but within the HHSEGS built-environment PAA. It merges with S-24 and then can be followed west out of the valley. Artifacts found by the applicant's consultant along this segment include a hand-soldered can with a crimp seam top, a mule shoe, a crushed soldered can, a soldered-seamed sanitary can, and a large metal ring, likely from a bridle or harness. The applicant's consultant dated the can prior to 1883. A small scatter of aqua glass was also found and one basal fragment bore a pontil scar, dating the glass to pre-1860. Some modern trash was also observed including a wire hanger, a modern aluminum beer can, and a crushed sanitary can.

The history of the OST-MR is incomplete; therefore, any traces and tracks that are discovered are potentially eligible with those traces showing a high degree of integrity even more valuable. This trace appears to have retained integrity of location, feeling, and association which can add to the historical knowledge of the route(s) of the OST-MR. Because it has not been significantly altered there is a higher potential for the discovery of subsurface artifacts associated with the road may be present in the "pitch zone." Staff recommends that Track 4 is potentially eligible as a feature or element of the OST.

Track 5
Track 5 is a trail of unknown age that runs from Browns Springs in the east and near the western margin of the Pahrump Valley bolson on the west. It is outside of the project site, but within the HHSEGS built-environment PAA. There is evidence that it could be a trace of the OST. The history of the OST-MR is incomplete; therefore, any traces and tracks that are discovered are potentially eligible with those traces showing a high degree of integrity even more valuable. This trace appears to have retained integrity of location, feeling, and association which can add to the historical knowledge of the route(s) of the OST-MR. Because it has not been significantly altered there is a higher potential for the discovery of subsurface artifacts associated with the road may be present in the "pitch zone." Staff recommends that Track 4 is potentially eligible as a feature or element of the OST.

Assessment of Project Impacts to Historic-Period/Built-Environment CRHR-Eligible Resources and Recommended Mitigation

The project site lies within the OST-MR Northern Corridor. Documented and previously determined eligible portions of the OST are located within close proximity to the project site and traces on the project site and in the larger Pahrump Valley have not been adequately studied. Known elements/features within the OST-MR Northern Corridor to

date include the Northern Route of the Old Spanish Trail National Historic Trail as designated by the Old Spanish Trail Recognition Act of 2002, Track 4 (CH2MHill, 2012), Steiners Apx Trace (OSTA 2012), S-24 (CH2MHill, 2012), S-26 (CH2MHill, 2012), Track 5 (CH2MHill, 2012), Central trace (OSTA 2012), and Northern trace (OSTA 2012). While not all of the traces on the project site have been ground truthed, it is clear that the project site lies squarely among all of these tracks/traces and, therefore, within the OST-MR Northern Corridor, a regionally and nationally significant travel/trade corridor that aided the exploration and shaped the development of the southwestern United States.

The information from the above sources and the complex character of trail segments recorded by both the applicant's consultant and the OSTA, has led staff to conclude that, within the built-environment PAA and the wider Pahrump Valley, this resource is not represented by a single route, but as a corridor of converging and intermingled tracks and traces. The applicant's cultural resources consultant, CH2MHill, acknowledged the scale and complexity of the resource in their research design for the Historic Trails and Roads Technical Study. "For the sake of historical realism, it is assumed that there is no "one" road on the surface, and that the OST-MR is a braided or anastomosing network of tracks… (CH2MHill, DR125)." The project site is located within this corridor, with traces running throughout the project site.

Although not formally included in the Act, staff has concluded that there is a high probability that these tracks/traces would be eligible as part of the Old Spanish Trail National Historic Trail and eligible for the NRHP and CRHR. As such, the Corridor is a potential historical resource for the purposes of CEQA and potential impacts resulting from the proposed project must be evaluated. The construction of the proposed project would cause a substantial adverse change in the significance of the OST-MR Northern Corridor by erasing traces/trails on site and visually impacting traces/tracks off site, which could jeopardize the integrity of the OST-MR segment of the Old Spanish Trail National Historic Trail in the Pahrump Valley.

Additionally, the proposed project is within the viewshed of the NRHP-listed Old Spanish Trail/Mormon Road Historic District (District). The District was found eligible for the NRHP under Criteria A and D. KOP 2 in the **VISUAL RESOURCES** section of the **FSA** clearly shows that the power towers would be visible from the Stump Springs area. At a minimum the Stump Spring Segment, as described in the NRHP nomination form for the District, would be impacted based on the visual simulation at KOP 2. The proposed project would degrade three of the aspects of integrity that contribute to the District's significance; setting, feeling, and association.

While modern development in the Charleston View area may have disturbed some OST-MRNC tracks and traces in the HHSEGS built-environment PAA and has caused some visual intrusion with the construction of low-rise buildings, the overall setting of the Pahrump Valley has been well preserved with long stretches of uninterrupted natural landscape. The area is relatively flat and consists of scrub vegetation. This vast, relatively flat landscape is a major character-defining feature of the setting of the OST. When travelers came over the Spring Mountains and viewed the Pahrump Valley they knew they had come to one of the most difficult parts of their journey; between the

various springs in the Spring Mountains and Resting Spring west of Emigrant Pass there was no water, no respite from the hot, dry desert. Modern development has been sparse and the visibility of that development is minimal from the project site, as discussed in the **VISUAL RESOURCES** section of the FSA. Conversely, the HHSEGS proposed project would be visible for miles, creating the most significant visual intrusion into the valley to date. Based on the visual simulations and analysis of the visual impacts from the Key Observation Points (KOPs), the proposed project would be visible for at least 30 miles away as can be seen in **Figure 26** of the **VISUAL RESOURCES** section of the **FSA**. (Figure DR37-1 in the AFC demonstrates locations and areas that would have a view of the project.)

The integrity of the setting, feeling, and association of the tracks and traces outside of the HHSEGS project site would thus be significantly impacted by the project, which is within the viewshed of the NRHP-listed OST-MR District in Nevada, discussed above. KOP 2 in the **VISUAL RESOURCES** section of the **FSA** clearly shows that the power towers would be visible from the Stump Springs area. At a minimum the Stump Springs segment of the OST-MR District, as described in the NRHP nomination form, would be impacted, based on the visual simulation at KOP 2. The HHSEGS project would significantly degrade three of the aspects of integrity that contribute to the OST-MR District's significance—setting, feeling, and association.

As discussed above, staff considers the OST-MRNC a historical resource for the purposes of CEQA, and therefore potential impacts resulting from the HHSEGS project must be evaluated. The project would significantly impact the OST-MRNC by erasing potential tracks and traces on-site. Any OST-MRNC tracks and traces on the HHSEGS project site would be destroyed—directly, physically impacted by the project's construction. Destruction of the tracks and traces, and the resulting loss of integrity, is irreversible. Staff has concluded that this impact on the informational values of the OST-MRNC is significant and must be mitigated.

Staff has also concluded that the installation of the proposed power towers and heliostats would result in a significant and unavoidable direct, perceptual impact to the OST-MRNC. The installation of this large number of heliostats and 750plus-foot towers would substantially alter the vast, open landscape that is a character-defining feature of this historical resource. The visual quality of this section of the OST-MR would be permanently damaged by the project's presence, resulting in a substantial adverse change in the significance of a historical resource and a significant and unmitigable impact. This impact cannot be avoided or reduced if the project is constructed as designed and in the proposed location. Given the extended period of both the HHSEGS proposed project's operation (a minimum of at least 30 years) and the physical presence of the proposed project facilities, the impact of the project on the resource must be considered permanent. Staff is unaware of any suite of mitigation measures that would fully mitigate the impacts of the proposed project and reduce the impacts to a less than significant level. The historical significance of the OST-MR in the Pahrump Valley is largely tied to its view of the vast, unobstructed, flat expanse of desert landscape, which would be impeded by any type of screening that might be proposed to attempt to block views of the project, especially the power towers. Eliminating project

elements along the project site boundary would not lessen the visual impact, as the existing views are unobstructed for several miles.

The applicant has proposed no mitigation measures to reduce significant impacts to built-environment resources as they do not believe that significant impacts would occur. As noted above, staff is unaware of any action, short of project relocation or denial that would directly fully mitigate the significant direct impacts that the proposed project would have on the OST-MRNC. As an alternative, staff finds mitigation, identified in Conditions of Certification **CUL-9**, **CUL-10,** and **VIS-6**, to be a means of compensating, in large part, for the permanent loss of the resource's visual and informational values. **CUL-9** addresses both of the HHSEGS project's significant direct impacts: the physical impact on the potential OST-MRNC tracks and traces that may be located on the project site; and the visual impact on the setting of the OST-MRNC. **CUL-10** also addresses the project's significant direct impacts as well as the visual impact on the setting of the OST-MRNC by disseminating the information gathered in **CUL-9** to other cultural resource professionals and the public, so that the history of this significant resource is not lost. First, **CUL-9** would require the HHSEGS project owner, before the start of construction, to fund research by the OSTA to confirm potential OST-MRNC tracks and traces that are located on the project site and to fully record them. Second, **CUL-9** would require the HHSEGS project owner, during construction, to fund research by a qualified historian to gather information and verify existing data specific to the location, history, condition, and significance of the OST-MRNC, as an individually CRHR-eligible resource and an element of the Old Spanish Trail National Historic Trail and/or a possible contributor to the NRHP-listed Old Spanish Trail Historic District. The information resulting from **CUL-9** would be necessary to completing the Interpretive Program recommended in **CUL-10**.

However, even with full implementation of Conditions of Certification **CUL-9, CUL-10, and VIS-6**, the project's impact to the OST-MRNC would remain significant and unmitigable.

MULTI-RESOURCE MITIGATION FOR THE DEGRADATION OF FOUR HISTORICAL RESOURCES

The construction and operation of the proposed project would result in direct physical and visual degradation and cumulative degradation to four historical resources including archaeological, ethnographic, and built-environment landscapes in Pahrump Valley, and may result in indirect physical degradation to them as well. For the analytic details of each of these effects on each respective resource type, please see the *Assessment of Project Impacts to CRHR-Eligible Archaeological Resources and Recommended Mitigation, Analysis of Impacts to Ethnographic Resources,* and *Assessment of Project Impacts to Historic-Period/Built-Environment CRHR-Eligible Resources and Recommended Mitigation* subsections of the present section of this FSA. "CEQA established a duty for public agencies to avoid or minimize environmental damage where feasible." (Cal. Code Regs., tit. 14, § 15021(a))

Staff has modified the original interpretive center concept, the development of which was begun in **CUL-10** of the SSA and conceptually completed subsequent to the publication of the SSA, and offers a related concept that would appear to be consistent

with the regulatory intent of mitigation under CEQA, while still meeting the basic objectives for the mitigation of the proposed project's effects on the multiple subject historical resources in Pahrump Valley. CEQA requires mitigation proposed for projects under consideration to be feasible measures which have the potential to minimize any significant adverse effects (Cal. Code Regs., tit. 14, § 15126.4), where "feasible" is defined as "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors" (Cal. Code Regs., tit. 14, § 15364). In addition to being feasible, mitigation measures must also be "roughly proportional" to the significant effects that a proposed project may have on the environment (Cal. Code Regs., tit. 14, § 15364, subd. (a)(4)(B)).

The mitigation that staff recommends for the Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape, the Pahrump Paiute Home Landscape, the Ma-hav Landscape, and the Old Spanish Trail-Mormon Road Northern Corridor focuses on the public interpretation of the resources, largely through extant interpretive facilities in and near Pahrump Valley. While the interpretation of the subject resources would be more effective closer to the remnants of the landscapes that the proposed project would damage, the use of extant interpretive facilities further afield would not entirely compromise the delivery of the interpretive mitigation objectives identified for those resources, and the use of the basic infrastructure and the staff of the extant facilities would somewhat reduce mitigation costs. **CUL-10** would parse out the different interpretive mitigation objectives to one or more extant interpretive facilities in the vicinity and thus accomplish the interpretive goals of resource mitigation. Under this multiple facility approach, **CUL-10** would require the applicant to fund the delivery of each of the parsed interpretive mitigation objectives in each interpretive facility that would agree to deliver particular interpretive mitigation objectives. The delivery mode groups and the delivery mode venues cited below serve as an example scenario for the implementation of **CUL-10**. Staff consultation with the venues is ongoing and to date has been informal and preliminary. **CUL-10** has been drafted with the flexibility in mind to accommodate the outcomes of more formal venue consultations.

Example CUL-10 Implementation Scenario

1. The construction and maintenance of an interpretive kiosk within one hundred yards of the facility site that presents broad overviews of the Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape, the Pahrump Paiute Home Landscape, the Ma-hav Landscape, and the Old Spanish Trail-Mormon Road Northern Corridor along with information on the nearby interpretive facilities where the public would be able to access more in-depth interpretive programs for each resource. The presentation of the overviews and the delivery of information on nearby interpretive facilities could occur in conjunction with the implementation of **VIS-6**, as long as the implementation of that condition occurred within the specified distance from the facility site.

2. The delivery of passive museum displays and multi-media presentations, *and* hands-on, interactive exhibits the purpose of which is to facilitate the interpretation of the cultural landscapes and corridor. The specific interpretive

modes would include the development and delivery of separate displays, presentations, *and* exhibits, of museum quality, about

- the genesis, paleoecology, and archaeology of the Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape,
- the seasonal subsistence cycle of the Pahrump Paiute Tribe, and
- the Old Spanish Trail-Mormon Road Northern Corridor.

The Shoshone Museum in Shoshone, California could facilitate the delivery of the above interpretive modes. The Shoshone Museum, an extant venue approximately 37 miles west of the proposed facility site, is a gateway community into Death Valley National Park and one of the National Park Service's suggested routes into the park. The traffic through the community, primarily from Las Vegas, to Death Valley provides the museum with a relatively high local volume of visitors. The implementation of this subgroup of delivery modes would most likely require the construction of an expansion onto the museum to house museum displays and interactive exhibits, and to deliver multi-media presentations, in addition to the construction of the actual displays and exhibits, and the production of the multi-media presentations.

3. The delivery of ethnographic reconstructions the purpose of which is to facilitate the interpretation of the Native American use of the local landscape in the prehistoric and ethnographic periods. The specific interpretive modes would include the

   - Native American installation and maintenance of an aboriginal horticultural garden for public interpretation, and
   - the conjunctive Native American installation and maintenance of an exploratory reconstructed village consisting of a few replica dwellings that allow public access to walk in, about, and through the village and garden area. Providing direct visitor access to a real garden featuring native garden varietals, such as pumpkins, beans, and corn, set near the interpretive materials provided per item 2, above, will greatly enhance the visitor education experience beyond what passive interpretive materials would solely provide.

Staff believes that were the alternate level of mitigation set out here (**CUL-10**) and **CUL-11** to be emplaced for the proposed project, one would not be able to argue that the direct physical and visual, the indirect, and the cumulative effects of the proposed project would be reduced to a less than significant level for the Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape, the Ma-hav Landscape, and the Pahrump Paiute Home Landscape. Staff believes that the direct physical effects of the proposed project on the Old Spanish Trail-Mormon Road Northern Corridor would also not be reduced to a less than significant level with the implementation of **CUL-9**, and the multiple facility approach. The implementation of **CUL-9** and the multiple facility approach would still not reduce the direct visual and cumulative effects of the proposed

project on the Old Spanish Trail-Mormon Road Northern Corridor to a less than significant level. Staff would retain the belief that these particular effects would be unmitigable.

ALL CRHR-ELIGIBLE RESOURCES SUBJECT TO POTENTIAL PROJECT IMPACTS

Cultural Resources Table 11 lists, by resource type, the CRHR-eligible cultural resources potentially impacted by the project and the recommended conditions of certification that would mitigate, to the extent possible, the HHSEGS project's significant impacts.

CULTURAL RESOURCES Table 11
CRHR-Eligible Cultural Resources Potentially Subject to Impacts from the Proposed Project and Recommended Mitigation

Resource Type, Designation	Resource Description [type, size, age,]	CRHR-Eligibility	Recommended Conditions to Mitigate Impacts
Prehistoric Archaeological Resources			
Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape	Terminal Pleistocene to Holocene proposed landscape thematically focused on collection and processing of mesquite and other plant resources unique to the mesquite woodland-coppice dune association. Landscape elements include the archaeological deposits, the mesquite population, ancillary floral and faunal populations, and, the structural features of the faults, dunes, and aquifer discharge locales	Assumed eligible for listing in the CRHR	1. To re-create for the public a sense of the experience of this landscape, under **CUL-10**, through interpretive and preservation programs delivered at extant regional interpretive facilities, as partial compensation for the HHSEGS project's damage to this resource. 2. To obtain, under **CUL-11**, a comprehensive picture of a significant aboriginal landscape through the documentation of the landscape's composition and character over time; and
Buried archaeological resources that may be discovered during construction monitoring or identified during survey of potential soil borrow and disposal sites	Unknown	To be determined by CPM	**CUL-1** through **CUL-8**
Historical Archaeological Resources	None		

Resource Type, Designation	Resource Description [type, size, age,]	CRHR-Eligibility	Recommended Conditions to Mitigate Impacts
Ethnographic Resources	Three ethnographic landscapes: 1. Salt Song Landscape 2. Pahrump Paiute Home Landscape 3. Ma-hav Landscape	Recommended eligible for listing in the CRHR	**CUL-10** objectives for the recommended interpretive and preservation programs, as partial compensation to the public and to Native Americans for the HHSEGS project's damage to these resources, are: 1. To interpret the historic and cultural uses of the Ma-hav Landscape, its surroundings and relation to the Pahrump Paiute Home landscape, and those landscapes' linked cultural resources such as identified in the above mentioned archaeological landscape and portions of the Old Spanish Trail-Mormon Road Northern Corridor; 2. To interpret the nature and ecology of the mesquite springs area and surrounding habitats; and 3. To educate the public and otherwise promote wise and conservative water and energy use in desert environs.

Resource Type, Designation	Resource Description [type, size, age,]	CRHR-Eligibility	Recommended Conditions to Mitigate Impacts
Built-Environment Resources			
The Old Spanish Trail-Mormon Road Northern Corridor (see **Cultural Resources Figure 7**)	Historic trail and road.	Portions of the OST are designated as a National Historic Trail. NRHP and CRHR-eligible.[30]	**CUL-9** objectives are: 1. To complete research by the OSTA to confirm potential OST-MRNC tracks and traces that are located on the project site and to fully record them; 2. To complete research by a qualified historian to document the location, history, condition, and significance of the OST-MRNC, as an individually CRHR-eligible resource and an element of the Old Spanish Trail National Historic Trail and/or as a possible contributor to the NRHP-listed Old Spanish Trail Historic District; 3. To nominate the OST-MRNC to the CRHR and the NRHP; and 3. To provide newly compiled information on the OST-MRNC to the public as recommended in **CUL-10**, as partial compensation to the public for the HHSEGS project's damage to this resource.

[30] An NRHP nomination is currently being reviewed by the Nevada BLM.

CUMULATIVE IMPACTS AND MITIGATION

GEOGRAPHIC SCOPE OF ANALYSIS

Table 1, Hidden Hills Master List of Cumulative Projects, and the **Cumulative Projects Figure 1**, included in the Cumulative Impacts Assessment **EXECUTIVE SUMMARY** of the HHSEGS FSA, identify the development projects that may contribute to cumulative impacts on cultural resources in combination with the proposed HHSEGS project. These include St. Therese Mission, Pahrump Airport, Element Solar, Amargosa Farm, PSI Amargosa PV Solar Project, Silver State South Solar Project, Stateline Solar Farm, Sandy Valley, Searchlight Wind Energy, Southern Owens Valley Solar Ranch, Lathrop Wells Solar, Table Mountain, and South Solar Ridge. These projects are located within a geographic area that has been identified by staff as covering an area large enough to provide a reasonable basis for evaluating cumulative impacts for all resource elements or environmental parameters. Most of these projects would be required to undergo their own independent environmental review under CEQA.

Cumulative impacts could occur if impacts resulting from the implementation of the proposed HHSEGS project combine with the impacts of other local or regional projects on the same or similar resources. Cumulative impacts would occur locally if the HHSEGS impacts combined with the impacts of projects located within the area identified in **Cumulative Projects Figure 2**. Cumulative impacts could also occur as a result of the development of some of the many proposed and licensed solar and wind development projects that have been, or are anticipated to be, constructed in the foreseeable future. This geographic scope is appropriate because it is likely that cultural resources similar to those in the HHSEGS PAA are present throughout the Pahrump Valley and eastern Mojave Desert.

PROJECT CUMULATIVE IMPACTS AND MITIGATION

Archaeological Resources

Staff projects the cumulative effects of the proposed project, and of past and reasonably foreseeable probable future projects on the Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape (Pahrump Metapatch Landscape) to be significant, and staff concludes that the proposed project's contribution to those effects are cumulatively considerable. The baseline cumulative effects of the development of the Charleston View community, the construction and use of the Front Sight Firearms Training Institute , and improvements to both the Tecopa Road and Nevada State Route 160 have been to degrade the setting, feeling, and association aspects of integrity related to the landscape's ability to convey its significance under Criterion 1, and the location and design aspects of integrity with respect to its analogous ability under Criterion 4. Staff believes, however, that the degree of degradation to date, relative to either criterion, has not been significant. Broad, important portions of the landscape remain intact. The construction and operation of the proposed project would represent the first significant, direct visual intrusion on the Pahrump Metapatch Landscape and has the potential to foster other indirect effects. The presence of the proposed project and the modifications made to the ancillary regional infrastructure to accommodate it would likely enhance development opportunities for other solar generation projects in

the future, which would, in turn, dependent on the particular technology suites, compound the significant effects of the proposed project on the subject landscape. The effects of the proposed project on the Pahrump Metapatch Landscape are cumulatively considerable, because they would be the first significant effects that would be inflicted on the landscape, the significance of which is amplified by the project's location adjacent to it, the effects would be extremely difficult to mitigate to a less than significant level, and they would likely degrade the visual integrity of the landscape to a point that would make the effects that subsequent projects would have seem less significant than they otherwise would.

The mitigation of what staff concludes here are the cumulatively considerable effects of the proposed project to a less than significant level is problematic. In theory, one may be able to devise a suite of mitigation measures that could be reasonably argued to accomplish this goal, but any such suite would face difficult tests of feasibility. As discussed above (see Multi-resource Mitigation for the Degradation of Multiple Landscapes), such a suite of mitigation measures would have to include the delivery of interpretive programs amidst or adjacent to this or the other cultural landscapes that this project would damage. As any such mitigation suite has been found to be infeasible for the present application, the project's cumulatively considerable effects to the Pahrump Metapatch Landscape are found by staff to be unmitigable. The implementation of **CUL-10**, and **CUL-11**, though not reducing the project's effects to less than significant, would nonetheless provide for their substantive reduction.

Ethnographic Resources

Were the project to be implemented as proposed three ethnographic landscapes would be cumulatively impacted in similar ways as described in the Archaeological Resources section above. The project site and vicinity are a known area for important Native American religious and traditional resource uses.

The Pahrump Paiute Home Landscape is much larger than the project footprint. The project would be visible from less than one tenth of the total Pahrump Paiute Home Landscape. However, all of the projects identified in the "Cumulative Impacts" subsection of this analysis are within the Pahrump Paiute Home Landscape. In addition, because of its size, there are many more reasonably foreseeable projects than those listed that would adversely impact the Pahrump Paiute Home Landscape.

Two other solar projects, Element Solar and Sandy Valley, are proposed either near or immediately adjacent to the Ma-hav Landscape. Element Solar would be of a similar scale to the Hidden Hills project, but would not incorporate solar power tower infrastructure into its designs. The proposed Sandy Valley project would occupy a much larger site footprint and would probably use solar power tower technology and infrastructure. Therefore, cumulative impacts would be greater from the Sandy Valley project. The Element Project would provide a slightly lesser set of impacts, but the combined set of projects would jointly provide even greater impacts than any one of the projects would singularly introduce.

As mentioned in the Integrity discussion for the three ethnographic landscapes, the Southern Paiute Salt Song Landscape has already been visually and physically

compromised to some extent by modern developments, such as the presence of numerous large cities, towns, military installations, energy generating facilities, mining infrastructure, and other infrastructure, such as transportation and transmission corridors. In addition, auditory, olfactory, and nightscapes have been compromised. The Spring Mountains are surrounded on several sides with incompatible intrusions to traditional religious and cultural practices. To the east/southeast lies the sprawling Las Vegas metropolis. To the north lie Nellis Air Force Base and the Nevada Test Site. And to the east/northeast lies the City of Pahrump. Across and through this terrain are several major highway corridors and transmission lines. Although not in the immediate vicinity of the proposed project, the expanse of these ethnographic landscapes exposes them to cumulative impacts resulting from projects well outside the area identified in **Cumulative Projects Figure 1**.

The impacts to the entire Salt Song Landscape are beyond the scope of this analysis. However, the segment of the Landscape that runs through the Pahrump Valley is already compromised, in particular, by the presence of the City of Pahrump.

Erosion of the spiritual context and critical elements of religious practice of the Salt Song Landscape in the Pahrump Valley is occurring primarily in response to the continued development in and around the Pahrump area. The focus of development, both current and future, is being driven by the need for housing and businesses to serve the influx of temporary construction and permanent operational personnel needed to build and staff the solar development projects in the area. These projects, some currently proposed by the same parent company in the immediate vicinity of the Hidden Hills project (Sandy Valley project), would have similar impacts as the Hidden Hills project and, therefore, would contribute cumulatively to the significant adverse impacts on the Landscape. Staff is not proposing any mitigation for impacts to the Salt Song Trail landscape. **CUL-10** provides compensatory mitigation for cumulative impacts to the Ma-hav landscape and Pahrump Paiute Landscape, but not to a level of less than significant.

Built-Environment Resources

St. Therese Mission, Pahrump Airport, Element Solar, and Sandy Valley Solar projects are considered most likely to contribute to the cumulative impacts on historic/built-environment resources, specifically the OST-MR Northern Corridor. The Sandy Valley project would have direct, physical impacts to the OST-MR as it appears to have the potential to adversely affect springs and tracks and traces in Nevada just east of the project site. The other projects could potentially increase the adverse impacts to the setting, or visual quality, of the Pahrump Valley, adversely affecting a contributing element of the OST-MR. The construction of the Hidden Hills project would result in permanent adverse impacts related to the destruction of the tracks and traces of the OST-MR on the project site, as well as create a substantial visual intrusion on the landscape. This would result in significant and unmitigable adverse impacts to built-environment resources, specifically the OST-MR. Therefore, any additional adverse impacts to the OST-MR Northern Corridor from other projects would simply add a cumulative element to the existing significant and unmitigable impacts.

PROJECT CUMULATIVE IMPACTS CONCLUSION

The construction of other projects in the same vicinity could affect unknown cultural resources of the same types as those affected by the proposed project. Proponents for other projects in the area may be able to reduce the impact(s) to CRHR-eligible cultural resources through deliberate project planning, or reduce impacts to presently unknown cultural resources to a less than significant level by implementing construction monitoring, evaluation of resources discovered during monitoring, and avoidance or data recovery for historical resources. However, significant and unmitigable cumulative impacts to the Pahrump Metapatch (archaeological) Landscape; Salt Song,; and the OST-MR Northern Corridor by the proposed project virtually guarantee that impacts from any other projects on these resources would result in an overall significant and unmitigable cumulative impact.

RESPONSE TO PUBLIC COMMENTS

Staff's responses to applicant and public comments are included in **Appendix 1**, PSA Response to Comments, Cultural Resources.

CONCLUSIONS, RECOMMENDATIONS, AND RECOMMENDED FINDINGS OF FACT

- Staff has evaluated the individual archaeological deposits found within the boundaries of the HHSEGS facility site and recommends that they are not historical resources under CEQA, and they are not contributors to the Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape.

- Staff recommends that no mitigation is required for HHSEGS project impacts to the individual archaeological deposits found within the boundaries of the HHSEGS facility site.

- Staff recommends the adoption and implementation of Conditions of Certification **CUL-1** through **CUL-8** to ensure that all significant impacts to archaeological historical resources discovered during HHSEGS project construction, including the potential project use of borrow and disposal sites, and operation are mitigated below the level of significance.

- Staff has identified the Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape, located just to the northeast of the HHSEGS facility site, as a historical resource under CEQA and recommends that it be assumed eligible for the California Register of Historical Resources (CRHR), under CRHR Criteria 1 and 4, for the purpose of the present siting case. The resource represents the aboriginal use of a locally significant ecological zone during still undetermined periods over probably at least the last 12,000 years.

- Staff concludes that the visual impact of the proposed HHSEGS project on the Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape would severely degrade the ability of the resource to convey its association with

aboriginal lifeways of the Holocene epoch, potentially compromising its CRHR eligibility.

- Staff has not identified, and the applicant has not recommended, any mitigation measures that would reduce the HHSEGS project impacts to the Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape to a less than significant level. Staff recommends the compensatory mitigation identified in Condition of Certification **CUL-11**; however, even with the adoption and implementation of **CUL-11**, the project would still have a significant and unmitigable impact on the Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape and related impacts to affected Native American cultural practices.

- Staff has identified and evaluated three ethnographic landscapes within which the HHSEGS project is located (Salt Song, Pahrump Paiute Home, and Ma-hav Landscapes) and recommends that they be assumed to be historical resources under CEQA, for the purpose of the present siting case, and potentially eligible for listing in the CRHR, under, variously, Criteria 1, 2, 3, and/or 4.

- Staff concludes that the presence and visual impact of the HHSEGS proposed project on these three ethnographic landscapes would significantly impact the setting, feeling, and association aspects of the resources' integrity, aspects critical to the resources' ability to convey their associative, artistic, and information values, potentially compromising their CRHR eligibility.

- Staff concludes, in consultation with Native American Tribes and Salt Song Practitioners, that no level of mitigation is appropriate for mitigating impacts to the Salt Song Trail landscape due to the Salt Song Trail Landscape's importance for Southern Paiute that are responsible for ushering their deceased to the afterlife and in providing relief to grieving families.

- Staff recommends the adoption and implementation of mitigation in Condition of Certification **CUL-10** for the HHSEGS project's impacts on the Pahrump Paiute Home landscape and the Ma-hav landscape. However, even with the adoption and implementation of **CUL-10**, the project would still have significant and unmitigable impacts on the ethnographic landscapes and Native American spiritual practices dependent on these resources.

- Staff has identified a historic trail corridor, within which the HHSEGS project site is located, containing various converging and intermingled tracks and traces that comprise a portion of the Old Spanish Trail-Mormon Road. Staff recommends that this trail corridor be assumed to be a historical resource under CEQA, for the purpose of the present siting case, eligible for the CRHR under Criteria 1 and 4.

- Staff concludes that the HHSEGS project impacts on the Old Spanish Trail-Mormon Road Northern Corridor would be significant and that, even with adoption and full implementation of Conditions of Certification **CUL-9** and **CUL-10**, project impacts to this resource could not be mitigated to a less than significant level.

- Staff recommends that construction and operation of the HHSEGS project, in conjunction with past, present, and reasonably foreseeable projects in the archaeological, ethnographic, and built-environment Project Areas of Analysis, would result in significant and unmitigable cumulative impacts to one archaeological landscape, one ethnographic landscape (Salt Song Trail landscape), and one built-environment historical resource, as identified in this section. Although full implementation of all recommended conditions of certification would reduce the significance of the project-related impacts to some degree, thereby reducing the project's contribution to cumulative impacts to these resources, they would not reduce the cumulative HHSEGS project contribution to the total resource inventory for this project or that of the past, present, and foreseeable future projects in the vicinity to these resources to below the level of significance.

- Staff recommends that full implementation of all Cultural Resources conditions of certification would ensure compliance with all applicable laws, ordinances, regulations, and standards identified in **Cultural Resources Table 1**.

RECOMMENDED CONDITIONS OF CERTIFICATION

CUL-1 Prior to the start of construction-related ground disturbance or grading, boring, and trenching, as defined in the General Conditions for this project; and/or surface grading or subsurface soil work during pre-construction activities or site mobilization, and/or mowing activities and heavy equipment use in loose or sandy soils, at the site and for access roads and linear facilities, the project owner shall obtain the services of a Cultural Resources Specialist (CRS) and one or more Alternate CRS(s). The project owner shall submit the resumes and qualifications for the CRS, CRS alternates, and all technical specialists to the CPM for review and approval.

The CRS shall manage all cultural resources monitoring, mitigation, curation, and reporting activities, and any pre-construction cultural resources activities (e.g., geoarchaeology or data recovery), unless management of these is otherwise provided for in accordance with the cultural resources conditions of certification (Conditions). The CRS may elect to obtain the services of Cultural Resources Monitors (CRMs), Native American Monitors (NAMs), and other technical specialists, if needed, to assist in monitoring, mitigation, and curation activities. The project owner shall ensure that the CRS makes recommendations regarding the eligibility for listing in the California Register of Historical Resources (CRHR) of any cultural resources that are newly discovered or that may be affected in an unanticipated manner.

No construction-related ground disturbance or grading, boring, and trenching, as defined in the General Conditions for this project; and/or surface grading or subsurface soil work during pre-construction activities or site mobilization, and/or mowing activities and heavy equipment use in loose or sandy soils, at the site, access roads, and linear facilities, shall occur prior to Energy

Commission Compliance Project Manager (CPM) approval of the CRS and alternates, unless such activities are specifically approved by the CPM.

If, during operation of the power plant, circumstances develop that would require ground disturbance in soils or sediments previously undisturbed during project construction, no surface grading or subsurface soil work shall occur prior to submission of a Petition to Modify and CPM review and approval of a project-specific protocol for addressing unanticipated discoveries, consistent with the approved Cultural Resources Mitigation and Monitoring Plan (CRMMP).

CULTURAL RESOURCES SPECIALIST

The resumes for the CRS and alternate(s) shall include information demonstrating to the satisfaction of the CPM that their training and backgrounds conform to the U.S. Secretary of the Interior's Professional Qualifications Standards, as published in Title 36, Code of Federal Regulations, part 61 (36 C.F.R., part 61). In addition, the CRS and alternate(s) shall have the following qualifications:

1. Listing in the Register of Professional Archaeologists;

2. Qualifications appropriate to the needs of the project, including a background in anthropology, archaeology, history, architectural history, or a related field;

3. At least three years of archaeological or historical, as appropriate (per nature of predominant cultural resources on the project site), resources mitigation and field experience in California; and

4. At least one year of experience in a decision-making capacity on cultural resources projects in California and the appropriate training and experience to knowledgably make recommendations regarding the significance of cultural resources. The resumes of the CRS and alternate CRS shall include the names and telephone numbers of contacts familiar with the work of the CRS/alternate CRS on referenced projects and demonstrate to the satisfaction of the CPM that the CRS/alternate CRS has the appropriate training and experience to implement effectively the Conditions.

CULTURAL RESOURCES MONITORS

CRMs shall have the following qualifications:

1. B.S. or B.A. degree in anthropology, archaeology, historical archaeology, or a related field, and one year experience monitoring in California; or

2. A.S. or A.A. degree in anthropology, archaeology, historical archaeology, or a related field, and four years experience monitoring in California; or

3. Enrollment in upper division classes pursuing a degree in the fields of anthropology, archaeology, historical archaeology, or a related field, and two years of monitoring experience in California.

CULTURAL RESOURCES TECHNICAL SPECIALISTS

The resume(s) of any additional technical specialist(s), e.g., historical archaeologist, historian, architectural historian, and/or physical anthropologist, shall be submitted to the CPM for approval.

The historian(s) must meet the U.S. Secretary of Interior's Professional Qualifications Standards, as published in Title 36, Code of Federal Regulations, part 61 (36 CFR, part 61). Resume(s) of the selected historian(s) shall be submitted for review and approval by the CPM and shall include the names and telephone numbers of contacts familiar with their work on referenced projects and demonstrate, to the satisfaction of the CPM, that the historian has the appropriate training and experience to effectively implement all study requirements.

Verification: At least 45 days prior to the start of ground disturbance, the project owner shall submit the resumes for the CRS and alternate(s) to the CPM for review and approval.

At least 10 days prior to a termination or release of the CRS, or within 10 days after the resignation of a CRS, the project owner shall submit the resume of the proposed new CRS, if different from the alternate CRS, to the CPM for review and approval. At the same time, the project owner shall also provide to the proposed new CRS the Application for Certification and all cultural resources documents, field notes, photographs, and other cultural resources materials generated by the project. If no alternate CRS is available to assume the duties of the CRS, the project owner shall designate a CRM to serve in place of a CRS for a maximum of 3 days. If cultural resources are discovered, ground disturbance shall remain halted until there is a CRS or alternate CRS to make a recommendation regarding significance.

At least 20 days prior to ground disturbance, the CRS shall provide a letter naming CRMs and attesting that the identified CRMs meet the minimum qualifications for cultural resources monitoring required by this condition.

At least 5 days prior to additional CRMs beginning on-site duties during the project, the CRS shall provide letters to the CPM identifying the new CRMs and attesting to their qualifications.

At least 15 days prior to any technical specialists, other than CRMs, beginning tasks, the resume(s) of the specialists shall be provided to the CPM for review and approval.

At least 10 days prior to the start of ground disturbance, the project owner shall confirm in writing to the CPM that the approved CRS will be available for onsite work and is prepared to implement the cultural resources Conditions.

CUL-2 Prior to the start of construction-related ground disturbance or grading, boring, and trenching, as defined in the General Conditions for this project; and/or surface grading or subsurface soil work during pre-construction activities or site mobilization, and/or mowing activities and heavy equipment use in loose or sandy soils, at the project site, access roads, and linear facilities, if the CRS has not previously worked on the project, the project owner shall provide the CRS with copies of the Application For Certification (AFC), data responses, confidential cultural resources reports, all supplements, the Energy Commission cultural resources Final Staff Assessment (FSA), and the cultural resources conditions of certification from the Final Decision for the project. The project owner shall also provide the CRS and the CPM with maps and drawings showing the footprints of the power plant, all linear facility routes, all access roads, and all laydown areas. Maps shall include the appropriate USGS quadrangles and a map at an appropriate scale (e.g., 1:24,000 or 1" = 200') for plotting cultural features or materials. If the CRS requests enlargements or strip maps for linear facility routes, the project owner shall provide copies to the CRS and CPM. The CPM shall review map submittals and, in consultation with the CRS, approve those that are appropriate for use in cultural resources planning activities. No ground disturbance shall occur prior to CPM approval of maps and drawings, unless such activities are specifically approved by the CPM.

If construction of the project would proceed in phases, maps and drawings not previously provided shall be provided to the CRS and CPM prior to the start of each phase. Written notice identifying the proposed schedule of each project phase shall be provided to the CRS and CPM.

Weekly, until ground disturbance is completed, the project construction manager shall provide to the CRS and CPM a schedule of project activities for the following week, including the identification of area(s) where ground disturbance will occur during that week.

The project owner shall notify the CRS and CPM of any changes to the scheduling of the construction phases.

Verification: At least 40 days prior to the start of ground disturbance, the project owner shall provide the AFC, data responses, confidential cultural resources documents, all supplements, cultural resources conditions of certification, and the FSA to the CRS, if needed, and the subject maps and drawings to the CRS and CPM. The CPM will review submittals in consultation with the CRS and approve maps and drawings suitable for cultural resources planning activities.

At least 15 days prior to the start of ground disturbance, if there are changes to any project-related footprint, the project owner shall provide revised maps and drawings for the changes to the CRS and CPM.

At least 15 days prior to the start of each phase of a phased project, the project owner shall submit the appropriate maps and drawings, if not previously provided, to the CRS and CPM.

Monthly, during ground disturbance, the project owner shall email an electronic copy of the MCR to Native Americans and other parties who have expressed or express an interest in that document.

Within 5 days of changing the scheduling of phases of a phased project, the project owner shall provide written notice of the changes to the CRS and CPM.

CUL-3 Prior to the start of construction-related ground disturbance or grading, boring, and trenching, as defined in the General Conditions for this project; and/or surface grading or subsurface soil work during pre-construction activities or site mobilization, and/or mowing activities and heavy equipment use in loose or sandy soils, at the project site and at laydown areas, roads, and other ancillary areas in California, the project owner shall submit the Cultural Resources Monitoring and Mitigation Plan (CRMMP), as prepared by, or under the direction of, the CRS, to the CPM for review and approval. The CRMMP shall follow the content and organization of the draft model CRMMP, provided by the CPM, and the authors' name(s) shall appear on the title page of the CRMMP. The CRMMP shall identify measures to minimize potential impacts to sensitive cultural resources. Implementation of the CRMMP shall be the responsibility of the CRS and the project owner. Copies of the CRMMP shall reside with the CRS, alternate CRS, each CRM, and the project owner's on-site construction manager. No ground disturbance shall occur prior to CPM approval of the CRMMP, unless such activities are specifically approved by the CPM.

The CRMMP shall include, but not be limited to, the following elements and measures:

1. The following statement included in the Introduction: "Any discussion, summary, or paraphrasing of the conditions of certification in this CRMMP is intended as general guidance and as an aid to the user in understanding the conditions and their implementation. The conditions, as

written in the Commission Decision, shall supersede any summarization, description, or interpretation of the conditions in the CRMMP. The Cultural Resources conditions of certification from the Commission Decision are contained in Appendix A."

2. A proposed general research design that includes a discussion of archaeological research questions and testable hypotheses specifically applicable to the project area, and a discussion of artifact collection, retention/disposal, and curation policies as related to the research questions formulated in the research design. The research design will specify that the preferred treatment strategy for any buried archaeological deposits is avoidance. A specific mitigation plan shall be prepared for any unavoidable impacts to any CRHR-eligible (as determined by the CPM) resources. A prescriptive treatment plan may be included in the CRMMP for limited data types.

3. Specification of the implementation sequence and the estimated time frames needed to accomplish all project-related tasks during the ground disturbance and post-ground–disturbance analysis phases of the project.

4. Identification of the person(s) expected to perform each of the tasks, their responsibilities, and the reporting relationships between project construction management and the mitigation and monitoring team.

5. A description of the manner in which Native American observers or monitors will be included, the procedures to be used to select them, and their role and responsibilities.

6. A description of all impact-avoidance measures (such as flagging or fencing) to prohibit or otherwise restrict access to sensitive resource areas that are to be avoided during ground disturbance, construction, and/or operation, and identification of areas where these measures are to be implemented. The description shall address how these measures would be implemented prior to the start of ground disturbance and how long they would be needed to protect the resources from project-related effects.

7. A statement that all encountered cultural resources 50 years old or older shall be recorded on the appropriate Department of Parks and Recreation (DPR) 523 form(s) and mapped and photographed. In addition, all archaeological materials retained as a result of the archaeological investigations (e.g., survey, testing, data recovery) shall be curated in accordance with the California State Historical Resources Commission's Guidelines for the Curation of Archaeological Collections, into a retrievable storage collection in a public repository or museum.

8. Among the categories of cultural resources subject to prescriptive treatment as a result of discovery during the construction and operation of the project, an explicit category for isolate, unexceptional prehistoric or historic artifacts, or groups of such artifacts, up to five in number in an

area of 25 square meters or less, of which the CPM shall be notified and which shall be reported completely in the MCR, but for which the CRS, having fulfilled all requisite documentation requirements, does not need the approval of the CPM to resume construction. This prescriptive treatment category shall specify that the CPM shall have the discretion to nullify this same category upon the CPM's determination that the CRS has inadvertently, or otherwise, misapplied explicit criteria set out in the category for what shall constitute unexceptional prehistoric and historic artifacts.

9. A statement that the project owner will pay all curation fees for artifacts recovered and for related documentation produced during cultural resources investigations conducted for the project. The project owner shall identify three possible curation facilities that could accept cultural resources materials resulting from project activities.

10. A statement demonstrating when and how the project owner will comply with Health and Human Safety Code 7050.5(b) and Public Resources Code 5097.98(b) and (e), including the statement that the project owner will notify the CPM and the Native American Heritage Commission (NAHC) of the discovery of human remains.

11. A statement that the CRS has access to equipment and supplies necessary for site mapping, photography, and recovery of any cultural resource materials that are encountered during ground disturbance and cannot be treated prescriptively.

12. A description of the contents, format, and review and approval process of the final Cultural Resource Report (CRR), which shall be prepared according to ARMR guidelines.

Verification: After approval of the CRS proposed by the project owner, the CPM will provide to the project owner an electronic copy of the draft model CRMMP for the CRS.

At least 30 days prior to the start of ground disturbance, the project owner shall submit the CRMMP to the CPM for review and approval.

At least 30 days prior to the start of ground disturbance, in a letter to the CPM, the project owner shall agree to pay curation fees for any materials generated or collected as a result of the archaeological investigations (survey, testing, data recovery) and as a result of the historical documentation of the Old Spanish Trail-Mormon Road Northern Corridor.

Within 90 days after completion of ground disturbance (including landscaping), if cultural materials requiring curation were generated or collected, the project owner shall provide to the CPM a copy of an agreement with, or other written commitment from, a curation facility that meets the standards stated in the California State Historical Resources Commission's Guidelines for the Curation of Archaeological Collections, to accept the

cultural materials from this project. Any agreements concerning curation will be retained and available for audit for the life of the project.

CUL-4 The project owner shall submit the final Cultural Resources Report (CRR) to the CPM for approval. The final CRR shall be written by or under the direction of the CRS and shall be provided in the ARMR format. The final CRR shall report on all field activities including dates, times and locations, results, samplings, and analyses. All survey reports, DPR 523 forms, data recovery reports, and any additional research reports not previously submitted to the California Historical Resource Information System (CHRIS) and the State Historic Preservation Officer (SHPO) shall be included as appendices to the final CRR.

If the project owner requests a suspension of ground disturbance and/or construction activities, then a draft CRR that covers all cultural resources activities associated with the project shall be prepared by the CRS and submitted to the CPM for review and approval. The draft CRR shall be retained at the project site in a secure facility until ground disturbance and/or construction resumes or the project is withdrawn. If the project is withdrawn, then a final CRR shall be submitted to the CPM for review and approval at the same time as the withdrawal request.

Verification: Within 30 days after requesting a suspension of construction activities, the project owner shall submit a draft CRR to the CPM for review and approval.

Within 90 days after completion of ground disturbance (including landscaping), the project owner shall submit the final CRR to the CPM for review and approval. If any reports have previously been sent to the CHRIS, then receipt letters from the CHRIS or other verification of receipt shall be included in an appendix.

Within 10 days after CPM approval of the CRR, the project owner shall provide documentation to the CPM confirming that copies of the final CRR have been provided to the SHPO, the CHRIS, the curating institution, if archaeological materials were collected, and to the tribal chairpersons of any Native American groups requesting copies of project-related reports.

CUL-5 Prior to, and for the duration of, construction-related ground disturbance, or grading, boring, and trenching, as defined in the General Conditions for this project; and/or surface grading or subsurface soil work during pre-construction activities or site mobilization, and/or mowing activities and heavy equipment use in loose or sandy soils, the project owner shall provide Worker Environmental Awareness Program (WEAP) training to all new workers within their first week of employment at the project site and at laydown areas, roads, and other ancillary areas in California. The cultural resources part of this training shall be prepared by the CRS and may be presented in the form of a video. The CRS is encouraged to include a Native American as a presenter in the training to contribute the Native American perspective on archaeological and ethnographic resources. During the training and during construction, the CRS shall be available (by telephone or in person) to answer questions posed

by employees. The training may be discontinued when ground disturbance is completed or suspended, but must be resumed when ground disturbance, as described in detail in **CUL-1**, resumes.

The training shall include:

1. A discussion of applicable laws and penalties under law;

2. Samples or visuals of artifacts that might be found in the project vicinity;

3. A discussion of what such artifacts may look like when partially buried, or wholly buried and then freshly exposed;

4. A discussion of what prehistoric and historical archaeological deposits look like at the surface and when exposed during construction, and the range of variation in the appearance of such deposits;

5. Instruction that the CRS, alternate CRS, and CRMs have the authority to halt ground disturbance in the area of a discovery to an extent sufficient to ensure that the resource is protected from further impacts, as determined by the CRS;

6. Instruction that employees, if the CRS, alternate CRS, or CRMs are not present, are to halt work on their own in the vicinity of a potential cultural resources discovery, and shall contact their supervisor and the CRS or CRM, and that redirection of work would be determined by the construction supervisor and the CRS;

7. An informational brochure that identifies reporting procedures in the event of a discovery;

8. An acknowledgement form signed by each worker indicating that they have received the training; and

9. A sticker that shall be placed on hard hats indicating that environmental training has been completed. No ground disturbance shall occur prior to implementation of the WEAP program, unless such activities are specifically approved by the CPM.

No ground disturbance shall occur prior to implementation of the WEAP program, unless such activities are specifically approved by the CPM.

Verification: At least 30 days prior to the beginning of ground disturbance, the CRS shall provide the cultural resources WEAP training program draft text, including Native American participation, graphics, and the informational brochure to the CPM for review and approval.

At least 15 days prior to the beginning of ground disturbance, the CPM will provide to the project owner a WEAP Training Acknowledgement form for each WEAP-trained worker to sign.

Monthly, until ground disturbance is completed, the project owner shall provide in the Monthly Compliance Report (MCR) the WEAP Training Acknowledgement forms of workers who have completed the training in the prior month and a running total of all persons who have completed training to date.

CUL-6 Prior to the start of construction-related ground disturbance or grading, boring, and trenching, as defined in the General Conditions for this project; and/or surface grading or subsurface soil work during pre-construction activities or site mobilization, and/or mowing activities and heavy equipment use in loose or sandy soils, at the project site and at laydown areas, roads, and other ancillary areas in California, the project owner shall notify the CPM of the date on which ground disturbance will ensue. The project owner shall ensure that the CRS, alternate CRS, or CRMs monitor, full time, all ground disturbance at the project site, along the linear facilities routes in California, and at laydown areas, roads, and other ancillary areas wherever such ground disturbance occurs on and in Holocene-age alluvial landforms Qa1 and Qa2 (see CH2 2012a, Figure DR101-1), which compose much of the eastern portion of the project site. The purpose of monitoring the physical disturbance of these landforms is to minimize any impacts to previously unknown archaeological resources that are found during the course of project construction and operation, and to ensure that known cultural resources are not impacted in an unanticipated manner.

Full-time archaeological monitoring for this project shall be the archaeological monitoring of ground-disturbing activities in the areas specified in the previous paragraph, for as long as the activities are ongoing. Where excavation equipment is actively removing dirt and hauling the excavated material farther than fifty feet from the location of active excavation, full-time archaeological monitoring shall require at least two monitors per excavation area. In this circumstance, one monitor shall observe the location of active excavation and a second monitor shall inspect the excavated spoils. The inspection of excavated spoils shall include periodic and systematic screening of five-gallon samples of such spoils through one-quarter-inch hardware cloth. For excavation areas where the excavated material is dumped no farther than fifty feet from the location of active excavation, one monitor shall both observe the location of active excavation and inspect the dumped material.

A Native American monitor (NAM) shall be obtained to monitor ground disturbance full time in project areas where the CRS, alternate CRS, or CRMS are monitoring full time. Contact lists of interested Native Americans shall be obtained from the Native American Heritage Commission (NAHC), and the project owner shall, to the extent feasible, adhere to the NAHC's *Guidelines for Monitors/Consultants Native American Cultural, Religious, Burial Sites* (http://www.nahc.ca.gov/guidelines4mon.html). Preference in selecting a monitor shall be given to the Pahrump Paiute Tribe, a Native American community with traditional ties to the project area. Should no member or too few members of that community be able to serve as monitors for whatever reason, or should the CPM assess that no member or too few

members of that community are qualified under the above guidelines to serve as monitors, then the project owner shall seek and, to the extent feasible, accommodate the preferences of the Pahrump Paiute Tribe as to the Native American community affiliation of any other Native American monitors that are to monitor the construction of the project. If efforts to obtain the services of a qualified Native American monitor are ultimately unsuccessful, the project owner shall immediately inform the CPM. The CPM will either identify potential monitors or will allow ground disturbance to proceed without a Native American monitor.

The research design in the CRMMP shall govern the collection, treatment, retention/disposal, and curation of any archaeological materials encountered.

On forms provided by the CPM, CRMs shall keep a daily log of any monitoring and other cultural resources activities and any instances of non-compliance with the conditions and/or applicable LORS. Copies of the daily monitoring logs shall be provided by the CRS to the CPM, if requested by the CPM. From these logs, the CRS shall compile a monthly monitoring summary report to be included in the MCR. If there are no monitoring activities, the summary report shall specify why monitoring has been suspended.

The CRS or alternate CRS shall report daily to the CPM on the status of the project's cultural resources-related activities, unless reducing or ending daily reporting is requested by the CRS and approved by the CPM.

In the event that the CRS believes that the current level of monitoring is not appropriate in certain locations, a letter or e-mail detailing the justification for changing the level of monitoring shall be provided to the CPM for review and approval prior to any change in the level of monitoring.

The CRS, at his or her discretion, or at the request of the CPM, may informally discuss cultural resources monitoring and mitigation activities with Energy Commission technical staff.

Cultural resources monitoring activities are the responsibility of the CRS. Any interference with monitoring activities, removal of a monitor from duties assigned by the CRS, or direction to a monitor to relocate monitoring activities by anyone other than the CRS shall be considered non-compliance with these conditions.

Upon becoming aware of any incidents of non-compliance with the conditions and/or applicable LORS, the CRS and/or the project owner shall notify the CPM by telephone or e-mail within 24 hours. The CRS shall also recommend corrective action to resolve the problem or achieve compliance with the conditions. When the issue is resolved, the CRS shall write a report describing the issue, the resolution of the issue, and the effectiveness of the resolution measures. This report shall be provided in the next MCR for the review of the CPM.

Verification: At least 30 days prior to the start of ground disturbance, the CPM will notify all Native Americans with whom the Energy Commission communicated during the project review of the date on which the project's ground disturbance will begin. At least 30 days prior to the start of ground disturbance, the CPM will provide to the CRS an electronic copy of a form to be used as a daily monitoring log.

Monthly, while monitoring is on-going, the project owner shall include in each MCR a copy of the monthly summary report of cultural resources-related monitoring prepared by the CRS and shall attach any new DPR 523A forms completed for finds treated prescriptively, as specified in the CRMMP.

At least 24 hours prior to implementing a proposed change in monitoring level, the project owner shall submit to the CPM, for review and approval, a letter or e-mail (or some other form of communication acceptable to the CPM) detailing the CRS's justification for changing the monitoring level.

Daily, as long as no cultural resources are found, the CRS shall provide a statement that "no cultural resources over 50 years of age were discovered" to the CPM as an e-mail or in some other form of communication acceptable to the CPM.

At least 24 hours prior to reducing or ending daily reporting, the project owner shall submit to the CPM, for review and approval, a letter or e-mail (or some other form of communication acceptable to the CPM) detailing the CRS's justification for reducing or ending daily reporting.

CUL-7 The project owner shall grant authority to halt ground disturbance to the CRS, alternate CRS, and the CRMs in the event of a cultural resources discovery. Redirection of ground disturbance shall be accomplished under the direction of the construction supervisor in accordance with the opinion of the CRS.

In the event that a cultural resource over 50 years of age is found (or if younger, determined exceptionally significant by the CPM), or impacts to such a resource can be anticipated, ground disturbance shall be halted or redirected in the immediate vicinity of the discovery sufficient to ensure that the resource is protected from further impacts. If the discovery includes human remains, the project owner shall comply with the requirements of Health and Human Safety Code § 7050.5(b) and shall additionally notify the CPM and the NAHC of the discovery of human remains. No action with respect to the disposition of human remains of Native American origin shall be initiated without direction from the CPM. Monitoring, including Native American monitoring, and daily reporting, as provided in other conditions, shall continue during the project's ground-disturbing activities elsewhere, while the halting or redirection of ground disturbance in the vicinity of the discovery shall remain in effect until the CRS has visited the discovery, and all of the following have occurred:

1. The CRS has notified the project owner, and the CPM has been notified within 24 hours of the discovery, or by Monday morning if the cultural resources discovery occurs between 8:00 AM on Friday and 8:00 AM on

Sunday morning. Notification shall include a description of the discovery (or changes in character or attributes), the action taken (i.e., work stoppage or redirection), reasoned recommendations of CRHR eligibility, and recommendations for appropriate regulatory treatment, whether or not, in any given case, a determination of CRHR eligibility has been made.

2. If the discovery would be of interest to Native Americans, the CRS has notified all Native American groups that have requested to be notified in the event of such a discovery within 24 hours of the discovery.

3. The CRS has completed field notes, measurements, and photography for a DPR 523 "Primary" form. Unless the find can be treated prescriptively, as specified in the CRMMP, the "Description" entry of the DPR 523 "Primary" form shall include a recommendation on the CRHR eligibility of the discovery. The project owner shall submit completed forms to the CPM.

4. The CRS, the project owner, and the CPM have conferred, and the CPM has concurred with any recommendations of eligibility made in relation to the discovery and approved the CRS's proposed treatment, if any, including the curation of the artifacts, or other appropriate treatment; and any necessary treatment has been completed. Ground disturbance may resume only with the approval of the CPM.

In the event that heavy rain should coincide with an incomplete or compromised project drainage system during construction, and flooding occurs that impacts cultural resources beyond the project site boundaries, the project owner shall treat such impacted cultural resources as discoveries under this condition of certification, and all provisions of this condition shall apply, with the exception of the requirement to halt construction in the vicinity of the discoveries.

Verification: At least 30 days prior to the start of ground disturbance, the project owner shall provide the CPM and CRS with a letter confirming that the CRS, alternate CRS, and CRMs have the authority to halt ground disturbance in the vicinity of a cultural resources discovery, and that the project owner shall ensure that the CRS notifies the CPM within 24 hours of a discovery, or by Monday morning if the cultural resources discovery occurs between 8:00 AM on Friday and 8:00 AM on Sunday morning.

Unless the discovery can be treated prescriptively, as specified in the CRMMP, completed DPR 523 forms for resources newly discovered during ground disturbance shall be submitted to the CPM for review and approval no later than 24 hours following the notification of the CPM, or 48 hours following the completion of data recordation/recovery, whichever the CRS decides is more appropriate for the subject cultural resource.

Within 48 hours of the discovery of a resource of interest to Native Americans, the project owner shall ensure that the CRS notifies all Native American groups that

expressed a desire to be notified in the event of such a discovery, and the CRS must inform the CPM when the notifications are complete.

No later than 30 days following the discovery of any Native American cultural materials, the project owner shall submit to the CPM copies of the information transmittal letters sent to the chairpersons of the Native American tribes or groups who requested the information. Additionally, the project owner shall submit to the CPM copies of letters of transmittal for all subsequent responses to Native American requests for notification, consultation, and reports and records.

Within 15 days of receiving them, the project owner shall submit to the CPM copies of any comments or information provided by Native Americans in response to the project owner's transmittals of information.

CUL-8 If fill soils necessary to the construction or operation of the California components of the project must be acquired from any non-commercial borrow site or disposed of at any non-commercial disposal site, in California or elsewhere, the project owner shall have the CRS survey any such borrow or disposal site for cultural resources, including ethnographic and built-environment resources, and record on DPR 523 series forms any resources found, unless the project owner is able to submit reports of the results of surveys completed less than five years prior to the anticipated use of any subject borrow or disposal site, that document 100 percent coverage of the subject site. The adequacy of the documentation of any prior survey is subject to the approval of the CPM.

Upon the completion of any new requisite survey, the project owner shall convey the results and the CRS's recommendations for further action to the CPM. The CPM, in consultation with the project owner, shall determine what, if any, further action may be required. If the CPM determines that significant archaeological resources that the project cannot avoid are present at the borrow or disposal site, other conditions, which may include the elimination of a proposed non-commercial borrow or disposal site from consideration, shall apply. The project owner shall have the CRS report on the methods and results of these surveys in the final CRR.

Verification: As soon as the project owner knows that a non-commercial borrow site or disposal site will be used, the owner shall notify the CRS and CPM, and provide documentation, for the approval of the CPM, of any relevant previous archaeological surveys completed less than five years prior to the anticipated use of any subject borrow or disposal site.

In the absence of documentation for any cultural resource surveys completed less than five years prior to the anticipated use of any subject borrow or disposal site, the CRS shall survey any such borrow or disposal site for archaeological resources. Said survey shall occur at least 30 days prior to the disturbance of the ground on any such site. The project owner shall report the results of any cultural resources survey to the CPM, with recommendations for further action. The CPM, in consultation with the project owner, shall determine what subsequent action is warranted.

CUL-9 Prior to the start of construction-related ground disturbance or grading, boring, and trenching, as defined in the General Conditions for this project; and/or surface grading or subsurface soil work during pre-construction activities or site mobilization, and/or mowing activities and heavy equipment use in loose or sandy soils, at the project site and at laydown areas, roads, and other ancillary areas in California, the project owner shall fund a study of the Old Spanish Trail-Mormon Road Northern Corridor (OST-MRNC) by the Old Spanish Trail Association (OSTA).The project owner shall submit the OSTA study research design to the CPM for review and approval prior to the start of the investigation. The study shall not begin prior to CPM approval. No ground disturbance shall occur prior to completion of the OSTA study, unless such activities are specifically approved by the CPM. The OSTA study shall, at a minimum:

a. Ground-truth all potential OST-MRNC tracks and traces within the identified OST-MRNC in the Pahrump Valley; and

b. Produce a report identifying the confirmed OST-MRNC tracks and traces in the Pahrump Valley and justifying the confirmation or rejection of each, with a map showing the confirmed tracks and traces; and

c. Complete a DPR-523l form for each confirmed track and trace located on the HHSEGS project site and submit these forms with the report required in Part b.

At the same time as or after the completion of the OSTA study, the project owner shall fund a follow-up study of the OST-MRNC, to be conducted by a qualified historian. The project owner shall submit the follow-up study research design to the CPM for review and approval prior to the start of the investigation. The study shall not begin prior to CPM approval. This OST-MRNC documentation and evaluation study shall, at a minimum:

a. Produce a local historical context of the OST-MRNC in the Pahrump Valley, incorporating the information from the OSTA report and the Old Spanish Trail Documentation Project, and evaluating the role of the Mound, Browns, Weeping Rock, Hidden Hills Ranch, and Stump springs as key natural water sources for those traveling along this portion of the OST-MRNC;

b. Evaluate the identified OST-MRNC tracks and traces for NRHP and CRHR eligibility in the local context of the Pahrump Valley;

c. Evaluate the identified OST-MRNC for inclusion in the National Register of Historic Places (NRHP)-listed Old Spanish Trail-Mormon Road Historic District (Nevada), and the Old Spanish Trail National Historic Trail.;

d. Produce a report of investigations, including full documentation of the OST-MRNC and a recommendation, with full justification, on nominating the OST-MRNC for inclusion in the CRHR and/or the NRHP-listed Old Spanish Trail-Mormon Road Historic District (Nevada); documentation

shall adhere to the Secretary of the Interior's Guidelines for Architectural and Engineering Documentation and the National Park Service guidelines for Historic American Landscape Surveys.

The project owner shall ensure that all reports and resource documentation are submitted to the CPM and to the appropriate California Historical Resources Information System (CHRIS) Information Center. The project owner shall also provide all OST-MRNC reports and resource documentation to the interpretive facilities identified in **CUL-10** for use in the planning and completion of OST-MRNC interpretation and exhibits. The project owner shall ensure that all reports, resource documentation, and nominations are submitted to the appropriate federal and/or state agencies for nomination to the NRHR, CRHR, and the Old Spanish Trail National Historic Trail.

Verification: At least 90 days prior to the start of ground disturbance, the project owner shall submit an agreement or contract with the OSTA for required research on the tracks and traces of the OST-MRNC to the CPM for review and approval.
At least 60 days prior to the start of the OSTA study, the project owner shall submit the research design for the study and a recommended due date for the submission of the draft report and DPR 523L forms to the CPM for review and approval.

At least 30 days prior to the start of ground disturbance, the project owner shall submit the final OSTA study report and DPR 523L forms to the CPM. Construction-related ground disturbance may start after the CPM approves the final report and forms.

No later than 45 days after CPM approval of the OSTA study report, the project owner shall submit an agreement or contract with a qualified historian for the required documentation of the OST-MRNC to the CPM for review and approval.

At least 60 days prior to the start of the OST-MRNC documentation study, the project owner shall submit the research design for the study and a recommended due date for the submission of the draft report to the CPM for review and approval.

No later than 120 days after CPM approval of the OST-MRNC documentation study research design and due date, the project owner shall submit the draft study report to the CPM for review and approval.

Within 30 days of receiving CPM approval of the draft OST-MRNC documentation study report, the project owner shall submit the final OST-MRNC documentation study report to the CPM.

Within 10 working days of receipt, the project owner shall provide a copy of all study-related correspondence with OSTA and other agencies and organizations to the CPM.

Within 90 days after CPM approval of all OST-MRNC study reports and documentation, the project owner shall submit the final OSTA and OST-MRNC documentation study reports and DPR 523L forms to the California Historical Resources Information System (CHRIS) and to the Interpretive Center (**CUL-10**) Stakeholders Group for use in the planning and completion of OST-MRNC interpretation and exhibits.

Within 30 days after submitting all OST-MRNC documentation to the CHRIS and the Interpretive Center Stakeholders Group, the project owner shall provide documentation to the CPM confirming receipt of the materials.

CUL-10 The project owner shall negotiate, design, plan, cause to be built, staff, and maintain the infrastructure, and architectural and interior improvements necessary to implement interpretive and preservation objectives that will reduce the project's significant and feasibly unmitigable effects to the Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape, the Pahrump Paiute Home Landscape, the Ma-hav Landscape, and the Old Spanish Trail-Mormon Road Northern Corridor in Pahrump Valley. The interpretive and preservation objectives that the project owner shall implement include, at a minimum:

1. The construction and maintenance of an interpretive kiosk within one hundred yards of the facility site that presents broad overviews of the Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape, the Pahrump Paiute Home Landscape, the Ma-hav Landscape, and the Old Spanish Trail-Mormon Road Northern Corridor along with information on the nearby interpretive facilities where the public shall be able to access more in-depth interpretive programs for each resource. The presentation of the overviews and the delivery of information on nearby interpretive facilities could occur in conjunction with the implementation of **VIS-6**, as long as the implementation of that condition occurred within the specified distance from the facility site.

2. The delivery of passive museum displays and multi-media presentations, *and* hands-on, interactive exhibits, at extant interpretive facilities in Pahrump or adjacent valleys, the primary purposes of which shall be to facilitate the interpretation of the cultural landscapes and corridor, and visual resources. The specific interpretive modes shall include, at a minimum, the development and delivery of accessible[31], separate displays, presentations, *and* exhibits, of museum quality[32], for the following topics:

   - the genesis, paleoecology, and archaeology of the Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape,
   - the seasonal subsistence cycle of the Pahrump Paiute Tribe, and
   - the Old Spanish Trail-Mormon Road Northern Corridor.

[31] "accessible" shall be herein defined as comporting with the *Smithsonian Guidelines for Accessible Exhibition Design* (http://accessible.si.edu/pdf/Smithsonian%20Guidelines%20for%20accessible%20design.pdf)

[32] "museum quality" shall be herein defined as comporting with the *Standards for Museum Exhibitions and Indicators of Excellence* as developed by the Standing Professional Committees Council of the American Association of Museums (http://name-aam.org/about/past-winners/standards-for-museum-exhibitions)

The interpretation of each of the above topic and subtopic areas shall facilitate separate consideration of the chronologic phases and sociocultural themes relevant to each such area. The planning, development, maintenance, and periodic renewal of these modes shall be done in consultation with stakeholders that actively participated in the consultation process conducted in conjunction with the review of the project owner's application for certification for this project.

3. The delivery of ethnographic reconstructions,[33] at an extant interpretive facility in Pahrump or adjacent valleys, the purpose of which shall be to facilitate the interpretation of the Native American use of the local landscape in the prehistoric and ethnographic periods. The specific interpretive modes shall include, at a minimum:

   - Native American installation and maintenance of an aboriginal horticultural garden reliant on natural spring water to the extent feasible, for public interpretation, and
   - the conjunctive Native American installation and maintenance, of an exploratory reconstructed village consisting of a few replica dwellings that allow public access to walk in, about, and through the village and garden area. Providing direct visitor access to a real garden, featuring native garden varietals, such as pumpkins, beans, and corn, set near the interpretive materials provided per item 2, above, will greatly enhance the visitor education experience beyond what passive interpretive materials would solely provide.

The planning, development, maintenance, and periodic renewal of these modes shall be done in consultation with representatives of the Native American communities that actively participated in the consultation process conducted in conjunction with the review of the project owner's application for certification for this project.

The project owner shall conduct each phase of the implementation of this condition in consultation with stakeholders who formally respond to the project owner's formal invitation to participate in such consultation, and shall also be able to provide evidence, to the satisfaction of the CPM, of all resultant consultation. At a minimum, the stakeholders should include, in addition to representatives of the hosting interpretive facilities, the Pahrump Paiute Tribe, the Old Spanish Trail Association, the Armagosa Conservancy, a representative of each municipality or county government in whose jurisdiction a hosting interpretive facility falls.

[33] "museum quality" shall be herein defined as comporting with the *Standards for Museum Exhibitions and Indicators of Excellence* as developed by the Standing Professional Committees Council of the American Association of Museums (http://name-aam.org/about/past-winners/standards-for-museum-exhibitions)

The CPM, in consultation with the California and Nevada Bureau of Land Management, will provide active and discretionary oversight to ensure that the negotiated venues for the delivery of the mitigation objectives, the design of the delivery modes, the environmental planning for those modes, and actual mode delivery, maintenance, and efforts of periodic renewal are consistent with the intent of this condition.

Verification: No later than 12 months after the CPM's issuance of the notice to proceed for the project, the project owner shall conclude negotiations with the facilities that will host the delivery of the mitigation objectives for **CUL-10**. The project owner shall submit, for CPM for review and approval, a report of these negotiations and their respective outcomes, and shall further include, as appendices, formal correspondence from each host facility that specifies precisely what mitigation objectives that the facility has agreed to host, the period of time for which the facility has agreed to host them, and any conditions that the host facility has placed on their agreement with the project owner.

No later than 6 months after the CPM's issuance of the notice to proceed for the project, the project owner shall submit, for CPM for review and approval, a draft consultation protocol that sets out the precise manner in which the project owner intends to interact with the stakeholders whose input the project owner shall seek as the project owner negotiates, designs, plans, constructs, and maintains the delivery modes for the mitigation objectives of this condition. The minimum stakeholder group shall include, to the extent feasible, representatives of the hosting interpretive facilities, the Pahrump Paiute Tribe, the Old Spanish Trail Association, the Armagosa Conservancy, a representative of each municipality or county government in whose jurisdiction a hosting interpretive facility falls. The draft protocol shall include, as appendices, proofs of contact for each of the above members of the minimum stakeholders group and any additional potential stakeholders with whom the project owner has made contact, and an initial stakeholder list.

No later than 18 months after the CPM's issuance of the notice to proceed for the project, the project owner shall submit, for CPM for review and approval, a draft, host facility-approved, initial design proposal for each delivery venue for each mitigation objective in this condition.

No later than 24 months after the CPM's issuance of the notice to proceed for the project, the project owner shall submit, for CPM for review and approval, the host facility-approved, final design for each delivery venue for each mitigation objective in this condition.

No later than 30 months after the CPM's issuance of the notice to proceed for the project, the project owner shall initiate construction or installation of each delivery venue for each mitigation objective in the approved final designs.

No later than 36 months after the CPM's issuance of the notice to proceed for the project, the project owner shall ensure, and provide the CPM evidence, that each delivery venue for each mitigation objective in the approved final designs is in full operation.

For the operational life of the project, through project decommissioning, the project owner shall provide evidence in the annual compliance report for the project that each delivery venue for each mitigation objective in the approved final designs continues to be maintained.

CUL-11 The project owner shall design and implement a multidisciplinary program of primary research on the geology, geomorphology, hydrology, ecology, and archaeology of the Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape, which is delineated and described in the cultural resources section of the Final Staff Assessment for the HHSEGS project. The scale of the research shall be sufficient to provide reliable interpretative synopses, from both processual and historical perspectives, of each of these disciplines. The measure of research sufficiency, should any dispute arise, shall be the expert opinion of research institution faculty members who actively pursue research and publish in peer-reviewed journals in each discipline. The CPM shall select the faculty members whose opinion would be sought to resolve any dispute.

The project owner shall develop, under the direct and active supervision of a qualified professional geoarchaeologist, a draft formal research design that includes a proposed budget for the research and submit the design plan simultaneously to the CPM for review and approval, and to Native American tribes who have expressed an interest in commenting or participating in the research program for review and comment.

Upon the CPM's approval of the research design, the project owner shall implement the program as designed. The project owner shall ensure that the research team shall provide regular quarterly progress reports to the CPM for review and comment.

Following completion of the research program, the project owner shall submit the research program's draft final report simultaneously to the CPM for review and approval, and to the Native American tribes who have been actively involved in the research process for review and comment.

The project owner shall also ensure that the research program's approved final report, completed DPR 523 series forms, and other associated documentation are submitted to the appropriate California Historical Resources Information System (CHRIS) Information Center(s) and other repositories, both in California and Nevada.

The project owner shall provide a copy of all final documents and study-related correspondence with other agencies and organizations to the CPM in a timely manner.

The project owner shall ensure the curation of all research documentation related to the execution of this research program and the material culture recovered as a result in a curation facility that meets federal curation

standards. The project owner shall also be responsible for any curation fees associated with the program.

The project owner shall develop and execute professional and public outreach initiatives that would clearly benefit the public.

Verification: No later than 90 days from the start of construction, the project owner shall submit a draft formal research design to the CPM for review and approval.

No later than 90 days subsequent to the CPM's approval of the formal research design, the project owner shall, unless otherwise stipulated by the CPM, initiate the implementation of the research design and complete the fieldwork portion of it without interruption.

No later than 90 days subsequent to the CPM's approval of the formal research design and every 90 days thereafter until the submission to the CPM of the draft final report of the research program, the project owner shall submit a brief report on the progress of the different phases of research and on the preliminary research results to that date.

No later than 270 days subsequent to the completion of the fieldwork portion of the formal research design, the project owner shall, unless otherwise stipulated by the CPM, provide the CPM with written proof of the submission of the approved final report and complete DPR 523 series forms to the appropriate CHRIS Information Center(s) and to other appropriate regional repositories in California and Nevada. The CPM shall make the final determination which other repositories, in addition to CHRIS Information Centers, are appropriate.

No later than 270 days subsequent to the completion of the fieldwork portion of the formal research design, the project owner shall, unless otherwise stipulated by the CPM, provide draft proposals for the professional and public outreach initiatives that are to be one result of this research to the CPM for review and approval.

No later than 390 days subsequent to the completion of the fieldwork portion of the formal research design, the project owner shall, unless otherwise stipulated by the CPM, provide the CPM with written proof of the completion of the CPM-approved professional and public outreach initiatives.

CULTURAL RESOURCES ACRONYM GLOSSARY

HIDDEN HILLS SOLAR ELECTRIC GENERATING PROJECT

A.D.	After the Birth of Christ
AFC	Application for Certification
ARMR	Archaeological Resource Management Report
B.C.	Before the Birth of Christ
CEQA	California Environmental Quality Act
CHRIS	California Historical Resources Information System
Conditions	Conditions of Certification
CRHR	California Register of Historical Resources
CRM	Cultural Resources Monitor
CRMMP	Cultural Resources Monitoring and Mitigation Plan
CRR	Cultural Resource Report
CRS	Cultural Resources Specialist
DPR 523	Department of Parks and Recreation cultural resource inventory form
EIC	Eastern Information Center, University of California, Riverside
FSA	Final Staff Assessment
HHSEGS	Hidden Hills Solar Electric Generating System
KOP	Key Observation Point (see also VISUAL RESOURCES section of FSA
LORS	laws, ordinances, regulations, and standards
MCR	Monthly Compliance Report
MLD	Most Likely Descendent
NAHC	Native American Heritage Commission
NAM	Native American Monitor
NRHP	National Register of Historic Places

OHP	Office of Historic Preservation
OSTA	Old Spanish Trail Association
OST-MR	Old Spanish Trail-Mormon Road
OST-MRNC	Old Spanish Trail-Mormon Road Northern Corridor
PAA	Project Area of Analysis. The project site (see below) plus what additional areas staff defines for each project that are necessary for the analysis of the cultural resources that the project may impact.
Project Site	The bounded area(s) identified by the applicant as the area(s) within which they propose to build the project.
PSA	Preliminary Staff Assessment
SHPO	State Historic Preservation Officer
Staff	Energy Commission cultural resources technical staff
WEAP	Worker Environmental Awareness Program

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CULTURAL RESOURCES

List of Comment Letters

		Cultural Resources Comments?
1	Inyo County	
2	Bureau of Land Management	
3	National Park Service	**X**
4	The Nature Conservancy	
5	Amargosa Conservancy	**X**
6	Basin & Range Watch	**X**
7	Pahrump Paiute Tribe	**X**
8	Richard Arnold, Pahrump Paiute Tribe	**X**
9	Big Pine Tribe of Owens Valley	**X**
10	Intervener Cindy MacDonald	**X**
11	Intervener Center for Biological Diversity	
12	Intervener, Old Spanish Trail Association	**X**
13	Applicant, BrightSource Energy, Inc.	**X**

Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
3	**July 23, 2012**	**National Park Service**	
3.1		Documentation and evaluation of the Old Spanish Trail (OST).	CEC staff agrees that the documentation and evaluation provided by the applicant is inadequate. That is why Staff has recommended additional work per **CUL-9**.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
5	**July 21, 2012**	**The Amargosa Conservancy**	
5.8		Viewshed of the OST	Impacts to the setting of the OST are evaluated in the **Visual Resources** and **Cultural Resouces** sections of the **FSA**.

Comment #	DATE	COMMENT TOPIC	RESPONSE
6	**July 23, 2012**	**Basin and Range Watch**	
6.19		Adequacy of Mitigation (specifically CUL-9)	The PSA did not state -- and the FSA does not state -- that the mitigation measure would reduce the impact to the OST to less than significant. The CEQA Guidelines states "An EIR shall describe feasible measures which could minimize significant adverse impacts..."(CCR Title 14, Chapter 3, Article 9, 15126.4(a)(1)).
6.20		Mitigation, Interpretive Center does not mitigate for impacts to OST	See response to comment 6.19 above. See **CUL-10** in the FSA for a discussion of the mitigation.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
7	**July 23, 2012**	**Pahrump Piahute Tribe**	
7.2		The proposed project will impact visual, cultural, wildlife and water resources	Comment noted, and addressed throughout respective section of the **FSA**
7.3		Insufficent mitigation measures	The mitigation measures in the SSA were preliminary. The **FSA** provides the final verion of these mitigation measures.
7.4		Request for legal representation to handle mitigations for life of project	Comment noted.
7.5		Request for compensatory lands equal to the project size be “placed in the Pahrump Paiute Tribes hands.”	Please see **CUL-1** through **CUL-11** for a complete description of the mitigation measures.

7.6		Objects to **VIS-6** mitigations that only require wayside panels in Inyo County and that are verified as complete by Inyo County. Also requests that Interpretive center "building" include an archaeological curation facility meeting federal standards and is operated by a person meeting federal qualifications. Also requests that it should not be a foregone conclusion that Interpretive Center be placed in Inyo County.	Please see **CUL-1** through **CUL-11** for a complete description of the mitigation measures.
7.8		Alternatives analysis -- scope regarding Cultural Resources	Please see the **Alternatives** Section of the **FSA.**
7.9		Request to be involved in Management plans or mitigations regarding plants, wildlife and water.	Please see **CUL-1** through **CUL-11** for a complete description of the mitigation measures.
7.10		Pahrump Paiute Tribe requests to be consulted with regard to selection of Native American monitors.	**CUL-6** revised to give Pahrump Paiute Tribe first preference for selection as Native American monitors, and, in event members of that community are unable to serve as monitors, applicant must try to accommodate the Pahrump Paiute Tribe's preference as to the Native American community affiliation of any other monitors.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
8	**July 23, 2012**	**Richard Arnold, Pahrump Piahute Tribe**	
8.1		Environmental Justice - Native Americans	Please see the **Executive Summary** and **Socioeconomics** sections of the FSA for more information regarding EJ.
8.2		Ethnographic Study information - Confidentiality	A redacted version of the ethnographic study was filed on August 17, 2012, and is consistent with the Tribe's specific requests, and can be viewed here: http://www.energy.ca.gov/sitingcases/hiddenhills/documents/2012-08-16_Hidden_Hills_Ethnography_Report_TN-66701.pdf

8.3		The Pahrump Paiute Holy lands are unfairly impacted – environmental justice	Please see the **Executive Summary** and **Socioeconomics** sections of the FSA for more information regarding EJ.
8.4		SSA does not adequately address Pahrump Paiute cultural practices – suggest releasing a redacted version of the ethnographic study	A redacted version of the ethnographic study was filed on August 17, 2012, and is consistent with the Tribe's specific requests, and can be viewed here: http://www.energy.ca.gov/sitingcases/hiddenhills/documents/2012-08-16_Hidden_Hills_Ethnography_Report_TN-66701.pdf
8.5		Project will alter the cultural landscape in ways that render the potential cultural usage of the land to unusable and this will impact cultural transmission opportunities.	Please see **CUL-1** through **CUL-11** for a complete description of the mitigation measures.
8.6		Project will reduce water levels that will in turn impact water dependent and culturally important wildlife and plant life.	Please see **CUL-1** through **CUL-11** for a complete description of the mitigation measures.
8.7		Request to include cultural easements for areas that are intended to protect threatened and endangered plants and animals	Please see **CUL-1** through **CUL-11** for a complete description of the mitigation measures.
8.9		Pahrump Paiute Tribe does not want to participate in mitigations with the St. Therese Mission.	Please see **CUL-1** through **CUL-11** for a complete description of the mitigation measures.

Comment #	DATE	COMMENT TOPIC	RESPONSE
9	**July 21, 2012**	**Big Pine Tribe of Owens Valley**	
9.1		Project impacts to the Old Spanish Trail (OST)	Staff has evaluated the impacts of the proposed project to the OST and concluded that the impacts would be significant and unavoidable.
9.2		Water Resources	Please see the **Water Supply** section of the **FSA**.
9.3		Biological resources	Please see the **Biological Resources** Section of the **FSA**.
9.4		Alternatives	Please see the **Alternatives** Section of the FSA for a discussion of the Alternatives with regards to Cultural Resource impacts.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
10	**July 21, 2012**	**Intervenor Cindy MacDonald -- p. 5-1**	
10.1a		NAGPRA - LORS Relevancy	Only those LORS that are applicable to the applicant/owner are listed in SSA and FSA. NAGPRA is only applicable to federal land managers and institutions holding NAGPRA defined items that are recipients of federal funding – Not applicable
10.1b/c		Executive Order 13007 / 12898 LORS relevancy	Only those LORS that are applicable to the applicant/owner are listed in SSA and FSA. EO 13007 is only applicable to federal land managers that consider actions that may prevent Native American access to sacred sites on federal lands – Not applicable

10.1d		Executive Order 13175 LORS relevancy	Only those LORS that are applicable to the applicant/owner are listed in SSA and FSA. EO 13175 requires federal agencies to conduct consultation with tribes when placing unfunded mandates on tribes or in the course of developing policies that may burden federally recognized tribes – Not applicable
10.1e		PRC 5097.99 LORS relevancy	This Public Resources Code prohibits anyone from taking or possessing Native American human remains taken from a burial unless otherwise provided by law. CEC has no knowledge that the applicant has taken or possesses Native American human remains. No known Native American human remains have been identified within the project area boundaries. Should Native American human remains be discovered during project related ground disturbing activities, then **CUL-3** addresses the potential discovery by requiring the applicant to develop a Cultural Resources Monitoring and Mitigation Plan that has as a required section (9), that the applicant follow procedures provided by law at Health and Human Safety Code 7050.5. **CUL-5** requires that a Worker Environmental Awareness Program is instituted to inform project workers of applicable environmental laws including those laws pertaining to Native American human remains.
10.1f		PRC 5097.993 -994 LORS relevancy	This Public Resources Code states that various forms of deliberate damage to historical resources on public or private land is subject to fines and imprisonment unless the act is exempt per a number of exceptions. **CUL 5** requires that a Worker Environmental Awareness Program is instituted to inform project workers of applicable environmental laws including those laws pertaining to Native American human remains.

10.1g		Penal Code 622 ½ LORS relevancy	Similar to 5097.993-994 (**Response 10.1f,** above), except the penalty / fine for violators is less.
10.1h		Ca H & S Code 8010- 8011 LORS relevancy	This code addresses repatriation of Native American remains and cultural items from federal institutions in California and California State Agencies and museums. This code does not apply to the applicant.
10.2		Younts Ranch	The complex of buildings and structures that once comprised the Younts Ranch, later known as Hidden Hills Ranch, is located approximately 2 miles to the east of the project site and outside of the PAA. However, Staff did visit the area during a site visit and noted that the integrity of the buildings and structures on the Younts Ranch has been severely compromised. The majority of the buildings and structures are no longer standing, which can been seen in the photos attached to Comment Letter #10 (to view, see **Appendix RTC)** many of them have either fallen down and/or been burned down.
10.3		Vandalism of historic and cultural resources	Staff is unsure as to how the commentor is using the phrase "zone of impact." Prior to assessing a project's potential impact Staff determins the Project Area of Analysis (PAA). The PAA includes the project site and a buffer around the project site in an effort to identify both direct and indirect impacts. The PAA is established based on the characteristics of the project components as well as the types of cultural resources in the area. After the PAA is established Staff documents the current condidtions of the area, which then become the baseline. This baseline is used to evaluate the project's potential impacts.

10.4		Private property rights	Property owners rights with regards to demolition are set by the local authorites, generally the planning office. Any demolition that would occur as a result of the proposed project under CEC review would be evaluated for potential environmental impacts.
10.5		Impacts to Cathedral Canyon	The area known as Cathedral Canyon is located approximately 2 miles to the east of the project site and outside of the Project Area of Analysis (PAA) . However, Staff did visit the area during a site visit and noted that the integrity has been severely compromised. The majority of the statuary and other decorations, the bridge that once spanned the canyon, and the stairs leading down into the canyon have all been removed. Additionally the project site is not visible from in the canyon.
10.6		Suggested mitigation - preserve Cathedral Canyon.	As required by CEQA mitigation measures have been developed in an effort to reduce significant impacts to cultural resources. Please see **CUL-10** in the **FSA** for more detailed information.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
12	**July 23, 2012**	**Intervenor Old Spanish Trail Association**	
12.1		Integrity of the OST National Historic Trail	Please see full discussion, analysis and suggested mitigation measures releated to the OST in the **FSA**
12.2		OST - Applicant's eligibility determination	These comments relate to the applicant's consultant's work; therefore, CEC Staff cannot appropriately and accurately reply.
12.3		NRHP eligiblity of the OST	The commentor quotes and summarizes National Register Bulletin - Guidelines for Evaluating Rural Historic Landscapes, which are discussed in the **FSA**.

12.4		Springs associated with OST	**CUL-9** of the FSA requires a more in depth study of the OST in the Pahrum Valley including several of the springs located east of the project site. See the FSA for more details on **CUL-9**.
12.5		SHPO consultation	Consultation with SHPO is under the perview of the BLM and will be done as a part of BLM's Section 106 process related to the natural gas pipeline and Valley Electric Association's (VEA) Hidden Hills Transmission Project and its NEPA review process.
12.6		Cumulative Impacts to the OST, the adjacent springs, and the surrounding desert enviornment.	As required by CEQA, the FSA evaluates the cumulative impacts of a number of projects in the vicinity including the total impact of those projects on significant historical resources as well as the proposed project's contribution to those impacts. Please see "Cumulative Impacts" analysis in the **FSA** for more details.
12.7		Visual/setting impacts	The **Visual Resources** section of the FSA discusses the impacts to the scenic vistas. The Cultural Resources section of the FSA discusses the impacts of the proposed project on significant historical resources including visual/setting impacts to resources partially or wholly outside of the project site boundary.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
13	**July 23, 2012**	**Applicant, BrightSource Energy, Inc. -- p. 142**	
13.1		Applicant appears to imply that the appropriate scope of the cultural resources analysis would be a geographic area relatively tightly wound around the proposed facility site and only in California.	The scope of staff's cultural resources analysis is the geographic area that encompasses the physical components of the proposed project in California and the area across which those components have the potential to affect historical resources. The latter area includes parts of California and Nevada.

13.1 (1)		Applicant states that the Pahrump Metapatch Mesquite Woodland Coppice Dune Archaeological Landscape is entirely in Nevada.	There is a factual error in the applicant's assertion. As presently delineated, the landscape overlaps the boundary between California and Nevada. As stated in the analysis, the present landscape boundary is preliminary and subject to future refinement.
13.1 (2)a		Salt Song Landscape conceptual or metaphysical	The landscape is not a concept as it exists on and about the ground of Pahrump Valley. It is a “concept” (as is anything else) when rendered into a report, that requires a reader to “conceptualize.” Some aspects of the Salt Song trail understandings and related practices infer “metaphysical” entities, that is, entities not subject to ordinary sensory experience. However, the landscape in which these practices take place are not metaphysical, nor are the practitioners and the practices they perform, including songs, metaphysical.
13.1 (2)b		Salt Song Landscape is a large landscape – not fully delineated	The ethnographer would need a minimum of two years of ethnographic research to fully document the Salt Song trail. Sufficient time was not provided to conduct a full study. CEQA only requires enough information to make an informed decision. Enough information is provided in the Ethnographic study and the FSA to make an informed decision. Generally, some resources are relatively small and some resources are relatively large. CEQA does not specify that only certain sized resources require consideration. E.g. Route 66 extends from Chicago to Santa Monica and crosses 8 states. The Salt Song landscape is described in the **FSA**.

13.1 (3)		Pahrump Home Landscape is a large landscape – not fully delineated	The ethnographer would need a minimum of two years of ethnographic research to fully document the Pahrump Paiute Home Landscape. Sufficient time was not provided to conduct a full study. CEQA only requires enough information to make an informed decision. Enough information is provided in the Ethnographic study and the SSA to make an informed decision. Generally, some resources are relatively small and some resources are relatively large. CEQA does not specify that only certain sized resources require consideration. The Pahrump Paiute Home Landscape is generally delineated and described in the FSA.
13.1 (4)		Ma-hav Landscape is a large landscape – not fully delineated	The ethnographer would need a minimum of one year of ethnographic research to fully document the Ma-hav Landscape. Sufficient time was not provided to conduct a full study. CEQA only requires enough information to make an informed decision. Enough information is provided in the Ethnographic study and the SSA to make an informed decision. Generally, some resources are relatively small and some resources are relatively large. CEQA does not specify that only certain sized resources require consideration. An explanation of how the boundaries were delineated is found in the FSA.
13.1 (5)		Old Spanish Trail/Mormon Road (OST/MR) Northern Corridor	Staff is required to analyze potential project impacts to historical resources; as such Staff must first identify those historical resources. This involves determining if resources are eligible for the NRHP and/or CRHR.

13.2		The SSA does not describe the process for how the three ethnographic landscapes were identified. The process is instead sequestered in a confidential appendix. The applicant can not agree or disagree with Staff conclusions without reviewing the confidential ethnographic report.	The FSA provides information on the process for (Native American Consultation), (Ethnographic Resource Investigation – Ethnographic Methods), (Research Design), and (Interviews). Sufficient non-confidential information was carried forward from the confidential report and placed in the SSA allowing the applicant to understand staff's conclusions. However a redacted version of the confidential report has been docketed and is available to the public to facilitate understanding of the nuanced background information leading to and supporting what was found by employing the methods in the Pahrump valley and as relates to project related impacts.
13.3		Applicant states that staff has made wholly unsubstantiated assertions of historical significance for multiple cultural resources in the SSA. The applicant admonishes that determinations of historical significance under CEQA must be made with reference to "substantial evidence."	Staff made an assumption of historical significance with regard to one cultural resource, the Pahrump Metapatch Mesquite Woodland Coppice Dune Archaeological Landscape.

13.4		The applicant makes the assertion that staff attempts, in the SSA, to inappropriately apply California historic preservation law in Nevada, and, further, that the use of the California Register of Historical Resources' (CRHR) eligibility yardstick is only applicable to cultural resources in California.	Staff believes that the applicant's former assertion is faulty. In the SSA, staff does not apply historic preservation law to actions that are proposed to occur in Nevada. The entire environmental analysis, one small part of which is the cultural resources analysis, explicitly states that staff's consideration of the proposed project is limited only to those components of the project that are proposed to be built and operated in California. Staff's application of California historic preservation law is focused exclusively on the analysis of how the Calfornia project components would affect historical resources, wherever those effects may occur. The focus of the actions analyzed is soley in California. Those actions have effects further afield. The applicant's latter assertion that one cannot apply the tests for historical signficance set out in the CRHR to cultural resources outside of California also does not well withstand scrutiny. In the first place, each of the five resources that the applicant enumerates are at least partly present in California. Secondly, section 15064.5(a)(4) of the CEQA Guidelines explicitly states that nothing precludes a lead agency from determining that a resource is an historical resource as defined in section 5020.1(j) of the Public Resources Code. That section states that a historical resource "includes, but is not limited to, any object, building, structure, site, area, place, record, or manuscript which is historically or archaeologically significant." The test is not expressly limited to the exclusive consideration of cultural resources in California. Staff believes the use of the CRHR standards of historical significance is entirely appropriate to the present analysis.

13.5 (1)		Applicant states that the SSA does not explain how a landscape or corridor can be an historical resource under California law, and that National Park Service (NPS) guidance on the evaluation of landscapes is inapplicable to California landscapes.	Sections 5020.1(j) and (h) of the Public Resources Code, respectively and together, set out a partial range of entities that qualify as historical resources under California law. Germane to the consideration of whether a landscape is an entity appropriate for consideration as an historical resource is section 2050.1(j)'s reference to "area" as one such entity. Related to this reference is section 5020.1(h)'s definition of "historic district," which is, in part, defined as a "definable unified geographic entity." It would be questionable for one to try and assert the argument that such an entity does not easily equate to the concept of "area." In the historic preservation realm, the calculus for consideration of a landscape under California law is that it equals an historic district, defined again at section 2050.1(h) as "a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development," which in turn equals an area, which in turn is one of the enumerated entities that qualify for consideration as an historical resource. The applicant asserts that NPS guidance on the evaluation of landscapes is inapplicable under California law; the guidance is not binding even under Federal law. However, it is just guidance, and wholly appropriate, as the foundation for the evaluative process for cultural resources under the CRHR, and is derived directly from the evaluative process for the National Register of Historic Places, which is administered by NPS.
13.5 (2)		Applicant states that no clear geographic boundaries are found in the SSA for four of the five resources that staff determines or assumes to be historically significant.	The geographic boundary for the Pahrump Metapatch Mesquite Woodland Coppice Dune Archaeological Landscape may be found on page 45 of the SSA and is also included in the FSA.

13.5 (3)a		SSA does not provide a description of the physical identity of the landscapes that supports significance conclusions. (Ethnographic Resources)	See the **FSA** Sections entitled "Southern Paiute, Pahrump Paiute, and Ma-hav Ethnographic Landscapes Generally Described" which provides per each ethnographic landscape, sections on "Contributing Attributes," "Periods of Significance" and another section entitled "Evaluation of Ethnographic Resources" and the discussion entitled "Integrity".
13.5 (3)b		Applicant asserts that staff does not adequately describe the physical character of cultural resources during their respective periods of significance, nor describe the present integrity of the resources and their consequent abilities to convey their respective significance. (Archaeological Resources)	The applicant is referred to the Archaeological Resources discussion in the **FSA** for more information.
13.5 (3)c		(Built-environment Resources)	See pages 65-70 if the SSA:.http://www.energy.ca.gov/sitingcases/hiddenhills/documents/2012-06-15_Supplemental_Staff_Assessment_and_Schedule_Update_TN-65775.pdf
13.6 (1)a		Applicant asserts that staff provides no rationale for the eligibility of the Pahrump Metapatch Mesquite Woodland Coppice Dune Archaeological Landscape under CRHR Criterion 1.	The *Landscape Interpretation* subsection of the cultural resources analysis in the **FSA** provides a relatively thorough discussion of the role of the landscape in the economy and ethnogeography of the people whose home the landscape was in prehistory.

13.6(1)b		Applicant asserts that staff's discussion of the eligibility of the Pahrump Metapatch Mesquite Woodland Coppice Dune Archaeological Landscape under CRHR Criterion 4 is speculative and not supported by substantial evidence.	This is a reiteration of the applicant's Comment No. 13.3. Please refer to staff's response to that comment.
13.6 (2)		SSA does not provide a description of the events (Criterion 1) or the high artistic value (Criterion 3) of the songs that substantiate eligibility of the Salt Song Landscape	See the **FSA** section "Southern Paiute Salt Song Landscape." Also, see Ethnographic Study.
13.6 (3)		SSA does not provide a description of the events (Criterion 1) or the (Criterion 2) of the life and times of Chief Tecopa that substantiates eligibility of the Pahrump Paiute Home Landscape	See page "Pahrump Paiute Home Landscape" discussion in the **FSA**. Also see Ethnographic Study .http://www.energy.ca.gov/sitingcases/hiddenhills/documents/2012-06-15_Supplemental_Staff_Assessment_and_Schedule_Update_TN-65775.pdf
13.6 (4)		SSA does not provide a description of the events (Criterion 1) or the (Criterion 4) or potential to yield information that substantiates eligibility of the Pahrump Paiute Home Landscape	See "Ma hav landscape" discussion in **FSA**. Table A (Ma-hav period of significance and events) inadvertently omitted from SSA. Ma-hav landscape has information potential in both history and prehistory. While some of the Ma-hav landscape has been surveyed and did not yield eligible prehistoric historical resources, not all of the landscape has been surveyed.
13.6 (5)		Applicant is questioning the scope of the consideration of the Old Spanish Trail/Mormon Road.	Traces of the OST have been documented on the project site by OSTA as well as by the applicant's own consultant. Staff has determined that the study prepared by the applicant was inadequate. Tracks and traces on the project site, and the larger PAA, were not evaluated in the proper context of either the OST specifically in the Pahrump Valley or the larger 2,700+ miles long resource.

13.7		The applicant appears to assert, with reference to section 15064.5(b) of the CEQA Guidelines, that only physical effects to a subject resource constitute material impairment of the significance of that historical resource.	The key reference in section 15064.5(b)(1) is that a substantial adverse change in the signficance of an historical resource means changes not only to the resource under consideration but also to that resource's "immediate surroundings." In the historic preservation field, when a cultural resource is under consideration for historical significance for that resource's potential associative values, for its association with events or persons important in local, regional, or national prehistory or history, the medium through which such a resource may or may not be able to convey its significance to others is its surroundings. The full complement of characteristics relative to which one must consider a project's potential effects includes the characteristics of a resource under consideration and the characteristics of its surroundings. Material changes to the characteristics of either the resource itself or to the resource's surroundings constitute material impairment under section 15064.5(b). Please see the discussion of integrity at section 4852(c) of the California Code of Regulations, which relates to the CRHR, for further clarification on this issue.
13.7 (1)		The applicant reiterates the prior mistaken claim that the Pahrump Metapatch Mesquite Woodland Coppice Dune Archaeological Landscape is entirely in Nevada (see staff response to **Comment No. 13.1 (1)**), and asserts that the proposed project would not physically demolish or materially alter any aspect of the landscape.	The commentor is refered to the *Impacts and Recommended Mitigation* subsection of the SSA on pages 45 and 46 exactly how the constructed project would irreparably alter, materially impair the visual surroundings of the landscape and permanently degrade the landscape's ability to convey its historical significance. The aspects of the landscape that the proposed project would materially alter are the aspects of integrity referred to in the historic preservation field as setting, feeling, and association.

13.7 (2)		Salt Song Trail Landscape	The Salt Song Landscape in which these practices take place is not metaphysical, nor are the practitioners and the practices they perform, including songs, metaphysical. The Salt Song is generally delineated at **Figure 2**. The landscape is defined by various contributing elements which are physical. The Salt Song is based upon substantial practitioner interaction witht he landscape and were the landscape not physically present then the Salt Song would not be possible to conduct.
13.7 (3)		Pahrump Paiute Home Landscape	The Pahrump Paiute Home landscape is not precisely defined at its margins. Staff did not have sufficient research time to define the perimeter boundaries in consultation with nieghboring tribes. However the project is in or near the middle of the Homeland and that portion of territory is unequivocally the Pahrump Paiute's Homeland. The homeland is physically defined by a list of contributing elements. One subset of the Pahrump Paiute Homeland is the Ma-hav Landscape, which is also a physical area, defined in part by a seperate set of contributing elements.
13.7 (4)		Ma-hav Landscape	The Ma-hav landscape is physically bounded and a map is included in the Ethnographic report, and the **FSA** shows the landscape boundaries. The Ma-hav landscape is defined by contributing elements.
13.7 (5)		[Old Spanish Trail/Mormon Road]	See response to comment 13.6 (5).
13.8		No historic resources are on site	Staff disagrees with this comment. Traces of the OST have been documented on the project site by OSTA as well as by the applicant's own consultant.

13.9		Applicant asserts that staff needs to cite some authority for the footnote definition of the term "lifeway" is the SSA.	The term is one of common useage. (see http://www.thefreedictionary.com/lifeway life·way (lfw) n. 1. A customary manner of living; a way of life. 2. A custom, practice, or art: the traditional lifeways of a tribal society.) A definition has been provided in the FSA.
13.10		The FSA should define “ethnographic landscape”	The definition is included in the **FSA**
13.11		Location of OST	Comment noted
13.12		Federal land mis-spelling	This typo has been corrected in the **FSA**.
13.13		Add Antiquities Act, NHPA, ARPA, BLM Cultural Resources Permit, NAGPRA	These federal laws do not pertain to the applicant, with the exception of the BLM permit, which may be issued to the applicant’s consultants in general. The BLM permit is not a Law, Ordinance, Regulation or Standard.
13.14		Federal Use of Human Subjects regulations do not apply.	Use of Human Subjects does not apply to the applicant and will be removed.
13.15		Applicant asserts that staff needs to revise the Project Site and Vicinity subsection of the SSA to more explicitly emphasize the present degree of degradation to the natural landscape in the vicinity of the proposed project area and to emphasize the potential for further future development on the project area.	Staff made note of these issues in the SSA where staff felt the issues were relevant to the consideration of cultural resources. The baseline visual effects of Charleston View is obliquely referred to in relation to the Pahrump Metapatch Mesquite Woodland Coppice Dune Landscape on page 45 of the SSA. Begining on page 69 of the SSA is the discussion of the baseline conditions of the project site in relation to the Built-Environment resources.

13.17		Applicant asserts that staff needs to revise the Project Site and Vicinity subsection of the SSA to more accurately portray the character of the cultural resources associated with the proposed project.	Revisions have been made to paragraphs 3 and 4 of that subsection to address this comment.
13.19		PAA	The rational for the PAA was discussed at length beginning on page 6 of the SSA. A map has been provided in the **FSA,** see **Figure 2**
13.20		PAA	Comment noted.
13.21		Applicant objects to staff's characterization of the mesquite populations along the fault system to the northeast of the project site as "woodlands." The applicant apparently prefers the term "thicket," and requests that staff make this global change.	In the Biological Resources section of the PSA, staff acknowledged the inconsistency in the literature and among resource agencies in the terminology used to describe mesquite habitats, but the argument is academic and irrelevant to the consideration of the cultural value of the populations in the project vicinity. Staff noted in that section that in the project area, mesquite range from low shrubby thickets on dunes to taller, lusher stands in the incised washes. Staff ultimately chose to be consistent with the terminology used in the most relevant literature. Please refer to the **Biological Resources** section of the **FSA** for a more detailed discussion of the terminology, habitat values, and conservation importance of the area's mesquite resources.

13.22		Applicant requests that staff provide appropriate citations for the definition of "archaeological landscape" as set out in the Project Area of Analysis (PAA) subsection of the SSA.	The concept of an archaeological landscape is discussed in the subject subsection as a broad, basic introduction for the layperson. Please see the *Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape (Pahrump Metapatch Landscape)* subsection in the SSA for the technical discussion of the concept and for the technical evaluation of the archaeological landscape in the project area of analysis for the proposed project.
13.23		Applicant reiterates assertion that staff's assessment of the historical signficance of the Pahrump Metapatch Mesquite Woodland Coppice Dune Archaeological Landscape is not supported by substantial evidence. The applicant further asserts a similar lack of substantial evidence for staff's finding that the proposed project would be a visual intrusion upon the subject landscape.	The discussion that the applicant cites as the basis for this comment, as with **Comment No. 22**, is a broad, basic introduction for the layperson of the subject landscape and the proposed project's potential effects on it. With regard to the applicant's reiterated assertion that staff provides no substantial evidence to support the historical significance of the landscape, please see the response above to **Comment No. 13.3**. With regard to the applicant's desire for substantial evidence in relation to the proposed project's potential effects on the landscape, please see the Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape (Pahrump Metapatch Landscape) subsection in the SSA.

13.24		Applicant reiterates assertion that staff's discussion of the Pahrump Metapatch Mesquite Woodland Coppice Dune Archaeological Landscape does not rely on substantial evidence and can, therefore, not serve as the basis for the evaluation of the historical significance of the resource or justify any requirement to mitigate any significant effect that the proposed project may have on it.	With regard to the applicant's reiterated assertion that staff provides no substantial evidence to support the historical significance of the landscape or any of its components, please see the response above to Comment No. 13.3.
13.25		Location of Mound Spring	Comment noted.
13.26		PAA	The rational for the PAA was discussed at length beginning on page 6 of the SSA. A map has been provided in the FSA.
13.27		Visibility of project	Please see the **Visual Resources** Section of the **FSA**.
13.28		Applicant requests that staff revise the portion of the Archival and Library Research subsection that discusses archaeological site CA-INY-2492.	The discussion in the SSA of CA-INY-2492 related to the resource's CRHR eligibility status at the time of the record search in which the resource came to light. The relevant text is now absent from the **FSA.**
13.29		Applicant disputes staff's description of the itinerary of the August 2, 2011 meeting among local Native American communities, the applicant, and BLM and Energy Commission staffs.	The distinction that staff attempts to make in the text is between "project area" and "project site." Subsequent to meeting at a local community center in the Town of Pahrump, meeting participants toured the vicinity of the project, but not the facility site itself. The text has been revised to clarify this scenario.

13.30		Applicant wants a summary of the CEC-NA meetings, wants to attend such meetings.	The applicant is entitled to request/hold meetings with Tribes at any time before or after filing AFC. The applicant's consultant CH2MHill) handled these arrangements on behalf of the applicant.
13.31		CEC staff should specify in the FSA the ethnographic research that was conducted.	The Ethnographic research is specifically described at SSA pages 21-28.http://www.energy.ca.gov/sitingcases/hiddenhills/documents/2012-06-15_Supplemental_Staff_Assessment_and_Schedule_Update_TN-65775.pdf This information will be repeated in the FSA.
13.32		Applicant wants to see a confidential ethnographic study as part of "due process" and "fundamental fairness"	Sufficient ethnographic information was provided in the SSA with the exception of the failure to include plant and animal tables and the Ma-hav period of significance table. The FSA will include the erroneously omitted data tables. In addition, a redacted copy of the confidential ethnographic report has been docketed.
13.33		The commentor disagrees with Staff's eligibility determinations.	Comment noted. Staff is tasked with performing an independent analysis and disagrees with the commentor. The eligiblity determination have not changed between the SSA and the **FSA**.
13.34		The FSA should explain in more detail how the research design was developed.	More specific info for how the research design was developed and provided in the **FSA --** "Research Design"
13.35		Why were the seven elements/attributes specifically selected. FSA should explain the selection criteria.	The seven elements were general categories that ensued from the research data. A sentence will be added to the **FSA** to state that the seven attributes were derived from the research data.

13.36		Table data regarding plant / animal / Ma-hav	Sufficient ethnographic information was provided in the SSA with the exception of the failure to include plant and animal tables and the Ma-hav period of significance table. The **FSA** will include the erroneously omitted data tables. In addition, a redacted copy of the confidential ethnographic report has been docketed.
13.37		The Salt Song landscape is metaphysical, not delineated, not based on substantive evidence and is assumptive.	The Salt Song Landscape in which these practices take place is not metaphysical, nor are the practitioners and the practices they perform, including songs, metaphysical. The Salt Song is generally delineated at **Figure 2**. The Salt Song is based upon substantive evidence that was derived from literature of the annals of California, Nevada and the United States and from oral history interviews of people who know of or have directly participated in a Salt Song ceremony.
13.38		The Pahrump Paiute Home Landscape is predominately outside of California and is based upon assumption not substantial evidence.	Comment noted. Please see the **FSA** for a complete discussion of the Pahrump Paiute Home Landscape.
13.39		The Ma-hav Landscape is delineated upon four justifications without authority and no rational for why this landscape is more precisely delineated than the other two ethnographic landscapes.	The four justifications are a result of and ensue from the research. The boundary is conservatively delineated. It is more precisely delineated because it is the ethnographic landscape that most closely fits the project area and for which the impacts will be the most direct. A sentence describing why the Ma-hav landscape is more precisely delineated than the other two ethnographic landscapes will be added to the **FSA**.
13.40		Two landscapes can be considered subsets of a larger landscape. Is there one landscape or three landscapes?	There are three landscapes. Two landscapes stand on their own and also contribute to a larger landscape.

13.41		Applicant admonishes that the criteria related in the Method and Threshold for Determining Signficance of Impacts to Historical Resources subsection of the SSA should include legal citations. The applicant also asserts that staff did not meet the criteria in the SSA, nor did staff refer to the pertinent information that the applicant has provided.	The criteria set out in the Method and Threshold for Determining Signficance of Impacts to Historical Resources subsection of the SSA were general analytic tests derived from the California Environmental Quality Act, the CEQA Guidelines, and the regulations for the California Register of Historical Resources. The said subsection of the SSA has been revised to clarify the flow of staff's effects analysis, and to distinguish technical regulatory contexts from derived practice. Staff disagrees with the applicant's perspective that staff has not met the original criteria in the SSA, and staff has cited the applicant's submitted information, where pertinent.
13.42		Applicant emphatically states that staff's position that the proposed project's potential effects on presently unknown buried resources must be taken into account and that mitigation measures for any such effects must be developed is "contrary to CEQA."	Staff refers the applicant to section 15064.5(f) of the California Code of Regulations, which states, in part, that "a lead agency should make provisions for historical or unique archaeological resources accidentally discovered during construction."
13.43		Applicant reiterates perspective that the potential effects of a proposed project on buried cultural resources do not need to be taken into account, and focuses on project-specific concerns about buried cultural resources on the proposed facility site.	The discussion of the broad regulatory context for the analysis is explained in the **FSA**.
13.44		Eligibility Determinations	Staff refers applicant to the response above to **Comment No. 13.33**
13.45		Applicant notes incomplete paragraph.	Paragraph strings entirely eliminated during development of the **FSA**.
13.46		Applicant reiterates objection to the characterization of mesquite populations proximal to the proposed facility site as "woodlands."	Staff refers applicant to the response above to **Comment No. 13.21**.

13.48		Applicant asserts that staff's statement in the SSA that the applicant repeatedly objected to staff's numerous requests for primary field data to support the evaluation of the historical significance of the Pahrump Metapatch Mesquite Woodland Coppice Dune Archaeological Landscape is incorrect.	The applicant repeatedly denied staff requested information that staff stated was necessary to the development of a legally defensible analysis. Staff doesn't share in the applicant's perspective, and believes it is in the interest of public transparency to enter into the record why key information was not available for use in staff's analysis. The applicant goes on in **Comment No. 48** to justify not having provided staff with this key information on the basis of the applicant's mistaken and reiterated belief that the subject landscape is entirely in Nevada (see above response to **Comment No. 13.1 (1)**), that the request of field research is contrary to standards of professional practice, a topic area for which no formal professional standards exist, that the scope and the potential cost of the research that staff requested is unreasonable, despite never having offered to negotiate the matter with staff, and that the applicant has provided staff with information on the landscape that the applicant thought staff had agreed would be sufficient for the PSA but staff failed to incorporate into that document, not acknowledging that the applicant submitted that information, response to **Data Request 105**, too late in the preparation of the SSA to incorporate it. **CUL-9** in the **FSA** will establish the process for ascertaining this information, as **DR 105** was not sufficient in establishing the specifics of this Landscape.
13.49		Applicant reiterates that the Pahrump Metapatch Mesquite Woodland Coppice Dune Archaeological Landscape is entirely in Nevada, and that staff has not provided substantial evidence to support the landscape's consideration as an historical resource.	Staff again refers the applicant to above responses to **Comment Nos. 13.1 (1) and 13.3**, respectively.

13.50		Applicant reiterates question about the legitimacy of staff's technical assumption of the Pahrump Metapatch Mesquite Woodland Coppice Dune Archaeological Landscape's historical significance, and again makes the inapplicable assertion that CRHR criteria for historical significance cannot be applied to cultural resources not in California.	With regard to the question of the subject landscape's historical significance, staff refers the applicant to the above response to **Comment No. 13.3**. With regard to the applicant's concern with the provenience of the landscape, staff refers the applicant to the above response to **Comment No. 13.1 (1)**. Staff would also like to note that one logical implicantion of the applicant's insistence that the CRHR does not apply under CEQA to non-California resources would be that developers of energy projects in California, and their State regulators, have the freedom to visually degrade cultural resources in adjacent states despite being bound under CEQA to preserve analogous resources in California. That would seem to staff to be contradictory to the intent of CEQA.
13.51		Applicant makes assertions that 1) the Pahrump Metapatch Mesquite Woodland Coppice Dune Archaeological Landscape is not in California, 2) the landscape includes some land that is Federally managed, 3) that Federally managed land is managed specifically by the BLM, and 4) the Nevada BLM is the lead Federal agency for the consideration of the proposed project in that state.	With regard to 1), see above response to **Comment No. 13.1 (1)**. With regard to 2) through 4), the applicant is correct. Staff, however, believes that none of this information is relevant to the Energy Commission's responsibility to comply with CEQA, or constrains our authority to comment on the potentially significant effects that the proposed project may have on cultural resources, whatever the provenience of those resources, and to recommend mitigation for any such effects.

13.52		Applicant asserts that staff clearly says in the *Impacts and Recommended Mitigation* subsection of the SSA that the proposed project's potential effects on the Pahrump Metapatch Mesquite Woodland Coppice Dune Archaeological Landscape would be entirely indirect and entirely visual. The applicant goes on to take issue with the depth of staff's analysis of these visual effects and mistakenly asserts that the present baseline of visual degradation to the subject landscape is given no mention.	Staff never states that the subject effects would be indirect. Under section 15358(a) of the CEQA Guidelines, the visual effects to which the landscape would be subject as a result of the construction of the proposed project would be "direct or primary" in nature. Staff affirms the original analysis of the proposed project's potential visual effects, and has clarified the disucssion in the **FSA**.
13.53		Applicant states that staff provides no metrics to quantify the analysis of three inherently subjective, not to be confused with arbitrary, aspects of the integrity of the Pahrump Metapatch Mesquite Woodland Coppice Dune Archaeological Landscape. Those particular aspects of integrity are setting, feeling, and association. The applicant then reiterates the applicant's belief from **Comment No. 13.52** that the present baseline of visual degradation to the landscape is not discussed, and reiterates the applicant's belief that the landscape is in Nevada and should more properly be dealt with under Federal environmental law.	Staff affirms the original analysis of the proposed project's potential visual effects, and has added language for the FSA to elaborate and reaffirm the point of view of that analysis. With regard to the applicant's issue with the discussion of the present visual baseline for the landscape, see the above response to **Comment No. 13.52**, and, with regard to the question of the landscape's geographic provenience, see the above response to **Comment No. 13.1 (1)**.

13.54		Baseline conditions	Prior to assessing a project's potential impact Staff determines the Project Area of Analysis (PAA). The PAA includes the project site and a buffer around the project site in an effort to identify both direct and indirect impacts. The PAA is established based on the characteristics of the project components as well as the types of cultural resources in the area. After the PAA is established Staff documents the current condidtions of the area, which then become the baseline. This baseline is used to evaluate the project's potential impacts.
13.56		Applicant questions how staff can arrive at the conclusion that the proposed project's effects on the Pahrump Metapatch Mesquite Woodland Coppice Dune Archaeological Landscape would be significant and unmitigable, when no systematic survey of the landscape has been made.	The survey of the subject landscape is an effort the purposes of which would have been, in part, to identify, inventory, and evaluate the historical significance of the landscape, not to assess effects.

13.57		Although not particularly clear, the applicant seems to be asserting that documentation equivalent to Federal Historic American Building Survey (HABS) and Historic American Engineering Record (HAER) documentation has been considered, in other planning contexts, to be sufficient mitigation in itself, and that this might be an appropriate resolution to the proposed project's effects on the Pahrump Metapatch Mesquite Woodland Coppice Dune Archaeological Landscape, particularly given, in the applicant's opinion, that the proposed project's effects are indirect. The applicant admonishes staff for alledgedly precluding the input of others as part of the development of mitigation for the landscape, again citing the mistaken assertion that the confidential ethnographic report, appendix A, has some material bearing on the subject landscape.	Staff believes that field investigations to support a State-level variant of Federal Historic American Landscape Survey (HALS) documentation should be one aspect of mitigation for the direct effects (see response to **Comment No. 13.52**) that the proposed project would have on the subject landscape. Staff does not believe that such documentation alone is adequate as mitigation for the virtually permanent loss of a large part of an important landscape.
13.58		Applicant asserts that there is no public loss associated with the proposed project's potential effects to the Pahrump Metapatch Mesquite Woodland Coppice Dune Archaeological Landscape, because an unspecified portion of the dunes that are one component of the landscape are presently in private hands, and the applicant is unaware that the public has expressed any "substantial" concerns about the loss.	Although staff does not possess precise information on the ratio of public to private land acreage for the subject landscape, staff can state that public lands would make up an easy majority of the resource. There would, therefore, be a real and immediate public loss associated with the proposed project's direct visual effects to the landscape. Under CEQA, present land ownership status does not have any bearing on the identification and the evaluation of the historical significance of cultural resources. The heritage values of these resources transcend historic changes in land ownership, and are ascribed the status of a public trust by virtue of the values' consideration in the planning process.

13.59		Applicant reiterates that staff has merely made an unsubstantiated assumption that the construction and operation of the proposed project would constitute a significant visual degradation to the Pahrump Metapatch Mesquite Woodland Coppice Dune Archaeological Landscape, and asserts further that because staff's effects assessment was developed in secrecy, largely on the basis of the confidential ethnographic report, appendix A, and on the basis of meetings that expressly excluded the applicant, any mitigation for the resource is unwarranted, absent the transparent and formal establishment of a significant effect.	Staff affirms the original analysis of the proposed project's potential visual effects, and has added language for the FSA to elaborate and reaffirm the point of view of that analysis. Staff reiterates the commentary made above in reference to **Comment Nos. 13.55 and 13.57** that the confidential ethnographic report, appendix A, has nothing to do with the subject of archaeological landscapes.
13.60		Applicant asserts that mitigation for the Pahrump Metapatch Mesquite Woodland Coppice Dune Archaeological Landscape proposed under **CUL-11** is inappropriate, as the applicant feels there would be no direct effects of the proposed project on the subject landscape.	Staff reiterates the position that the proposed project would indeed have direct effects on the subject landscape and refers the applicant to the above response to **Comment No. 13.52**.
13.61		Ethnographic Landscapes not supported by applicable law, no substantive evidence and outside of California	Ethnographic landscapes are supported by CEQA, there is substantial ethnographic evidence as provided in the SSA and the redacted Confidential Ethnographic Study, and the landscapes are in the project area, in California, in Nevada and in other states.

13.62 (1)		Provide an explanation of the Pahrump Tribe that further details how they are listed by the State of California, how they have been informally recognized by the federal government and how they have over 100 tribal members.	The information provided in the **FSA** describes who the Pahrump Paiute are as a tribal government.
13.62 (2)		"No amount of land alteration can prevent a people from continuing their traditions, therefore the project will have a less than significant impact."	Duly noted. The statement does not speak to a quality of life or the demise of a way of life, only the fact that a way of life will endure until it ceases. The quote is a statement of a resolution to endure, and is not a statement as to the quality or tenuousness of the endurance.
13.63		Ethnographic Report availablity	The Ethnographic report was docketed and is available for public review, as noted earlier: .http://www.energy.ca.gov/sitingcases/hiddenhills/documents/2
13.64		Can project impacts be mitigated or not to a level of less than significant?	Please refer to the Impact Analysis in the **FSA**.
13.65		**VIS-6**	Please see the **Visual Resource** Section of the **FSA**.
13.66		Eligibility determination	Comment noted.
13.67		Eligibility determination	Comment noted.
13.68		Eligibility determination	Comment noted.
13.69		Eligibility determination	Comment noted.
13.70		Eligibility determination	Comment noted.
13.71		Visual/setting impacts	Comment noted.
13.72		Eligibility determination	Comment noted.
13.73		Visual/setting impacts	Comment noted.
13.75		Eligibility determination	Comment noted.
13.77		Eligibility determination	Comment noted.

13.78		Cannot agree with proposed Findings of Fact until a review of the confidential ethnographic report is afforded.	The Ethnographic report was docketed and is available for public review as indicated above.
13.79		Applicant wishes to delete **CUL-1** language that articulates the CPM's authority to both approve and revoke the approval of Cultural Resources Specialists (CRS). Applicant states that this language is redundant, because the CPM's authority to approve the CRS is stated elsewhere in the condition.	Comment noted
13.80		Applicant appears to wish to eliminate redundancy in monthly reports to the CPM, and to restrict the distribution of monthly reports to the CPM.	**CUL-2** revised to clarify the use of the MCR and to reaffirm Energy Commission staff's recommendation that the MCR be made available to those who have an interest in it.
13.81		Applicant wishes to restrict to the project site the applicability of the requirement to pay for the curation of the artifacts recovered and related documentation produced as a result of cultural resources investigations conducted in conjunction with the licensing of this project. for the project	As the effects of the construction and operation of the project extend beyond the boundary of the project site, Energy Commission staff believes that the applicant's responsibility to curate cultural materials and the records related to the recovery of those materials must extend beyond the boundary of the project site to the limits of the project's effects.

13.82		Applicant notes no desire to change **CUL-4**.	n/a
13.83		Applicant eliminates the requirement under **CUL-5** to provide cultural resources awareness training to new workers on any part of the project outside of California, elimanates the option of having other members of the cultural resources compliance team besides the CRS conduct the training, and attempts to further clarify the extent of the temporary avoidance area that must be established around the discovery of new cultural resources during project construction and operation.	Energy Commission staff does not object to the applicant's restriction of worker training to only the California portions of the project or to the elimination of the option to have others besides the CRS conduct training. **CUL-5** has been revised accordingly. Staff finds the further clarification to the extent of temporary avoidance areas to be unnecessary and therefore declines to incorporate that comment.
13.84		Applicant seeks to reduce cultural resources construction monitoring on the basis of the applicant's mistaken statement that Energy Commission staff concurs in applicant's assessment that there are no known archaeological resources on project site.	**CUL-6** revised to reflect Energy Commission staff's perspective that the alluvial landforms of Holocene-age on the eastern portion of the project site (Qa1 and Qa2) have the potential to contain archaeological deposits due to the age of the landforms and to their depositional character.

13.85		Applicant seeks to clarify the scope of the CRS', Alternate CRS', or Cultural Resources Monitor's (CRM) authority to halt construction around an archaeological discovery, and seeks to vest complete authority in the CRS, rather than the CPM, to make determinations of exceptional signficance for finds of more recent age.	With regard to the scope of the authority of the applicant's cultural resources specialists to halt construction around a discovery, staff believes that **CUL-7**, as written, is sufficiently clear. Paragraph two of the condition states that "ground disturbance shall be halted or redirected in the immediate vicinity of the discovery sufficient to ensure that the resource is protected from further impacts." Clear enough. With regard to the CRS being given sole authority to make determinations of exceptional significance, staff declines this suggestion. As the lead agency under CEQA, the Energy Commission has the responsibility to make determinations on the historical significance of cultural resources in accordance with California Register of Historical Resources (CRHR) criteria. The Energy Commission will not wholly delegate that responsibility to a third party.
13.86		Applicant seeks to limit action under **CUL-8** to non-commercial fill borrow or disposal sites in California.	**CUL-8** revised to clarify that the condition is only applicable to the use or disposal of fill on the California components of the project, and the effects of any such use or disposal, wherever those effects may occur on non-commercial borrow or disposal sites, in California or elsewhere.
13.87		**CUL-9**	Comment noted.
13.88		**CUL-10**	Comment noted.

13.89		Applicant wishes **CUL-11** to be deleted. Applicant makes unsubstantiated assertion that a research study as mitigation for the Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape is inappropriate, and further indicates that it is even more inappropriate to analyze the project's effects on the landscape due to its multi-state character, notwithstanding the fact that the project's potential effects are also multi-state in character. The applicant also curiously asserts that the May 17, 2012 response to Data Request 105 (tn 65322) provides sufficient information on the landscape despite the fact that the response is a research design for a paleoenvironmental study that details how much is not known about the landscape.	Please see the **FSA**.

CULTURAL RESOUCES - PLATE 1

Hidden Hills Solar Electric Generating System (HHSEGS) - View Southeast across Hidden Hills Unit 2 toward the southern terminus of the Nopah Range.

CULTURAL RESOUCES

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Staff Photo

CULTURAL RESOUCES - PLATE 2

Hidden Hills Solar Electric Generating System (HHSEGS) - From North of Old Spanish Trail Highway looking toward Northwest. On coppice dune looking across Hidden Hills Units 1 and 2 toward Pahrump Dry Lake and the Nopah Range.

CULTURAL RESOUCES

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Staff Photo

CULTURAL RESOUCES - PLATE 3

Hidden Hills Solar Electric Generating System (HHSEGS) - View Northeast toward Griffith or Charleston Peak from dune field.

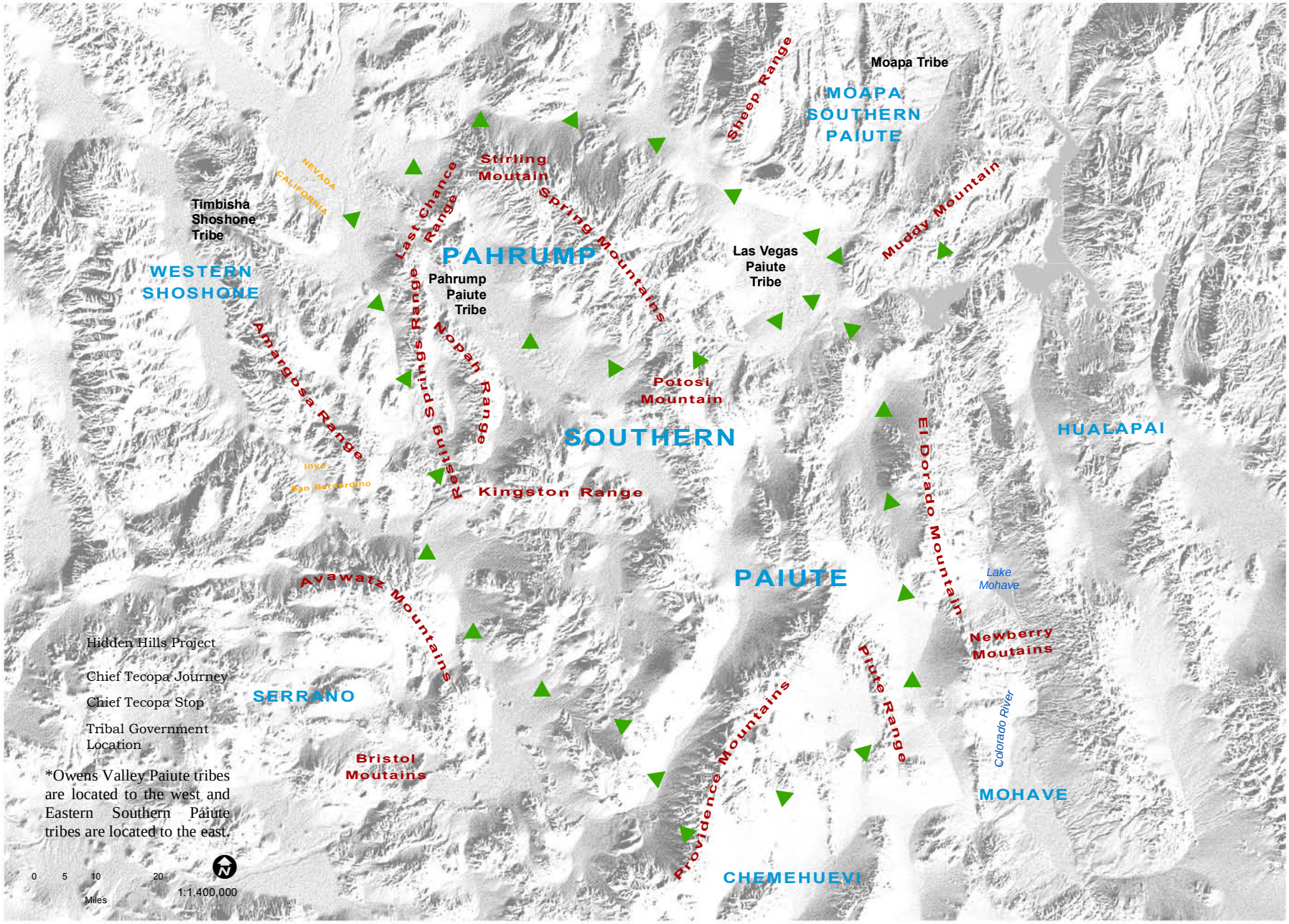
CULTURAL RESOUCES

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Staff Photo

CULTURAL RESOUCES - FIGURE 1

Hidden Hills Solar Electric Generating System (HHSEGS) - Tribal Ancestral Territories and Tribal Government Locations in and around Pahrump Valley

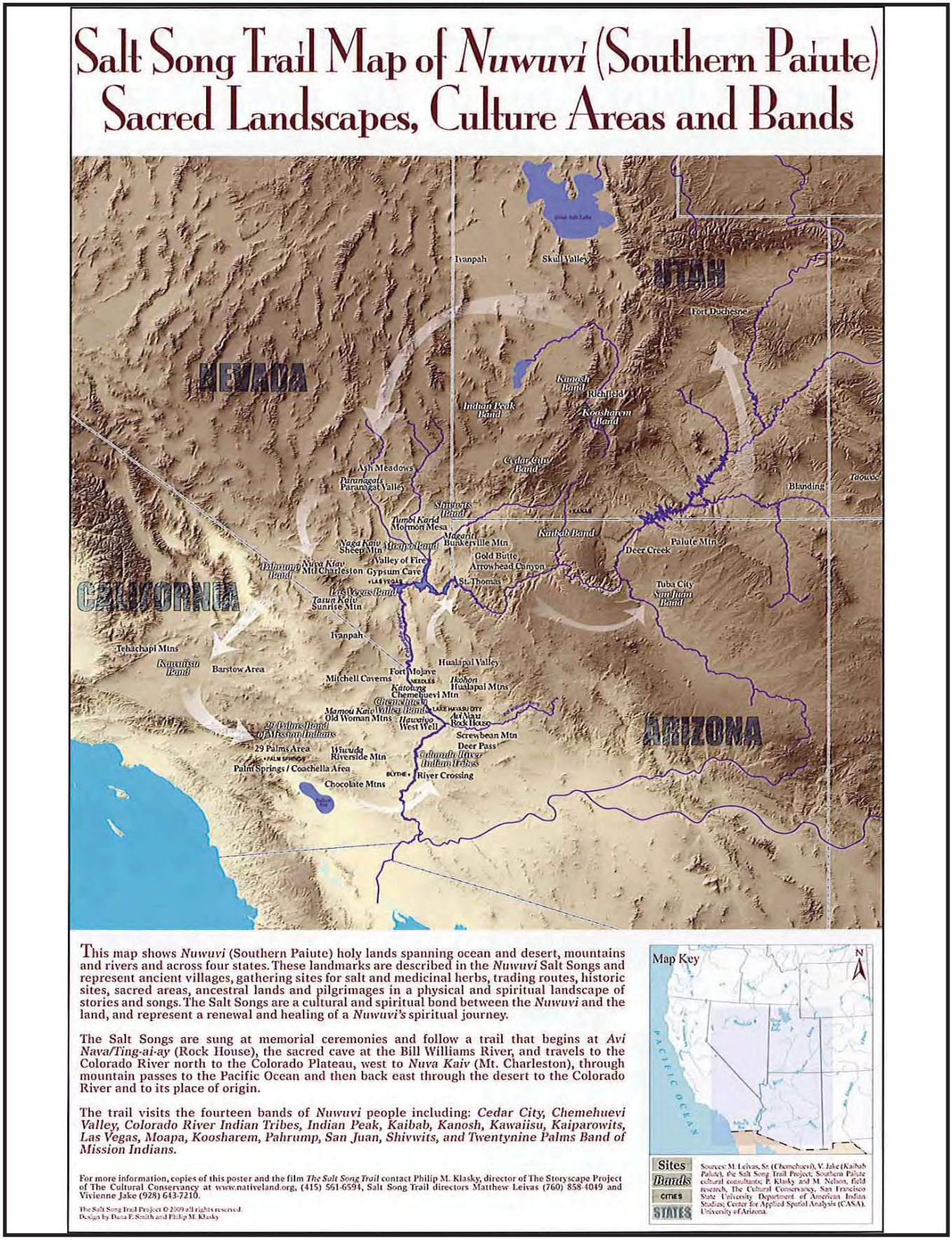


CULTURAL RESOUCES

CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Adapted from *Handbook of North American Indian* Volumes 8 and 11, and *Chief Tecopa and The Hikos* by Celeste Lowe.

CULTURAL RESOURCES - FIGURE 2
Hidden Hills Solar Generating System (HHSEGS) - Salt Song Trail Map of Nuwuvi (Southern Paiute)
Sacred Landscapes, Culture Areas and Bands



This map shows *Nuwuvi* (Southern Paiute) holy lands spanning ocean and desert, mountains and rivers and across four states. These landmarks are described in the *Nuwuvi* Salt Songs and represent ancient villages, gathering sites for salt and medicinal herbs, trading routes, historic sites, sacred areas, ancestral lands and pilgrimages in a physical and spiritual landscape of stories and songs. The Salt Songs are a cultural and spiritual bond between the *Nuwuvi* and the land, and represent a renewal and healing of a *Nuwuvi's* spiritual journey.

The Salt Songs are sung at memorial ceremonies and follow a trail that begins at *Avi Nava/Ting-ai-ay* (Rock House), the sacred cave at the Bill Williams River, and travels to the Colorado River north to the Colorado Plateau, west to *Nuva Kaiv* (Mt. Charleston), through mountain passes to the Pacific Ocean and then back east through the desert to the Colorado River and to its place of origin.

The trail visits the fourteen bands of *Nuwuvi* people including: *Cedar City, Chemehuevi Valley, Colorado River Indian Tribes, Indian Peak, Kaibab, Kanosh, Kawaiisu, Kaiparowits, Las Vegas, Moapa, Koosharem, Pahrump, San Juan, Shivwits, and Twentynine Palms Band of Mission Indians.*

For more information, copies of this poster and the film *The Salt Song Trail* contact Philip M. Klasky, director of The Storyscape Project of The Cultural Conservancy at www.nativeland.org, (415) 561-6594, Salt Song Trail directors Matthew Leivas (760) 858-4049 and Vivienne Jake (928) 643-7210.

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Design by Dana F. Smith and Philip M. Klasky

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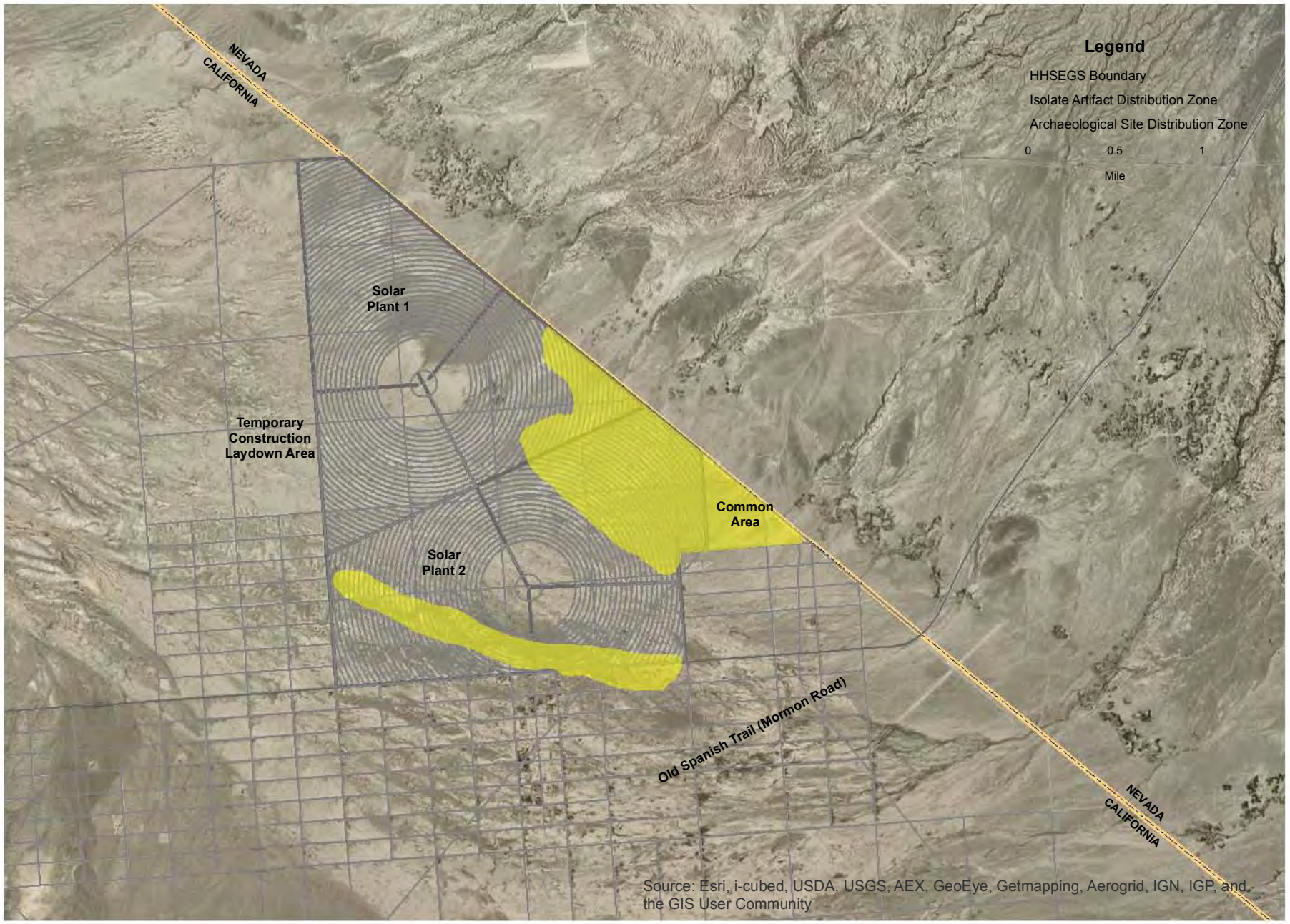
SOURCE: The Salt Song Trail Project (c) 2009 all rights reserved. Design by Dana F. Smith and Philip M. Klasky

CULTURAL RESOUCES - FIGURE 3

Hidden Hills Solar Electric Generating System (HHSEGS) - Distribution of Archaeological Sites and Isolate Artifacts

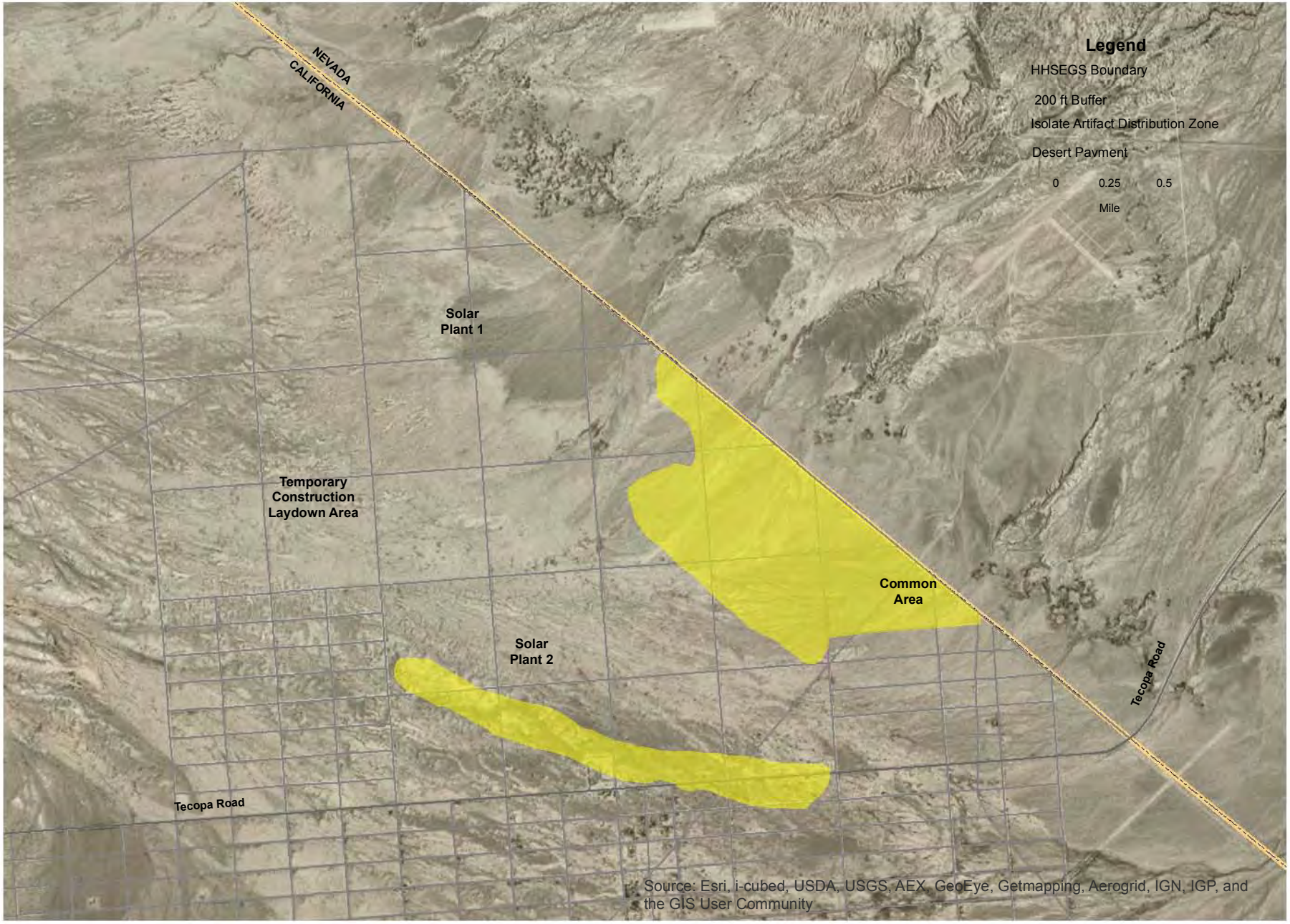


CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2M HILL - Figure 3

CULTURAL RESOUCES - FIGURE 4

Hidden Hills Solar Electric Generating System (HHSEGS) - Covariatial of Isolate Artifacts and Facility Site Desert Pavements

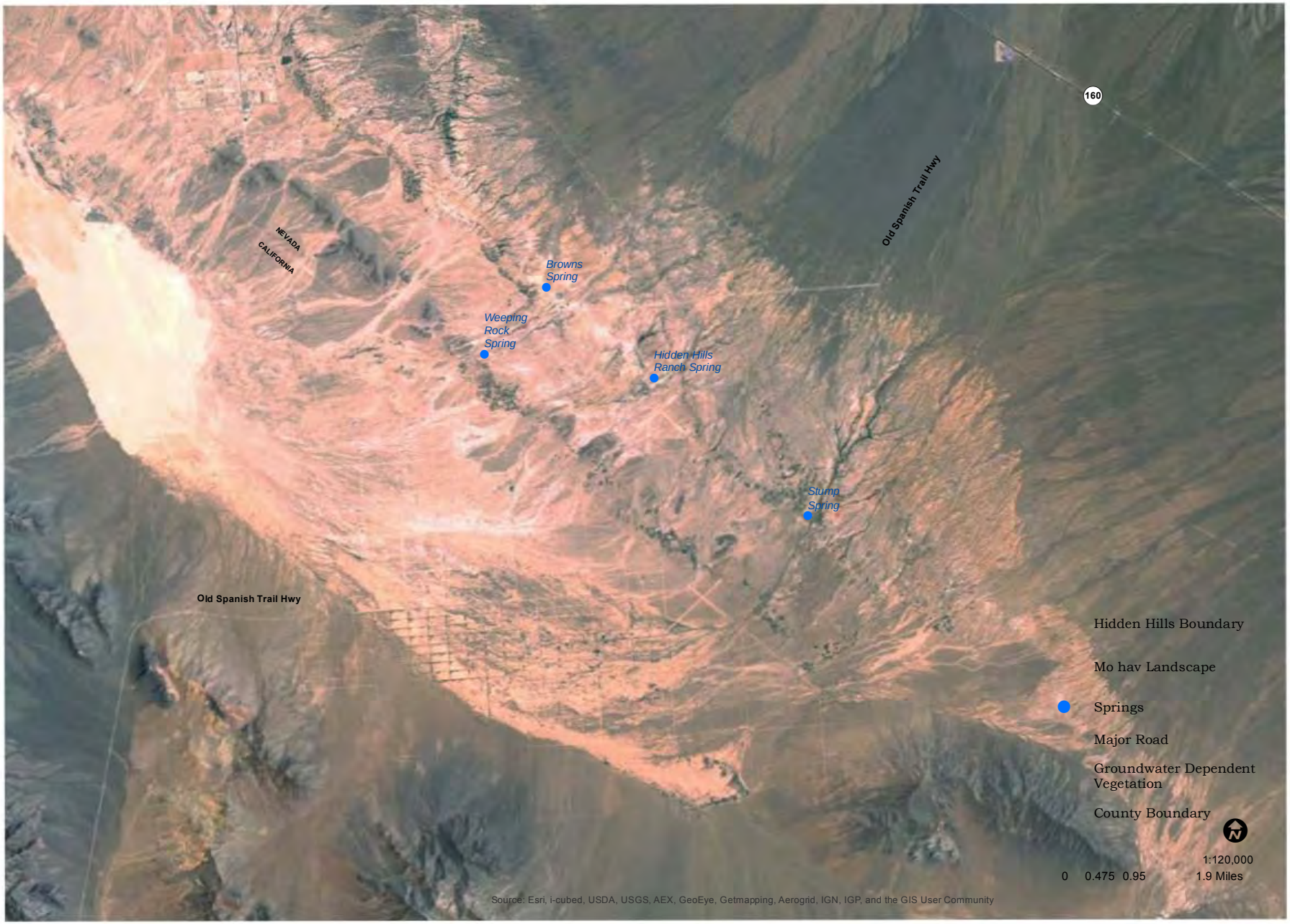


CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: DR127-2 & Facility Data from CH2MHILL. Archaeological features by Commission Staff

CULTURAL RESOUCES - FIGURE 5

Hidden Hills Solar Electric Generating System (HHSEGS) - Mo hav Landscape Vicinity Map



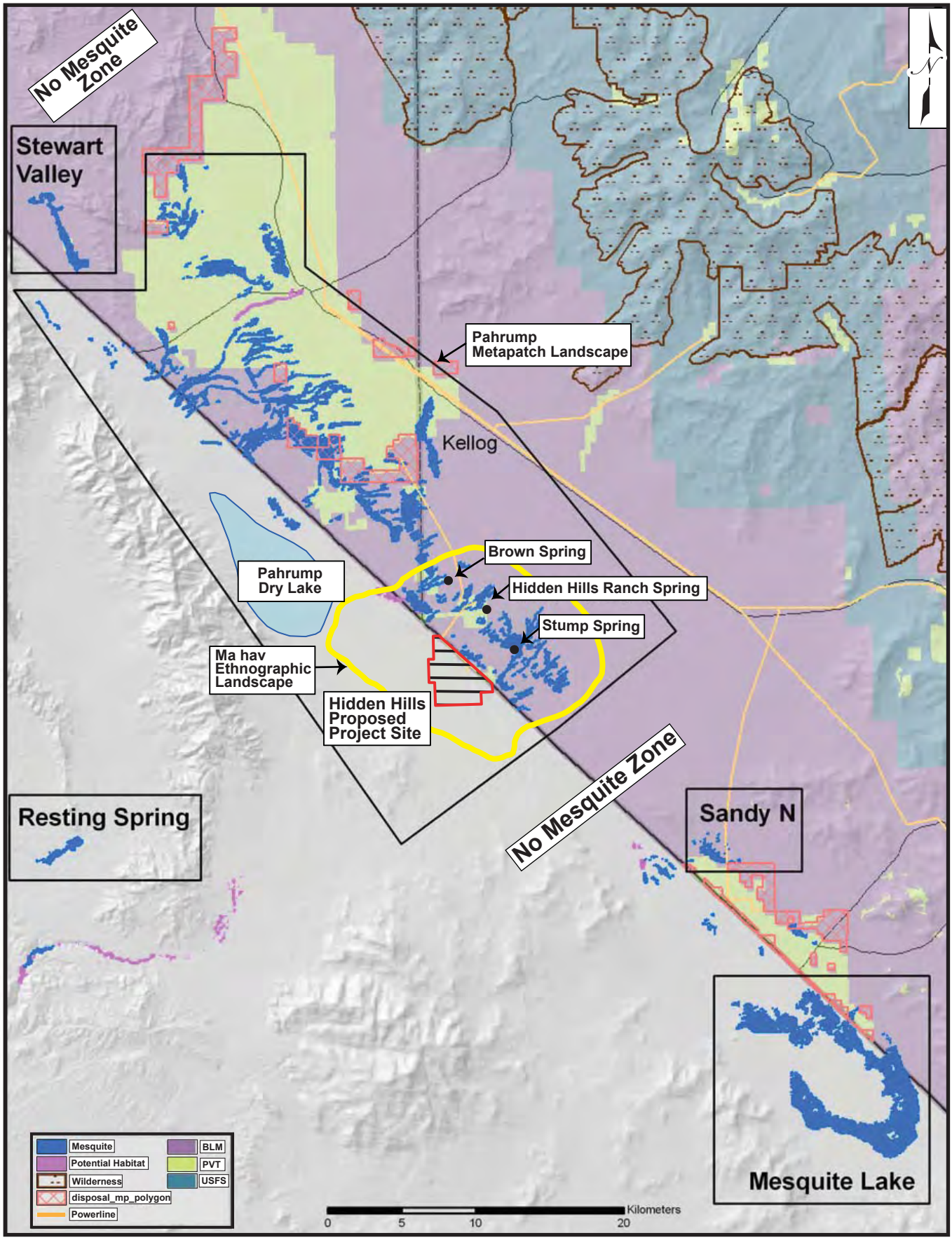
CULTURAL RESOUCES

CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: US Major Highway - USDA National Agriculture Imagery Program (NAIP) imagery and USGS Digital Ortho Quarter, Quad, CH2M HILL, Tele Atlas North America, Inc (2010).

CULTURAL RESOURCES - FIGURE 6

Hidden Hills Solar Generating System (HHSEGS) - Initial Boundary of Pahrump Metapatch Mesquite Woodland – Coppice Dune Archaeological Landscape

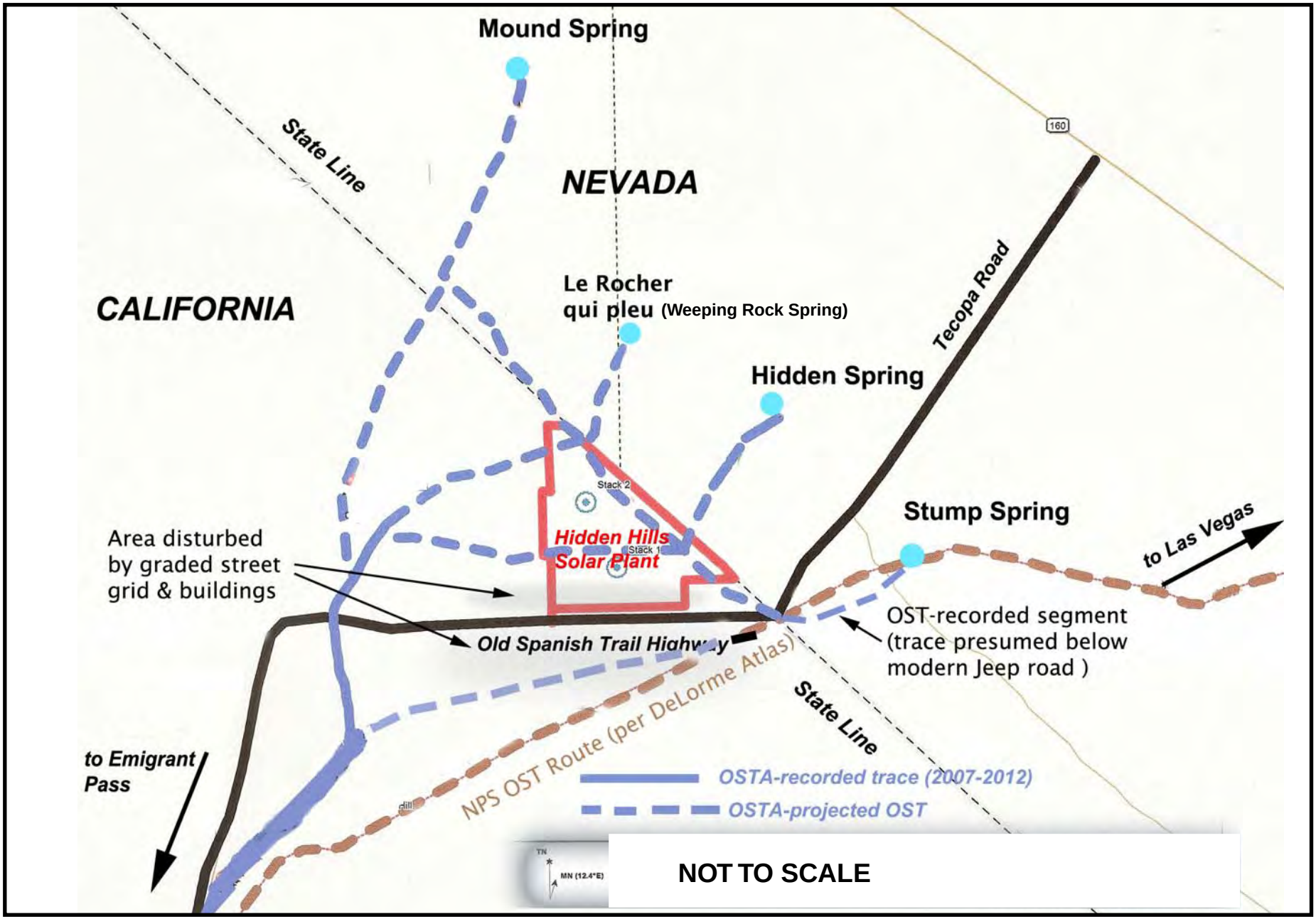


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Lisa Crampton, PhD, et al. 2006. Archaeological Features by Commission Staff

CULTURAL RESOUCES - FIGURE 7

Hidden Hills Solar Electric Generating System (HHSEGS) - Traces of the Old Spanish Trail studied by the OSTA



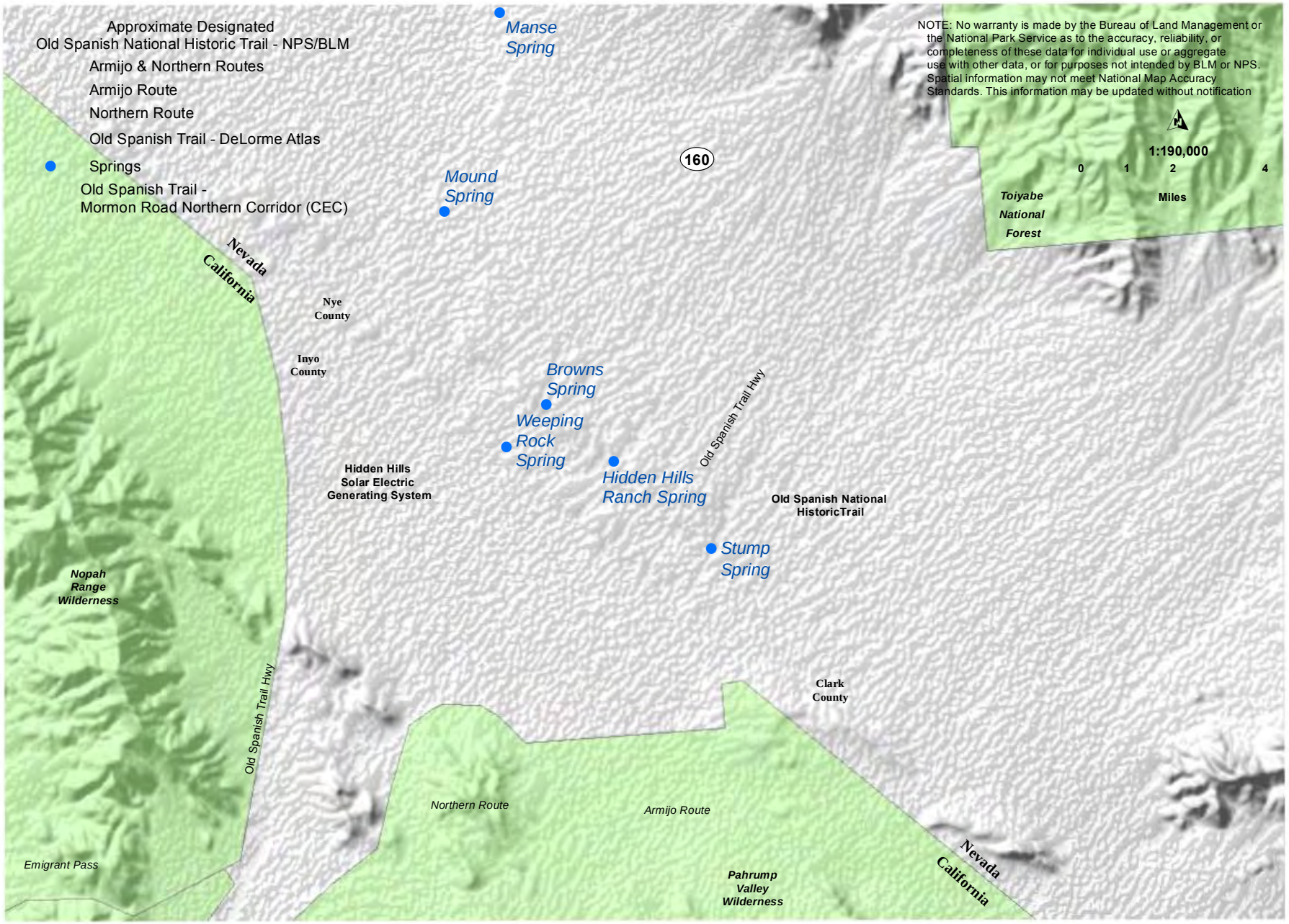
CULTURAL RESOUCES

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Old Spanish Trail Association

CULTURAL RESOURCES - FIGURE 8

Hidden Hills Solar Electric Generating System (HHSEGS) - Historic Trails in the Project Vicinity



CULTURAL RESOURCES

CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL, MultiNet, DeLorme Atlas, Bureau of Land Management/National Park Service

HAZARDOUS MATERIALS MANAGEMENT

Testimony of Geoff Lesh, PE and Rick Tyler

SUMMARY OF CONCLUSIONS

Staff concludes that hazardous materials use at the proposed HHSEGS would not present a significant impact on the public or environment. With adoption of the proposed mitigation measures/conditions of certification, the proposed project would comply with all applicable laws, ordinances, regulations, and standards (LORS).

These Conditions of Certification meet the Energy Commission's responsibility to comply with the California Environmental Quality Act and serve as staff's recommendations for the Energy Commission to consider in its decision to avoid or reduce the severity of hazardous material-related impacts to less than significant and for the project to conform to all applicable LORS.

INTRODUCTION

The purpose of this **HAZARDOUS MATERIALS MANAGEMENT** section of this Final Staff Assessment (FSA) is to determine if the proposed HHSEGS could potentially cause significant impacts on the public from the use, handling, storage, or transportation of hazardous materials at the proposed project site. If significant adverse impacts on the public are identified, Energy Commission staff must evaluate facility design alternatives and additional mitigation measures to reduce those impacts to the extent feasible.

This analysis does not address the potential exposure of workers to hazardous materials used at the proposed project site. Employers must inform employees of hazards associated with their work and provide those employees with special protective equipment and training to reduce the potential for health impacts from the handling of hazardous materials. The **WORKER SAFETY AND FIRE PROTECTION** section of this document describes the protection of workers from those risks.

For this analysis, staff examines plausible potential loss of containment incidents (spills) for the hazardous materials to be used at the proposed facility. The worst case plausible event, regardless of cause, is considered, and analyzed to see whether the risk to local populations is significant. Hazardous material handling and usage procedures are designed to reduce the likelihood of a spill, to reduce its potential size, and to prevent or reduce the potential migration of a spill off site to the extent that there won't be significant off-site impacts. These measures look at potential direct contact from runoff of spills, air-borne plume concentrations, and the potential for spills to mix with runoff water and be carried offsite. Generally, staff seeks to confirm that the applicant has proposed secondary containment basins for containing hazardous material liquids, and that volatile chemicals would have a restricted exposure to the atmosphere after capture. Containment basins are designed to be able to hold the contents of a full tank plus the potential rainfall from a 25-year storm without any loss of containment. In the event of a spill, the spilled material, along with any mixed-in water and any

contaminated soils, would then be placed into containers and processed and disposed of as required by regulations.

Hazardous materials such as mineral and lubricating oils, corrosion inhibitors, herbicides, and acids and bases to control pH would be present at the proposed project site. Hazardous materials used during the construction phase include gasoline, diesel fuel, motor oil, lubricants, and small amounts of solvents and paint. No acutely toxic hazardous materials would be used on-site during construction. None of these materials pose a significant potential for off-site impacts as a result of the quantities on-site, their relative toxicity, their physical states, and/or their environmental mobility.

Although no natural gas is stored, the project will involve the handling of moderate amounts of natural gas. Natural gas poses some risk of both fire and explosion.The risk of a fire and/or explosion on-site can be reduced to insignificant levels through adherence to applicable codes and the development and implementation of effective safety management practices.

The HHSEGS would also require the transportation of certain liquid and solid hazardous materials to the facility. This document addresses all potential impacts associated with the use, storage, and transport of hazardous materials.

LAWS, ORDINANCES, REGULATION, AND STANDARDS

The following federal, state, and local laws and policies (see **HAZARDOUS MATERIALS MANAGEMENT Table 1** below) apply to the protection of public health and hazardous materials management. Staff's analysis examines the project's compliance with these requirements.

HAZARDOUS MATERIALS MANAGEMENT Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
The Superfund Amendments and Reauthorization Act of 1986 (42 USC §9601 et seq.)	Contains the Emergency Planning and Community Right To Know Act (also known as SARA Title III).
The Clean Air Act (CAA) of 1990 (42 USC 7401 et seq. as amended)	Establishes a nationwide emergency planning and response program, and imposes reporting requirements for businesses that store, handle, or produce significant quantities of extremely hazardous materials.
The CAA Section on Risk Management Plans (42 USC	Requires states to implement a comprehensive system to inform local agencies and the public when a significant quantity of such materials is stored or handled at a facility. The requirements of both SARA Title III and the CAA are reflected in the California Health and Safety Code, section 25531, et seq.

Applicable Law	Description
§112(r)	
49 CFR 172.800	Requires that the suppliers of hazardous materials prepare and implement security plans in accordance with U.S. Department of Transportation (DOT) regulations.
49 CFR Part 1572, Subparts A and B	Requires that suppliers of hazardous materials ensure that their hazardous material drivers comply with personnel background security checks.
The Clean Water Act (CWA) (40 CFR 112)	Aims to prevent the discharge or threat of discharge of oil into navigable waters or adjoining shorelines. Requires a written spill prevention, control, and countermeasures (SPCC) plan to be prepared for facilities that store oil that could leak into navigable waters.
6 CFR Part 27	The CFATS (Chemical Facility Anti-Terrorism Standard) regulation of the U.S. Department of Homeland Security (DHS) that requires facilities that use or store certain hazardous materials to submit information to the DHS so that a vulnerability assessment can be conducted to determine what certain specified security measures shall be implemented.
State	
California Health and Safety Code, sections 25531 to 25543.4	The California Accidental Release Program (Cal-ARP) may require the preparation of a Risk Management Plan (RMP) and Off-site Consequence Analysis (OCA) and submittal to the local Certified Unified Program Authority (CUPA) for approval.
Title 8, California Code of Regulations, section 5189	Requires facility owners to develop and implement effective safety management plans to ensure that large quantities of hazardous materials are handled safely. While these requirements primarily provide for the protection of workers, they also indirectly improve public safety and are coordinated with the RMP process.
Title 8, California Code of Regulations, section 5189	Sets forth requirements for design, construction, and operation of the vessels and equipment used to store and transfer ammonia. These sections generally codify the requirements of several industry codes including the American Society for Material Engineering (ASME) Pressure Vessel Code, the American National Standards Institute (ANSI) K61.1, and the National Boiler and Pressure Vessel Inspection Code. These codes apply to anhydrous ammonia but are also used to design storage facilities for aqueous ammonia.
California Health and Safety Code, sSection 41700	Requires that “No person shall discharge from any source whatsoever such quantities of air contaminants or other material which causes injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency

Applicable Law	Description
	to cause injury or damage to business or property."
California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)	Prevents certain chemicals that cause cancer and reproductive toxicity from being discharged into sources of drinking water.
LOCAL	
None	

The Certified Unified Program Agency (CUPA) with the responsibility to review the Hazardous Materials Business Plan (HMBP) is the Inyo County Environmental Health Services Department (ICEHSD). With regard to seismic safety issues, the site is located in a seismically active region of California. Construction and design of buildings and vessels storing hazardous materials will meet the appropriate seismic requirements of the 2010 California Building Code.

METHODOLOGY AND THRESHOLDS FOR DETERMININGENVIRONMENTAL CONSEQUENCES

Staff reviewed and assessed the potential for the transportation, handling, and use of hazardous materials to impact the surrounding community. All chemicals and natural gas were evaluated. Staff's analysis examines the potential impacts on all members of the population including the young, the elderly, and people with existing medical conditions that may make them more sensitive to the adverse effects of hazardous materials. In order to accomplish this goal, staff utilizes the most current acceptable public health exposure levels (both acute and chronic) to protect the public from the effects of an accidental chemical release.

In order to assess the potential of released hazardous materials traveling off-site and affecting the public, staff analyzed several aspects of the proposed use of materials at the facility. Staff recognizes that some hazardous materials must be used at power plants. Therefore, staff conducted its analysis by focusing on the choice and amount of chemicals to be used, the manner in which the applicant would use the chemicals, the manner by which they would be transported to the facility and transferred to facility storage tanks, and the way in which the applicant plans to store those materials on-site.

Staff reviewed the applicant's proposed engineering and administrative controls for hazardous material use. Engineering controls are physical or mechanical systems such as storage tanks or automatic shut-off valves that can prevent a spill of hazardous material from occurring, or that can limit the spill to a small amount or confine it to a small area. Administrative controls are rules and procedures that workers must follow to help either prevent accidents or keep them small if they do occur. Both engineering and administrative controls can act as either methods of prevention or methods of response and minimization. In both cases, the goal is to prevent a spill from moving off-site and harming the public.

Staff reviewed and evaluated the proposed use of hazardous materials, as described by the applicant (HHSEG 2011a, section 5.5). Staff's assessment followed the five steps listed below:

- Step 1: Staff reviewed the chemicals and amounts proposed for on-site use, as listed in the revised Table 5.5-3R2of the Application for Certification (AFC) (CEC 2012jj), and determined the need and appropriateness of their use. Only those that are needed and appropriate are allowed to be used. If staff feels that a safer alternative chemical can be used, staff would recommend or require its use, depending upon the impacts posed.
- Step 2: Those chemicals, proposed for use in small amounts or whose physical state is such that there is virtually no chance that a spill would migrate off the site and impact the public, were removed from further assessment.
- Step 3: Measures proposed by the applicant to prevent spills were reviewed and evaluated. These included engineering controls such as automatic shut-off valves and different size transfer-hose couplings and administrative controls such as worker training and safety management programs.
- Step 4: Measures proposed by the applicant to respond to accidents were reviewed and evaluated. These measures also included engineering controls such as catchment basins and methods to keep vapors from spreading, and administrative controls such as training emergency response crews.
- Step 5: Staff analyzed the theoretical impacts on the public of a worst-case spill of hazardous materials even with the mitigation measures proposed by the applicant. When mitigation methods proposed by the applicant are sufficient, no further mitigation is recommended. If the proposed mitigation is not sufficient to reduce the potential for adverse impacts to an insignificant level, staff would propose additional prevention and response controls until the potential for causing harm to the public is reduced to an insignificant level. It is only at this point that staff can recommend that the project be allowed to use hazardous materials.

PROPOSED PROJECT

SETTING AND EXISTING CONDITIONS

The Hidden Hills Solar Electric Generating System (HHSEGS) will be located on privately-owned land, leased in Inyo County, California, adjacent to the Nevada border. It will comprise two solar fields and associated facilities: the northern solar plant (Solar Plant 1) and the southern solar plant (Solar Plant 2). Each solar plant will generate 270 megawatts (MW) gross (250 MW net), for a total net output of 500 MW. Solar Plant 1 will occupy approximately 1,483 acres (or 2.3 square miles), and Solar Plant 2 will occupy approximately 1,510 acres (or 2.4 square miles). A 103-acre common area will be established on the southeastern corner of the site to accommodate an administrative building, warehouse, maintenance complex, a gas metering station, and an onsite 138 kV switchyard. A temporary construction laydown and parking area on the west side of the site will occupy approximately 180 acres.(HHSG 2011a, section 5.5.1)

Each solar plant will use heliostats, which are elevated mirrors guided by a tracking

system mounted on a pylon, to focus the sun's rays on a solar receiving steam generator (SRSG) on top of a 750-foot tall solar power tower near the center of each solar field. In each plant, one Rankine-cycle steam turbine will receive steam from the SRSG (or solar boiler) to generate electricity. The solar field and power generation equipment will start each morning after sunrise and will shut down when insolation drops below the level required to keep the turbine online.

Several characteristics of an area in which a project is located affect its potential for an accidental release of a hazardous material. These include:

- local meteorology;
- terrain characteristics; and
- location of population centers and sensitive receptors relative to the project.

METEOROLOGICAL CONDITIONS

Meteorological conditions, including wind speed, wind direction, and air temperature, affect both the extent to which accidentally released hazardous materials would be dispersed into the air and the direction in which they would be transported. This affects the potential magnitude and extent of public exposure to such materials, as well as their health risks. When wind speeds are low and the atmosphere is stable, dispersion is severely reduced and can lead to increased localized public exposure.

Recorded wind speeds and ambient air temperatures are described in the **AIR QUALITY** section of the Application for Certification (AFC) (HHSG 2011a) and **FSA**.

TERRAIN CHARACTERISTICS

HHSEGS will be located in southern California's Mojave Desert in Inyo County adjacent to the California−Nevada border. The project site is located in a rural area and is currently undeveloped and unoccupied. The topography of the project site slopes gently, with the highest point in the southeastern corner and the lowest point along the northwest boundary. Sandy alluvium extends onto the project site from the northeast and larger ephemeral washes enter the project site from the east near the California-Nevada state line. The climate at the project site is arid with extreme fluctuations in daily and seasonal temperatures. Rainfall mostly occurs from November through March with late summer rainfall (approximately 0.3 inch per month) a regular occurrence. According to the California Department of Forestry and Fire Protection (CAL FIRE) 2008 Local Responsibility Fire Severity Maps, the project site is within a moderate fire hazard severity zone. (CH2 2012z, p. 70)

Access to the project site is provided via Tecopa Road (also known as Old Spanish Trail Highway), located to the east and south of the project site. State Route 160 (SR 160), located approximately 9 miles to the east of the project site in Nevada, is connected to the project site via Tecopa Road. Tecopa Road connects Nevada SR 160 to California State Route 127 (SR 127) located approximately 28 miles to the west of the project site. Regional access to the project area is provided via Interstate 15 (I-15) located approximately 37 miles to the southeast of the project site. Secondary access to the project site will be from Tecopa Road along the west side of the project site and then

along a paved road between the two solar plants. The internal roadway and utility corridors for each heliostat field and its power block will contain a 20-foot-wide paved or hardscape access road from the entrance of the solar plant site to the power block, and then around the power block.

LOCATION OF EXPOSED POPULATIONS AND SENSITIVE RECEPTORS

The general population includes many sensitive subgroups that may be at greater risk from exposure to emitted pollutants. These sensitive subgroups include the very young, the elderly, and those with existing illnesses. In addition, the location of the population in the area surrounding a project site may have a large bearing on health risk.

Identification of sensitive receptors is typically done to ensure that notice of possible impacts is provided to the community. No daycare, hospital, park, preschool, or school receptors were found within 6 miles of the project site. A sparsely populated rural residential community, Charleston View, lies immediately south of the proposed project site and Tecopa Road. The St. Therese Mission, a commercial facility, is under construction approximately 0.5 mile southeast of the HHSEGS site (immediately north of Tecopa Road). Because this development is planned to include a chapel, garden, restaurant, visitor center that will include a children's playground, and a residential unit, this future development will be treated as a sensitive receptor. The Front Sight Firearms Training Institute is located in Nevada approximately 1.7 miles north of the project site. This facility offers firearm classes during both the day and nighttime hours, including nighttime courses. The nearest residence to any power block equipment is approximately 3,500 feet south of the Solar Plant 2 power block and about 950 feet south of the project's southern boundary (HHSG 2011a, Sect 5.9.3).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Direction/Indirect Impacts and Mitigation

Small Quantity Hazardous Materials

In conducting this analysis, staff determined in Steps 1 and 2 that most of the proposed materials, although present at the proposed facility, pose a minimal potential for off-site impacts since they would be stored in either solid form or in small quantities, have low mobility, low vapor pressure, or low levels of toxicity. These hazardous materials, which were eliminated from further consideration, are discussed briefly below.

During the construction phase of the project, the only hazardous materials proposed for use include paint, cleaners, solvents, gasoline, diesel fuel, motor oil, welding gases, and lubricants. Any impact of spills or other releases of these materials would be limited to the site because of the small quantities involved, the infrequent use and hence reduced chances of release, and/or the temporary containment berms used by contractors. Petroleum hydrocarbon-based motor fuels, mineral oil, lube oil, and diesel fuel all have very low volatility and would represent limited off-site hazards, even in larger quantities.

During operations, hazardous chemicals such as cleaning agents, lube oil, sodium hydroxide, diesel fuel, acqueous ammonia (19 percent), sulfuric acid (96 percent) and other various chemicals (see **Hazardous Materials Appendix A** for a list of all chemicals proposed to be used and stored at HHSEGS) would be used and stored on-site and represent limited off-site hazard due to a combination of their small quantities, low volatility, and/or low toxicity[1].

After removing from consideration those chemicals that pose no risk of off-site impact in Steps 1 and 2, staff continued with Steps 3, 4, and 5 to review the remaining hazardous material: natural gas.

Large Quantity Hazardous Materials

Natural Gas

Although no natural gas is stored, the project would involve the handling of moderate amounts of natural gas. Natural gas poses some risk of both fire and explosion. The solar heat used in the boiler (steam) process would be supplemented by burning natural gas to heat a partial load steam boiler when solar conditions are insufficient. Each solar plant will include two types of gas-fired boilers: the auxiliary boiler and the nighttime preservation boiler (described previously). The auxiliary boiler will have a capacity of 350,000 pounds per hour (lb/hr) at 950° F and 1,450 psia. The night preservation boiler will provide superheated steam to the STG and boiler feedwater pump gland systems overnight and during other shutdown periods when steam is not available from the SRSG. The night preservation boiler will produce 8,000 lb/hour at 680° F and 145 psia.

Natural gas poses a fire and/or possible explosion risk because of its flammability. Natural gas is composed mostly of methane, but also contains ethane, propane, nitrogen, butane, isobutene, and isopentane. It is colorless, odorless, and tasteless and is lighter than air. Natural gas can cause asphyxiation when methane is 90 percent in concentration. Methane is flammable when mixed in air at concentrations of 5 to 14 percent, which is also the detonation range. Natural gas, therefore, poses a risk of fire and/or possible explosion if a release occurs under certain confined conditions. However, it should be noted that, due to its tendency to disperse rapidly (Lees 1998), natural gas is less likely to cause explosions than many other fuel gases such as propane or liquefied petroleum gas, but can explode under certain conditions (as demonstrated by the natural gas detonation in Belgium in July 2004).

The risk of a fire and/or explosion on site can be reduced to insignificant levels through adherence to applicable codes and the development and implementation of effective safety management practices. The National Fire Protection Association (NFPA) code 85A requires both the use of double-block and bleed valves for gas shut off and automated combustion controls. These measures will significantly reduce the likelihood of an explosion in gas-fired equipment. Additionally, start-up procedures would require air purging of the gas-fired boilers prior to start up, thereby precluding the presence of an explosive mixture. The safety management plan proposed by the applicant would

1 Boiler Optimization Plan, Hazardous Material Handling, CH2 2012p, pp 5-6:

address the handling and use of natural gas and would significantly reduce the potential for equipment failure because of either improper maintenance or human error.

While natural gas would be used in significant quantities, it would not be stored on site. It would be delivered via a new 12-inch-diameter natural gas pipeline to the HHSEGS project site. The gas pipeline would enter the HHSEGS site in the common area where it would connect with an onsite gas metering station. It would exit the HHSEGS site at the California-Nevada border, extending 32.4 miles to the Kern River Gas Transmission (KRGT) existing mainline system just north of Goodsprings in Clark County, Nevada.

The transmission and natural gas pipeline alignments will be located in Nevada, primarily on federal land managed by the U.S. Bureau of Land Management (BLM). A detailed environmental impact analysis of the transmission and natural gas pipeline alignments will be prepared by BLM (HHSG 2011a, Sect 5.12.1).

On site, the gas line will enter the project in the common area and travel about 900 feet to the gas metering station, from there it will continue northwest along the edge of the Solar Plant 2 solar field to the common road between Solar Plants 1 and 2. It will continue down that road to the access road going to each power block. The total distance of the on-site gas line from the gas metering station to the metering set at the power block is 2.4 miles for Solar Plant 1 and 2.3 miles for Solar Plant 2 (see **PROJECT DESCRIPTION FIGURE 2).**

A gas-metering station will be required at the KRGT tap point to measure and record gas volumes. Additionally, a gas meter station will be required in the common area and a gas metering set will be installed at each power block. Construction activities related to the metering station will include grading a pad and installing above- and belowground gas piping, and metering equipment. Pigging facilities will be installed at the HHSEGS meter station, and at the KGRT meter station. A distribution power line for the metering station operation lighting and communication equipment will be installed, and the metering station perimeter will be fenced for security (HHSG 2011a, section 4.2.2).

The natural gas pipeline will be designed to comply with 49 CFR 192, federal standards for gas transmission pipelines (HHSG 2011a, section 4.3). The natural gas pipeline must be constructed and operated in accordance with the Federal Department of Transportation (DOT) regulations, Title 49, Code of Federal Regulations (CFR), Parts 190, 191, and 192 (see Table 1 LORS), and ASME B31 piping codes. Staff concludes that existing LORS are sufficient to ensure minimal risks of pipeline failure. Additionally, in-California portions of the gas pipeline that would be constructed for this project would be located entirely on-site, which greatly reduces the risks of impacts to the public from a rupture or failure.

Recent incidents have demonstrated significant risks associated with purging of new pipelines with natural gas. On June 28, 2010, the United States Chemical Safety and Hazard Board (CSB) issued Urgent Recommendations to the United States Occupational Safety and Health Administration (OSHA), the National Fire Protection Association (NFPA), the American Society of Mechanical Engineers (ASME), and major gas turbine manufacturers to make changes to their respective regulations, codes, and guidance to require the use of inherently safer alternatives to natural gas blows for the

purposes of pipe cleaning. Recommendations were also made to the fifty states to enact legislation applicable to power plants that prohibits flammable gas blows for the purposes of pipe cleaning. In accordance with those recommendations, staff proposes Condition of Certification **HAZ-6** which prohibits the use of flammable gas blow for pipe cleaning at the facility either during construction or after the start of operations.

All fuel gas pipe purging activities shall vent any gases to a safe location outdoors, away from workers and sources of ignition. Fuel gas pipe cleaning and purging shall adhere to the provisions of most current versions of the National Fuel Gas Code (NFPA 54 and 56-PS) including all Temporary Interim Amendments.

Mitigation

Staff believes that this project's use of hazardous materials poses no significant risk but only if mitigation measures are used. These mitigation measures are discussed in this section. The potential for accidents resulting in the release of hazardous materials is greatly reduced by the implementation of a Safety Management Program, which includes both engineering and administrative controls. Elements of facility controls and the safety management plan are summarized below.

Engineering Controls

Engineering controls help prevent accidents and releases (spills) from moving off-site and impacting the community by incorporating engineering safety design criteria into the project's design. Engineering safety features proposed by the applicant include:

- Usage of secondary containment areas surrounding each of the hazardous materials storage areas, designed to contain accidental releases during storage;

  Physical separation of stored chemicals in isolated containment areas, separated by a noncombustible partition in order to prevent the accidental mixing of incompatible materials, which may in turn cause the formation and release of toxic gases or fumes.

Administrative Controls

Administrative controls help prevent accidents and releases (spills) from moving off-site and impacting the community by establishing worker training programs and process safety management programs.

A Worker Health and Safety Program would be prepared by the applicant and include (but not be limited to) the following elements (see the **WORKER SAFETY AND FIRE PROTECTION** section in this **FSA** for more details and specific regulatory requirements):

- Worker training on chemical hazards, health and safety issues, and hazard communication;
- Procedures to ensure the proper use of personal protective equipment;
- Safety operating procedures for the operation and maintenance of systems that use hazardous materials;
- Fire safety and prevention; and

- Emergency response actions including facility evacuation, hazardous material spill cleanup, and fire prevention.

At HHSEGS, the project owner would be required to designate an individual who would have the responsibility and authority to ensure a safe and healthful workplace. This project health and safety official would oversee the health and safety program and would have the authority to halt any action or modify any work practice in order to protect the workers, facility, and the surrounding community in the event that the health and safety program is violated.

Staff proposes Condition of Certification **HAZ-1** to ensure that no hazardous material would be used at the facility except as listed in the AFC and reviewed for appropriateness, unless there is prior approval by the Energy Commission compliance project manager (CPM). Staff reviewed the chemicals and amounts proposed for on-site use, as listed in Table 5.5-3 of the AFC and determined the need and appropriateness of their use. **HAZ-1** also requires changes to the allowed list of hazardous materials and their maximum amounts as listed in **Hazardous Materials Appendix A** to be approved by the CPM. Only those that are needed and appropriate would be allowed to be used. If staff feels that a safer alternative chemical can be used, staff would recommend or require its use, depending upon the impacts posed.

A Hazardous Materials Business Plan (HMBP) would also be prepared by the project owner that would incorporate state requirements for the handling of hazardous materials (HHSG 2011a, section 5.5.4). The HMBP includes:

- Inventory and Site Map,
- Emergency Response Plan
- Owner/Operator Identification
- Employee Training

Staff proposes Condition of Certification **HAZ-2**, which ensures that the HMBP would be provided to the Southern Inyo Fire Protection District (SIFPD), so that SIFPD can better prepare emergency response personnel for handling emergencies which could occur at the facility. In accordance with Condition of Certification **HAZ-3**, the project owner would also be responsible to develop and implement a Safety Management Plan for delivery of liquid hazardous materials. The plan would include procedures, protective equipment requirements, training and a checklist. It would also include a section describing all measures to be implemented to prevent mixing of incompatible hazardous materials. This plan would be applicable during construction, commissioning, and operation of HHSEGS.

On-site Spill Response

In order to address spill response, the facility would prepare and implement an emergency response plan which includes information on hazardous materials contingency and emergency response procedures, spill containment and prevention systems, personnel training, spill notification, on-site spill containment, prevention equipment and capabilities, etc. Emergency procedures would be established which include evacuation, spill cleanup, hazard prevention, and emergency response.

A Spill Prevention Control and Countermeasure (SPCC) Plan is required by Federal Regulations (see LORS above) and would be prepared for the petroleum-containing hazardous materials (HHSG 2011a, Sect 5.5.6.4.3).

Southern Inyo Fire Protection District (SIFPD) operates one year-round fire station, the Tecopa Station, located at 410 Tecopa Hot Springs Road in Tecopa, California, approximately 27 miles southwest of HHSEGS. The station has an approximate 30- to 40-minute response time to the project site. The SIFPD equipment consists of two Light Rescue Units, two Type 2 Engines, one Basic Life Support Ambulance, and one Ambulance (not staffed). SIFPD indicated in communications in March and July of 2011 that local firefighters are equipped to handle simple HazMat incidents, but that Pahrump Valley Fire Rescue Services (PVFRS) and Nye County Emergency Services (NCES) would need to be called in for assistance with more complex situations given their mutual aid agreements with Inyo County (CEC 2011j).

The PVFRS Main Station[2] in Pahrump, Nevada, is the closest HazMat responder. It is located 26 road miles from the project site, and has an approximately 40 minute response time. Nye County Emergency Services[3] has a HazMat team that operates through the Nye County Fire Department's Station 51 in Pahrump, which is 28 road miles from the project site, and has an approximate response time of 45 minutes. Station 51 is staffed with 15 to 20 volunteers who are trained as HazMat technicians. The team has the following equipment, as of April 2011: one HazMat truck with 25-foot trailer, one biohazard unit, one fire engine, and one ambulance (HHSG 2011a, Sect 5.5.4.3).

Staff concludes that, given the remote location and the very unlikely potential for any spill to cause an off-site impact, the hazardous material response time is acceptable. The remote location lengthens the response but, at the same time, eliminates the risk of off-site consequences to the public.

Transportation of Hazardous Materials

Containerized hazardous materials and cleaning chemicals would be transported periodically to the facility via truck and will occur over prearranged routes. While many types of hazardous materials would be transported to the site, previous modeling of spills involving much larger quantities of more toxic materials, (aqueous ammonia and 93 percent sulfuric acid) - two hazardous materials that would be used, stored, and transported at the proposed power plant – has demonstrated that minimal airborne concentrations would occur at short distances from the spill.

The primary regional transportation corridors within the project area include Interstate 15 (I-15), Nevada State Route 160 (NSR160), and California State Route 127 (CSR 127). The project area is primarily served by NSR 160 and local streets, including

[2] www.pahrumpfire.biz

[3] www.nyecounty.net

Tecopa Road that serves the project site. Although the HHSGS would be located in California, due to the location of the project site adjacent to the California-Nevada border, it is anticipated that the majority of the employees and construction workers would access the project site by way of the NSR 160/Tecopa Road intersection in Nevada. For a more detailed discussion traffic impacts associated with both the construction and operation of HHSEGS, please see the **Traffic and Transportation** section of this **FSA**.

During construction and operation of HHSEGS, staff believes that minimal amounts, small shipment sizes, and the types of hazardous materials (water treatment chemicals, paint, cleaners, solvents, gasoline, diesel fuel, motor oil, lubricants, and welding gases in standard-sized cylinders) do not pose a significant risk of either spills or public impacts along any transportation route. Staff therefore does not recommend a specific route.

Transportation of hazardous materials will comply with the applicable regulations for transporting hazardous materials, including the U.S. Department of Transportation, EPA, California Department of Toxic Substances Control, California Highway Patrol (CHP), and California State Fire Marshal. Specifically, California Vehicle Code sections 31303 and 32105 require that hazardous materials be transported along the shortest route possible and that transporters obtain a Hazardous Materials Transportation License from the CHP. Also, Nevada Administrative Code 459.9785 requires the transporter to hold a uniform permit and a safety permit issued by the Federal Motor Carrier Safety Administration of the United States Department of Transportation and to certify that it has a satisfactory security program as required by 49 CFR 385.407(b), including a written route plan that meets the requirements of 49 CFR 397.101. If the use of routes within Clark or Nye counties is needed, their respective codes specify the permitting requirements (HHSG, section 5.12.4.3.1).

Seismic Issues

The possibility exists that an earthquake could cause the failure of a hazardous materials storage tank. A quake could also cause the failure of the secondary containment system (berms and dikes), as well as electrically controlled valves and pumps. The failure of all these preventive control measures might then result in a vapor cloud of hazardous materials that could move off-site and impact residents and workers in the surrounding community. The effects of the Loma Prieta earthquake of 1989, the Northridge earthquake of 1994, and the earthquake in Kobe, Japan, in January 1995, heighten concerns about earthquake safety.

Information obtained after the January 1994 Northridge earthquake showed that some damage was caused to several large and small storage tanks at the water treatment system of a cogeneration facility. The tanks with the greatest damage, including seam leakage, were older tanks, while newer tanks sustained lesser damage with displacements and attached line failures. Therefore, staff conducted an analysis of the codes and standards, which should be followed to adequately design and build storage tanks and containment areas that could withstand a large earthquake.

Staff also reviewed the impacts of the February 2001 Nisqually earthquake near Olympia, Washington, a state with similar seismic design codes as California. No hazardous materials storage tanks were impacted by this quake. Referring to the sections on **GEOLOGY AND PALEONTOLOGY** and **FACILITY DESIGN** in the AFC, staff notes that the proposed facility would be designed and constructed to the applicable standards of the 2010 California Building Standards Code (HHSG 2011a, section 2.3.1.1). Therefore, on the basis of occurrences at Northridge with older tanks and the lack of failures during the Nisqually earthquake with newer tanks, staff determined that tank failures during seismic events are not likely and do not represent a significant risk to the public.

Site Security

HHSEGS proposes to use hazardous materials where special site security measures should be developed and implemented to prevent unauthorized access. US EPA published a *Chemical Accident Prevention Alert* regarding site security (EPA 2000a), the U.S. Department of Justice published a special report on Chemical Facility Vulnerability Assessment Methodology (US DOJ 2002), the North American Electric Reliability Corporation (NERC) published *Security Guidelines for the Electricity Sector* in 2002 (NERC 2002), and the U.S. Department of Energy published a draft *Vulnerability Assessment Methodology for Electric Power Infrastructure* in 2002 (DOE 2002). The energy generation sector is one of 14 areas of critical Infrastructure listed by the U.S. Department of Homeland Security. On April 9, 2007, the U.S Department of Homeland Security published, in the Federal Register (6 CFR Part 27), an Interim Final Rule requiring facilities that use or store certain hazardous materials to conduct vulnerability assessments and implement certain specified security measures. This rule was implemented with the publication of Appendix A, the list of chemicals, on November 2, 2007. Staff believes that all power plants under the jurisdiction of the Energy Commission should implement a minimum level of security consistent with the guidelines listed here.

In order to ensure that this facility (or a shipment of hazardous material) is not the target of unauthorized access, staff's proposed Conditions of Certification **HAZ-4** and **HAZ-5** address both Construction Security and Operations Security Plans. These plans would require the implementation of site security measures that are consistent with both the above-referenced documents and Energy Commission guidelines.

The goal of these conditions of certification is to provide the minimum level of security for power plants needed to protect California's electrical infrastructure from malicious mischief, vandalism, or domestic/foreign terrorist attacks. The level of security needed for this power plant is dependent upon the threat imposed, the likelihood of an adversarial attack, the likelihood of success in causing a catastrophic event, and the severity of consequences of that event.

In order to determine the level of security, the Energy Commission staff used an internal vulnerability assessment decision matrix modeled after the U.S. Department of Justice Chemical Vulnerability Assessment Methodology (July 2002), the NERC 2002 guidelines, the U.S. Department of Energy VAM-CF model, and U.S. Department of Homeland Security regulations published in the Federal Register (Interim Final Rule 6 CFR Part 27). Staff determined that HHSEGS would fall into the "low vulnerability"

category, so staff proposes that certain security measures be implemented but does not propose that the project owner conduct its own vulnerability assessment.

These security measures[4] include perimeter fencing and breach detectors, possibly guards, alarms, site access procedures for employees and vendors, site personnel background checks, and law enforcement contact in the event of a security breach. Site access for vendors would be strictly controlled. Consistent with current state and federal regulations governing the transport of hazardous materials, hazardous materials vendors would have to maintain their transport vehicle fleets and employ only drivers who are properly licensed and trained. The project owner would be required, through its contractual language with vendors, to ensure that vendors supplying hazardous materials strictly adhere to the U.S. Department of Transportation (DOT) requirements that hazardous materials vendors prepare and implement security plans per 49 CFR 172.800 and ensure that all hazardous materials drivers are in compliance with personnel background security checks per 49 CFR Part 1572, Subparts A and B. The Energy Commission's compliance project manager (CPM) may authorize modifications to these measures, or may require additional measures in response to additional guidance provided by the U.S. Department of Homeland Security, the U.S. Department of Energy, or the North American Electric Reliability Corporation (NERC), after consultation with appropriate law enforcement agencies and the applicant.

Intentional Destructive Acts

Solar generation projects can be the subject of intentional destructive acts ranging from random vandalism and theft to sabotage and acts of terrorism intended to disable the facility. Acts of vandalism and theft are far more likely to occur than sabotage or terrorism. Theft usually involves equipment at substations and switchyards that contain salvageable metal when metal prices are high. Vandalism usually occurs in remote areas and is more likely to involve spontaneous acts such as shooting at equipment. Theft or opportunistic vandalism is more likely than sabotage or terrorist acts, which are considered to be a negligible risk.

As indicated above, in order to keep the project infrastructure secure from threats from intentional destructive acts, the project site would be physically secured and staffed. Furthermore, uncontrolled access would be prevented through the use of access controls. Discussion of the project's site security plan also occurs in the **SOCIOECONOMICS** and **WORKER SAFETY / FIRE PROTECTION** sections of this **FSA**.

Protection of widely dispersed electrical generation equipment, substations, and thousands of miles of transmission lines from destructive acts is not practical. Damaged equipment and transmission lines may be quickly repaired or replaced in the same manner that storm damaged equipment are returned to service. The results of any such acts could be expensive to repair, but no substantial impacts to continued electrical

[4] Draft Construction Site Security Plan provided by applicant under confidential cover on April 16, 2012 as Supplemental Data Responses Set 3, Data Response SE-6.

service would be anticipated. No significant environmental impacts would be expected from physical damage to the proposed HHSEGS project or from loss of power delivery.

Facility Closure and Decommissioning

The requirements for handling of hazardous materials remain in effect until such materials are removed from the site, regardless of facility closure. Therefore, the facility owners are responsible for continuing to handle such materials in a safe manner, as required by applicable laws. In the event that the facility owner abandons the facility in a manner that poses a risk to surrounding populations, staff would coordinate with the California Office of Emergency Services, the Inyo County Environmental Health Services Department, and the California Department of Toxic Substances Control (DTSC) to ensure that any unacceptable risk to the public is eliminated.

CEQA Level of Significance

Staff's analysis of impacts associated with the storage, use, and handling of hazardous materials at the proposed HHSEGS has determined that impacts would be below the level of significance if staff's proposed conditions of certification are adopted.

CUMULATIVE IMPACTS AND MITIGATION

Staff considered the potential for impacts due to a simultaneous release of any of the hazardous chemicals from the proposed HHSEGS with other existing or foreseeable nearby facilities as listed in the **Cumulative Scenario** section. Because of the small amounts of the hazardous chemicals to be stored at the facility, staff determined that there was essentially no possibility of producing an offsite impact. Because of this determination, and the additional fact that there are no nearby facilities using large amounts of hazardous chemicals (the closest proposed major projects in the general area such as Element Solar and Sandy Valley Solar being five or more miles away, see **Cumulative Effects Figure 2**), there is little (if any) possibility that vapor plumes would mingle (combine) to produce an airborne concentration that would present a significant risk.

COMPLIANCE WITH LORS

Staff concludes that construction and operation of HHSEGS would be in compliance with all applicable LORS for both long-term and short-term project impacts in the area of hazardous materials management.

CONCLUSIONS

Staff's evaluation of the proposed project (with proposed mitigation measures) indicates that hazardous material use, storage, and transportation would not pose a significant impact on the public. Staff's analysis also shows that there would be no significant cumulative impact. With adoption of the proposed conditions of certification, the proposed project would comply with all applicable LORS. Other proposed conditions of certification address the issues of site security matters.

Staff recommends that the Energy Commission impose the proposed conditions of certification, presented below, to ensure that the project is designed, constructed, and operated in compliance with applicable LORS, and would protect the public from significant risk of exposure to an accidental release of hazardous materials. If all mitigation proposed by the applicant and by staff are implemented, the use, storage, and transportation of hazardous materials would not present a significant risk to the public.

Staff concludes that there is insignificant potential for hazardous materials release to have significant impact beyond the facility boundary, and therefore concludes there is also insignificant potential for significant impact to the environment. For any other potential impacts upon the environment, including vegetation, wildlife, air, soils, and water resulting from hazardous materials usage and disposal at the proposed facility, the reader is referred to the **BIOLOGICAL RESOURCES**, **AIR QUALITY**, **SOILS and SURFACE WATER, WATER SUPPLY**, **WASTE MANAGEMENT** sections of this **FSA**.

Staff proposes six conditions of certification, some of which are mentioned in the text (above), and listed below. **HAZ-1** ensures that no hazardous material would be used at the facility except as listed in the AFC, unless there is prior approval by the Energy Commission compliance project manager. **HAZ-2** ensures that local emergency response services are notified of the amounts and locations of hazardous materials at the facility, **HAZ-3** requires the development of a Safety Management Plan that addresses the delivery of all liquid hazardous materials during the construction, commissioning, and operation of the project that would further reduce the risk of any accidental release not specifically addressed by the proposed spill prevention mitigation measures, and further prevent the mixing of incompatible materials that could result in the generation of toxic vapors. Site security during the construction phase is addressed in **HAZ-4** and **HAZ-5** addresses site security during the operational phase. Condition **HAZ-6** addresses safety in cleaning and purging new gas piping.

PROPOSED CONDITIONS OF CERTIFICATION/ MITIGATION MEASURES

The following conditions of certification meet the Energy Commission's responsibility to comply with the California Environmental Quality Act and serve as staff's recommendations for the Energy Commission to consider in its decision to avoid or reduce the severity of hazardous material-related impacts to less than significant and for the project to conform to all applicable LORS.

HAZ-1 The project owner shall not use any hazardous materials not listed in **Hazardous Materials Appendix A**, below, or in greater quantities than those identified by chemical name in **Hazardous Materials Appendix A,** unless approved in advance by the Compliance Project Manager (CPM).

Verification: The project owner shall provide to the CPM in the Annual Compliance Report, a list of hazardous materials contained at the facility.

HAZ-2 The project owner shall concurrently provide a Hazardous Materials Business Plan to the Southern Inyo Fire Protection District (SIFPD), Inyo County

Environmental Health Services Department (ICEHSD) and the CPM for review. After receiving comments from the SIFPD, ICEHSD,and the CPM, the project owner shall reflect all received recommendations in the final documents. If no comments are received from the county within 30 days of submittal, the project owner may proceed with preparation of final documents upon receiving comments from the CPM. Copies of the final Hazardous Materials Business Plan shall then be provided to the ICEHSD and the Southern Inyo Fire Protection District for information and to the CPM for approval.

Verification: At least 60 days prior to receiving any hazardous material on the site for commissioning or operations, the project owner shall provide a copy of a final Hazardous Materials Business Plan to the CPM for approval.

HAZ-3 The project owner shall develop and implement a Safety Management Plan for delivery of liquid hazardous materials. The plan shall include procedures, protective equipment requirements, training and a checklist. It shall also include a section describing all measures to be implemented to prevent mixing of incompatible hazardous materials. This plan shall be applicable during construction, commissioning, and operation of the power plant.

Verification: At least sixty (60) days prior to the delivery of any liquid hazardous material to the facility, the project owner shall provide a Safety Management Plan as described above to the CPM for review and approval.

HAZ-4 At least thirty (30) days prior to commencing construction, a site-specific Construction Site Security Plan for the construction phase shall be prepared and made available to the CPM for review and approval. The Construction Security Plan shall include the following:

1. Perimeter security consisting of fencing enclosing the construction area;
2. Security guards;
3. Site access control consisting of a check-in procedure or tag system for construction personnel and visitors;
4. Written standard procedures for employees, contractors and vendors when encountering suspicious objects or packages on-site or off-site;
5. Protocol for contacting law enforcement and the CPM in the event of suspicious activity or emergency; and
6. Evacuation procedures.

Verification: At least thirty (30) days prior to commencing construction, the project owner shall notify the CPM that a site-specific Construction Security Plan is available for review and approval.

HAZ-5 The project owner shall prepare a site-specific Operation Security Plan for the operational phase that shall be made available to the CPM for review and approval. The project owner shall implement site security measures

addressing physical site security and hazardous materials storage. The level of security to be implemented shall not be less than that described below (as per NERC 2002[5]).

The Operation Security Plan shall include the following:

1. Permanent full perimeter fence or wall, at least eight feet high around the Power Block and Solar Field;

2. Main entrance security gate, either hand operable or motorized;

3. Evacuation procedures;

4. Protocol for contacting law enforcement, the CPM in the event of suspicious activity or emergency;

5. Written standard procedures for employees, contractors and vendors when encountering suspicious objects or packages on-site or off-site;

6. a. A statement (refer to sample, attachment "A") signed by the project owner certifying that background investigations have been conducted on all project personnel. Background investigations shall be restricted to ascertain the accuracy of employee identity and employment history, and shall be conducted in accordance with state and federal law regarding security and privacy;

   b. A statement(s) (refer to sample, attachment "B") signed by the contractor or authorized representative(s) for any permanent contractors or other technical contractors (as determined by the CPM after consultation with the project owner) that are present at any time on the site to repair, maintain, investigate, or conduct any other technical duties involving critical components (as determined by the CPM after consultation with the project owner) certifying that background investigations have been conducted on contractor personnel that visit the project site.

7. Site access controls for employees, contractors, vendors, and visitors;

8. Closed Circuit TV (CCTV) monitoring system, recordable, and viewable in the power plant control room and security station (if separate from the control room) capable of viewing, at a minimum, the main entrance gate; and

9. Additional measures to ensure adequate perimeter security consisting of either:

[5] North American Electric Reliability Council, www.nerc.com/files/V1-Communications.pdf

a. Security guard present 24 hours per day, seven days per week, **OR**

b. Power plant personnel on-site 24 hours per day, seven days per week and **one** of the following:

1) The CCTV monitoring system required in number 8 above shall include cameras that are able to pan, tilt, and zoom (PTZ), have low-light capability, are recordable, and are able to view 100% of the perimeter fence to the power block, the outside entrance to the control room, and the front gate from a monitor in the power plant control room; **OR**

2) Perimeter breach detectors **or** on-site motion detectors for the power block.

The project owner shall fully implement the security plans and obtain CPM approval of any substantive modifications to the security plans. The CPM may authorize modifications to these measures, or may require additional measures, such as protective barriers for critical power pant components (e.g., transformers, gas lines, compressors, etc.) depending on circumstances unique to the facility or in response to industry-related standards, security concerns, or additional guidance provided by the U.S. Department of Homeland Security, the U.S. Department of Energy, or the North American Electrical Reliability Council, after consultation with appropriate law enforcement agencies and the project owner.

Verification: At least 30 days prior to the initial receipt of hazardous materials on-site, the project owner shall notify the CPM that a site-specific Operations Site Security Plan is available for review and approval. In the Annual Compliance Report, the project owner shall include a statement that all current project employee and appropriate contractor background investigations have been performed, and updated certification statements are appended to the Operations Security Plan. In the Annual Compliance Report, the project owner shall include a statement that the Operations Security Plan includes all current hazardous materials transport vendor certifications for security plans and employee background investigations.

HAZ-6: The project owner shall Comply with NFPA 56(PS) and not allow any fuel gas pipe cleaning activities on site, either before placing the pipe into service or at any time during the lifetime of the facility, that involve “flammable gas blows” where natural (or flammable) gas is used to blow out debris from piping and then vented to atmosphere. Instead, an inherently safer method involving a non-flammable gas (e.g. air, nitrogen, steam) or mechanical pigging shall be used. Exceptions to any of these provisions will be made only if no other satisfactory method is available, and then only with the approval of the CPM.

Verification: At least 30 days before any fuel gas pipe cleaning activities conducted onsite involving fuel gas pipe of four-inch or greater external diameter, the project owner shall submit a copy of the Fuel Gas Pipe Cleaning Work Plan which shall indicate the method of cleaning to be used, what gas will be used, the source of pressurization, and whether a mechanical PIG will be used, to the CBO for information and to the CPM for review and approval.

SAMPLE CERTIFICATION (Attachment "A")

Affidavit of Compliance for Project Owners

I, _____
(Name of person signing affidavit)(Title)

do hereby certify that background investigations to ascertain the accuracy of the identity and employment history of all employees of

_____
(Company Name)

for employment at

_____
(Project name and location)

have been conducted as required by the California Energy Commission Decision for the above-named project.

_____
(Signature of Officer or Agent)

Dated this _____ day of _____, 20 _____.

THIS AFFIDAVIT OF COMPLIANCE SHALL BE APPENDED TO THE PROJECT SECURITY PLAN AND SHALL BE RETAINED AT ALL TIMES AT THE PROJECT SITE FOR REVIEW BY THE CALIFORNIA ENERGY COMMISSION COMPLIANCE PROJECT MANAGER.

SAMPLE CERTIFICATION (Attachment "B")

Affidavit of Compliance for Contractors

I, _____
(Name of person signing affidavit)(Title)

do hereby certify that background investigations to ascertain the accuracy of the identity and employment history of all employees of

_____
(Company Name)

for contract work at

_____
(Project name and location)

have been conducted as required by the California Energy Commission Decision for the above-named project.

_____
(Signature of Officer or Agent)

Dated this _____ day of _____, 20 _____.

THIS AFFIDAVIT OF COMPLIANCE SHALL BE APPENDED TO THE PROJECT SECURITY PLAN AND SHALL BE RETAINED AT ALL TIMES AT THE PROJECT SITE FOR REVIEW BY THE CALIFORNIA ENERGY COMMISSION COMPLIANCE PROJECT MANAGER.

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Hazardous Materials
Appendix A

Hazardous Materials Proposed for Use At the HHSEGS Power Project

Source: Table 5.5-3R2 (CEC 2012jj)

CH2M-Hill 10/19/2012

Table 5.5-3R2
HHSEGS Chemical Inventory

Trade Name	Chemical Name	CAS Number	Maximum Quantity Onsite	CERCLA SARA RQ[a]	RQ of Material as Used Onsite[b]	EHS TPQ[c]	Regulated Substance TQ[d]	Prop 65
Nalco Elimin-OX (or similar oxygen scavenger)	Carbohydrazide	497-18-7	1,200 gallons	[e]	[e]	[e]	[e]	No
Aqueous Ammonia (19% concentration)	Ammonium hydroxide	1336-21-6	1,200 gallons	1000 lb	1000 lb	500 lb	[e]	No
Acid	Sulfuric acid (93% - 66° Baumé)	7664-93-9	1,200 gallons	1000 lb	1075 lb	1000 lb	[e]	No
Lead Acid Batteries	Composed of the following: Lead (45-60% of battery) Sulfuric Acid (10-30% of battery)	 7439-92-1 7664-93-9	420,000 lbm	10 lb	16 lb	[e]	[e]	Yes (lead)
Caustic	Sodium hydroxide 50%	1310-73-2	1,200 gallons	1000 lb	2000 lb	[e]	[e]	No
Diesel Fuel (No. 2)	Diesel Fuel	None	34,000 gallons	42 gal[f]	42 gal[f]	[e]	[e]	Yes
Cleaning Chemicals and Detergents	Various	None	2,500 gallons	[e]	[e]	[e]	[e]	No
Wastewater Treatment System Anti-scalant	Nalco 5200M or similar	Proprietary	1,200 gallons	[e]	[e]	[e]	[e]	No
Wastewater Treatment System Anti-foaming Agent	Nalco 7468 or similar	Proprietary	1,200 gallons	[e]	[e]	[e]	[e]	Yes
WSAC Corrosion Inhibitor	Nalco 3DT-187 or similar (Phosphoric acid 5%)	7664-38-2	1,200 gallons	5000 lb	100,000 lb	[e]	[e]	No
WSAC Dispersant	Nalco 73801WR or similar	Proprietary	1,200 gallons	[e]	[e]	[e]	[e]	No
Closed Cooling Water Corrosion Inhibitor	Nalco TRAC107 or similar	1310-73-2 & 1330-43-4	500 gallons	1000 lb	2000 lb	[e]	[e]	No
Bisulfite	Sodium bisulfite 30%	7631-90-5	1,500 gallons	5000 lb	16,667 lb	[e]	[e]	No
Sodium hypochlorite	Sodium hypochlorite 12% (trade)	7681-52-9	1,500 gallons	100 lb	800 lb	[e]	[e]	No
Lubricating Oil	Oil	None	40,000 gallons (does not include oil contained within individual equipment and reservoirs)	42 gal[f]	42 gal[f]	[e]	[e]	Yes

Table 5.5-3R2
HHSEGS Chemical Inventory

Trade Name	Chemical Name	CAS Number	Maximum Quantity Onsite	CERCLA SARA RQ[a]	RQ of Material as Used Onsite[b]	EHS TPQ[c]	Regulated Substance TQ[d]	Prop 65
Mineral Transformer Insulating Oil	Oil	8012-95-1	100,000 gallons	42 gal[f]	42 gal[f]	[e]	[e]	Yes
Hydraulic Oil	Various Oil	None	5,000 gallons (does not include oil contained within individual equipment and reservoirs)	42 gal[f]	42 gal[f]	[e]	[e]	No
Sulfur hexafluoride	Sulfur hexafluoride	2551-62-4	880.4 lb (contained in circuit breakers)	[e]	[e]	[e]	[e]	No

[a] Reportable quantity for a pure chemical, per CERCLA [Ref. 40 CFR 302, Table 302.4]. Release equal to or greater than RQ must be reported. Under California law, any amount that has a realistic potential to adversely affect the environment or human health or safety must be reported.
[b] Reportable quantity for materials as used onsite. Since some of the hazardous materials are mixtures that contain only a percentage of a reportable chemical, the reportable quantity of the mixture can be different than for a pure chemical. For example, if a material only contains 10% of a reportable chemical and the RQ is 100 lb., the reportable quantity for that material would be (100 lb.)/(10%) = 1,000 lb.
[c] Threshold Planning Quantity [Ref. 40 CFR Part 355, Appendix A]. If quantities of extremely hazardous materials equal to or greater than TPQ are handled or stored, they must be registered with the local Administering Agency.
[d] TQ is Threshold Quantity from 19 CCR 2770.5 (state) or 40 CFR 68.130 (federal)
[e] No reporting requirement. Chemical has no listed threshold under this requirement.
[f] State reportable quantity for oil spills that will reach California state waters [Ref. CA Water Code Section 13272(f)]

HAZARDOUS MATERIALS
Appendix B

Basis for Staff's Use of 75 Parts Per Million Ammonia Exposure Criteria

BASIS FOR STAFF'S USE OF 75 PARTS PER MILLION AMMONIA EXPOSURE CRITERIA

Staff uses a health-based airborne concentration of 75 parts per million (PPM) to evaluate the significance of impacts associated with potential accidental releases of ammonia. While this level is not consistent with the 200-ppm level used by the U.S. Environmental Protection Agency and the California Environmental Protection Agency in evaluating such releases pursuant to the Federal Risk Management Program and State Accidental Release Program, it is appropriate for use in staff's analysis of the proposed project. The Federal Risk Management Program and the State Accidental Release Program are administrative programs designed to address emergency planning and ensure that appropriate safety management practices and actions are implemented in response to accidental releases. However, the regulations implementing these programs do not provide clear authority to require design changes or other major changes to a proposed facility. The preface to the Emergency Response Planning Guidelines states that "these values have been derived as planning and emergency response guidelines, **not** exposure guidelines, they do not contain the safety factors normally incorporated into exposure guidelines. Instead they are estimates, by the committee, of the thresholds above which there would be an unacceptable likelihood of observing the defined effects." It is staff's contention that these values apply to healthy adult individuals and are levels that should not be used to evaluate the acceptability of avoidable exposures for the entire population. While these guidelines are useful in decision making in the event that a release has already occurred (for example, prioritizing evacuations), they are not appropriate for and are not binding on discretionary decisions involving proposed facilities where many options for mitigation are feasible. The California Environmental Quality Act requires permitting agencies making discretionary decisions to identify and mitigate potentially significant impacts through feasible changes or alternatives to the proposed project.

Staff has chosen to use the National Research Council's 30-minute Short Term Public Emergency Limit (STPEL) for ammonia to determine the potential for significant impact. This limit is designed to apply to accidental unanticipated releases and subsequent public exposure. Exposure at this level should not result in serious effects but would result in "strong odor, lacrimation, and irritation of the upper respiratory tract (nose and throat), but no incapacitation or prevention of self-rescue." It is staff's opinion that exposures to concentrations above these levels pose significant risk of adverse health impacts on sensitive members of the general public. It is also staff's position that these exposure limits are the best available criteria to use in gauging the significance of public exposures associated with potential accidental releases. It is, further, staff's opinion that these limits constitute an appropriate balance between public protection and mitigation of unlikely events and are useful in focusing mitigation efforts on those release scenarios that pose real potential for serious impacts on the public. Table 1 provides a comparison of the intended use and limitations associated with each of the various criteria that staff considered in arriving at the decision to use the 75-ppm STPEL.

HAZARDOUS MATERIALS Appendix B Table-1
Acute Ammonia Exposure Guidelines

Guideline	Responsible Authority	Applicable Exposed Group	Allowable Exposure Level	Allowable* Duration of Exposures	Potential Toxicity at Guideline Level/Intended Purpose of Guideline
IDLH[2]	NIOSH	Workplace standard used to identify appropriate respiratory protection.	300 ppm	30 minutes	Exposure above this level requires the use of "highly reliable" respiratory protection and poses the risk of death, serious irreversible Injury, or impairment of the ability to escape.
IDLH/10[1]	EPA, NIOSH	Work place standard adjusted for general population factor of 10 for variation in sensitivity	30 ppm	30 minutes	Protects nearly all segments of general population from irreversible effects.
STEL[2]	NIOSH	Adult healthy male workers	35 ppm	15 minutes, 4 times per 8-hour day	No toxicity, including avoidance of irritation.
EEGL[3]	NRC	Adult healthy workers, military personnel	100 ppm	Generally less than 60 minutes	Significant irritation, but no impact on personnel in performance of emergency work; no irreversible health effects in healthy adults. Emergency conditions one-time exposure.
STPEL[4]	NRC	Most members of general population	50 ppm 75 ppm 100 ppm	60 minutes 30 minutes 10 minutes	Significant irritation, but protects nearly all segments of general population from irreversible acute or late effects. One-time accidental exposure.
TWA[2]	NIOSH	Adult healthy male workers	25 ppm	8 hours	No toxicity or irritation on continuous exposure for repeated 8-hour work shifts.
ERPG-2[5]	AIHA	Applicable only to emergency response planning for the general population (evacuation) (not intended as exposure criteria) (see preface attached)	200 ppm	60 minutes	Exposures above this level entail** unacceptable risk of irreversible effects in healthy adult members of the general population (no safety margin).

1) (EPA 1987) 2) (NIOSH 1994) 3) (NRC 1985) 4) (NRC 1972) 5) (AIHA 1989)

* The (NRC 1979), (WHO 1986), and (Henderson and Haggard 1943) all conclude that available data confirm the direct relationship to increases in effect with both increased exposure and increased exposure duration.

** The (NRC 1979) describes a study involving young animals, which suggests greater sensitivity to acute exposure in young animals. The WHO (1986) warned that the young, elderly, asthmatics, those with bronchitis, and those that exercise should also be considered at increased risk based on their demonstrated greater susceptibility to other non-specific irritants.

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ABBREVIATIONS FOR HAZARDOUS MATERIALS APPENDIX B, TABLE 1

ACGIH: American Conference of Governmental and Industrial Hygienists

AIHA: American Industrial Hygienists Association

EEGL: Emergency Exposure Guidance Level

EPA: Environmental Protection Agency

ERPG: Emergency Response Planning Guidelines

IDLH: Immediately Dangerous to Life and Health Level

NIOSH: National Institute of Occupational Safety and Health

NRC: National Research Council

STEL: Short Term Exposure Limit

STPEL: Short Term Public Emergency Limit

TLV: Threshold Limit Value

WHO: World Health Organization

HAZARDOUS MATERIALS MANAGEMENT

List of Comment Letters

		Haz Mat Comments?
1	Inyo County	
2	Bureau of Land Management	
3	National Park Service	
4	The Nature Conservancy	
5	Amargosa Conservancy	
6	Basin & Range Watch	
7	Pahrump Paiute Tribe	
8	Richard Arnold, Pahrump Piahute Tribe	
9	Big Pine Tribe of Owens Valley	
10	Intervenor Cindy MacDonald	**X**
11	Intervenor Center for Biological Diversity	
12	Intervenor, Old Spanish Trail Association	
13	Applicant, BrightSource Energy, Inc.	**X**

Comment #	DATE	COMMENT TOPIC	RESPONSE
10	**July 21, 2012**	**Intervenor Cindy MacDonald**	
10.1	**p. 8-2**	Lead Acid Batteries -- What is the number on site?	The lead acid batteries used for pointing heliostats will number one per heliostat or about 85,000. These would small batteries (garden vehicle size). There might also be several hundred more, larger, located inside a building to provide emergency backup power.
10.2	**p. 8-2**	Lead Acid Batteries -- What is the number for heliostats?	The lead acid batteries used for pointing heliostats will number one per heliostat or about 85,000.
10.3	**p. 8-2**	Lead Acid Batteries -- What are their lifetimes?	Typically, lead acid batteries last 3-6 years, depending on their usage and environmental conditions.
10.4	**p. 8-2**	Lead Acid Batteries -- What is their placement?	The batteries would be mounted near the heliostat motor, beneath the mirror of the heliostat. They would be above the ground.

10.5	**p. 8-2**	Lead Acid Batteries -- What are their environmental impacts to soil, water, biological resources?	There should be no impacts. The batteries are sealed. They contain a small amount of dilute suphuric acid, which should never get spilled. If it did, individual spills would be small and not consequential. Disposal of end-of-life batteries as hazardous waste is regulated.
10.6	**p. 8-2**	Lead Acid Batteries -- What are their impacts to human health and public safety?	There should be no impacts, either onsite or offsite.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
13	**July 23, 2012**	**Applicant, BrightSource Energy, Inc.**	
13.1	**p. 207**	suggested change to PSA page 4.5-5 Step 1, requests revision to first sentence re on-site chemicals and use	Revision to text made to reference revised Table 5.5-3R2.
13.2	**p. 207**	suggested change to PSA page 4.5-8, 3rd full paragraph through p. 4.5-9, 1st full paragraph: request for update on natural gas supply system, as reflected in General Comments (PROJECT DESCRIPTION)	Revision to text made.
13.3	**p. 207**	Suggested change to PSA page 4.5-9, 1st full paragraph, 3rd sentence re: pigging facilities for natural gas supply system.	Revision to text made.
13.4	**p. 207**	Suggested change to PSA page 4.5-10, last paragraph, first sentence, request to update sentence to reflect Condition of Certification, HAZ-1.	Keep standard condition language.
13.5	**p. 208**	Suggested change to PSA page 4.5-10, last paragraph, second sentence, request to reword sentence re: Table 5.5-3R1.	Revision to text made to reference revised Table 5.5-3R2.
13.6	**p. 208**	Question regarding PSA page 4.5-11, first partial paragraph, last sentence, requests that certain words be stricken, i.e. "or require" for alternative chemicals.	Revision to text made as requested.

13.7	**p. 208**	Add word "Verification" to second paragraph of condition HAZ-1	Revision made to **HAZ-1**.
13.8	**p. 208**	Reword HAZ-2 for better clarity.	Revision made to **HAZ-2**.
13.9	**p. 208**	Request to change 60 days to 30 days for submittal of Hazardous Materials Business Plan prior to delivery.	Staff believes 60 days is prudent considering volume of submittals to the CPM to occur during the pre-construction period.
13.10	**p. 208**	Request to reword requirement for a Safety Management Plan for hazardous materials to apply to those delivered in large, bulk quantities by tanker trucks. Request to change review time from 60 to 30 days.	Revision to text made as requested regarding Safety Management Plan. Review period of 60 days seems reasonable considering volume of submittals to the CPM to occur during the pre-construction period.
13.11	**p. 209**	Request to reword/reformat HAZ-4 for clarity.	Revision to text made.
13.12	**p. 209**	Request to reword/reformat HAZ-5 for clarity.	Revision to text made.
13.13	**p. 209**	Request to change language of Haz 5 to move requirements of the condition to the verification section.	Keep standard condition language to maintain requirements in condition, rather than move to verification portion of HAZ-5..
13.14	**p. 211**	Suggest revision to language of HAZ-6 Verification.	Revision to text made.

LAND USE

Testimony of Christina Snow

SUMMARY OF CONCLUSIONS

This section of the Final Staff Assessment (FSA) analyzes the potential effects on land use that would occur by construction and operation of the proposed Hidden Hills Solar Electric Generating System (HHSEGS). Energy Commission staff concludes the proposed project would not result in the conversion of any farmland (as classified by the Farmland Mapping and Monitoring Program) to non-agricultural use or conflict with existing agricultural zoning or Williamson Act contracts; would not disrupt or divide the physical arrangement of an established community; and would not conflict with any applicable habitat conservation plan, natural community conservation plan or biological opinion. However, staff has determined that the proposed project would not be consistent with applicable County of Inyo laws, ordinances, regulations, and standards (LORS) pertaining to land use planning. Staff has further determined that the proposed project's conflict with such plans, policies and regulations of Inyo County would result in a significant impact under the California Environmental Quality Act (CEQA) Guidelines.

Socioeconomics Figure 1 and **Socioeconomics Table 2** do not identify the presence of an environmental justice community. Therefore, the minority population in the six-mile buffer does not constitute an environmental justice population as defined by *Environmental Justice: Guidance Under the National Environmental Policy Act* and would not trigger further scrutiny for purposes of an environmental justice analysis.

INTRODUCTION

This land use analysis addresses project compatibility with existing or reasonably foreseeable[1] land uses; consistency with County of Inyo applicable laws, ordinances, regulations, and standards (LORS); and potential project related direct, indirect, and cumulative environmental effects.

The HHSEGS solar fields and associated facilities are located on privately owned land that is adjacent to the Nevada border in unincorporated Inyo County, California. The electric transmission line and natural gas pipeline alignments begin on the project site and then exit the eastern border of the project site extending into Nevada. The project linears will be located primarily on federal land managed by the U.S. Bureau of Land Management (BLM). The California Energy Commission has jurisdiction over the portion of the proposed project that lies within California, which is subject to CEQA. Land use impacts associated with the portions of the project located in Nevada will be analyzed in a separate environmental analysis prepared by the Bureau of Land Management pursuant to the National Environmental Policy Act (NEPA) and are exempt from CEQA pursuant to Public Resources Code § 21080(b)(14).

[1]Whether a project is reasonably foreseeable (i.e., a "probable future project") for purposes of cumulative impact analysis depends on the nature of the resource in question, the location of the project, and the type of project. (14 California Code of Regulations, Section 15130(b)(2)).

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

Land Use Table 1 lists the local land use LORS applicable to the proposed project. The proposed project's consistency with these LORS is analyzed under **Assessment of Impacts and Discussion of Mitigation** and in **Land Use Table 2**. The project site does not involve federally managed lands, therefore, there are no identified applicable federal land use related LORS.

Land Use Table 1
Applicable Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	Description
State	
California Subdivision Map Act	Governs the creation, recognition, consolidation/reconfiguration, adjustment and elimination of parcels on land within California.
Local	
County of Inyo General Plan	The County of Inyo General Plan, adopted December 11, 2001, consists of seven elements: Government Element, Land Use Element, Economic Development Element, Housing Element, Circulation Element, Conservation and Open Space Element and Public Safety Element. Although there are no specific plans in Inyo County, the General Plan provides information on the population, housing units and other characteristics of several communities within the county. The proposed project site is located within the Charleston View area of the county.
County of Inyo Title 18 Zoning Ordinance	The Zoning Ordinance establishes zones in the unincorporated areas of the County of Inyo regulating the use of land, height of buildings, area of lots, building sites and provides maps showing the zoning classification boundaries.
County of Inyo Title 16 Subdivision Ordinance	The Subdivision Ordinance provides procedures and standards governing the design, improvements and survey of subdivisions in the county. Its purpose is to promote the orderly development of the land within the unincorporated area of the county; to protect purchasers and land owners; to prevent circumvention of existing subdivision, zoning and building ordinances and regulations; to insure the reservation of adequate streets for vehicular traffic and adequate access to land so divided; to assure compliance with the sewer and water ordinances of the county; to avoid danger and expense to the public through adequate control and regulation of surface drainage; and to provide for the local administration of the State Subdivision Map Act.
County of Inyo Title 21 Renewable Energy Development Ordinance	The Renewable Energy Ordinance, adopted August 17, 2010, is intended to support, encourage and regulate the development of the County's solar and wind resources while protecting the health, safety and welfare of its citizens and its environment.

SETTING

PROJECT SITE

The project site is approximately eight miles[2] directly south of Pahrump, Nevada and approximately 45 miles west of Las Vegas, Nevada. The city of Los Angeles is located approximately 180 miles southwest and Edwards Air Force Base is located approximately 130 miles west-southwest of the site. The unincorporated towns of Tecopa and Shoshone are the two closest California communities, located approximately 24 miles southwest and 36 miles west of the project site. Death Valley National Park is located approximately 20 miles west of the project site.
The HHSEGS is proposed to be located on approximately 3,097 acres (5.12 square miles) of privately owned land in southeastern Inyo County, California immediately adjacent to the Nevada border. The project site is not developed, but contains unimproved dirt roads as a result of a previously approved development consisting of 170 parcels. Currently, there are no agricultural uses on the proposed HHSEGS site, although approximately 12 acres of land within the project boundary had previously been used as an orchard.

HHSEGS will consist of two solar fields and associated facilities that include a northern solar plant (Solar Plant 1) and a southern solar plant (Solar Plant 2). Solar Plant 1 consists of approximately 1,483 acres (2.3 square miles), and Solar Plant 2 will consist of approximately 1,510 acres (2.4 square miles). A common area encompassing 103 acres will be established on the southeastern corner of the site and will accommodate an administration, warehouse, switchyard and maintenance complex as well as an asphalt-paved visitor and employee parking area. The administration complex will occupy approximately 4.8 acres of the 103-acre common area (AFC, Figure 1.2-3).

The temporary construction laydown area, consisting of 180 acres (AFC, Figure 2.1-3), would be located immediately west of the Solar Plant 1 area. The project site and adjacent construction laydown area have not been developed except for the previously mentioned unimproved roads and trails throughout the site and the abandoned 12-acre orchard. Immediately south of the proposed project lies a sparsely populated residential area, Charleston View. Approved in the 1970s, Charleston View contains parcels ranging in size from two acres to 40 acres. The land use adjacent to the western and northern sides of the proposed project site is predominately undeveloped land with parcels ranging from 20 acres to larger tracts of land that are managed by BLM. Lands adjacent to the project on the eastern boundary within Nevada are also undeveloped with a large portion managed by the BLM and a privately owned smaller portion. Refer to **Land Use Figure 2**, which depicts the project site and surrounding designations.

The access to the HHSEGS site would be from the existing two-lane Old Spanish Trail Highway[3] to the project entrance road on the east side of the project. Secondary access

[2] 28 miles is the driving distance from the proposed project to Pahrump, Nevada. Eight (8) miles is the direct distance from southern Pahrump to the proposed project's northern boundary (Solar Field 1).

[3] The road is referred to as Tecopa Road/Highway in Nevada, although Old Spanish Trail Highway and Tecopa Road have been used interchangeably.

would be from Old Spanish Trail Highway along the west side of the site, then along a paved road between the two solar plants.

Transmission Lines

The HHSEGS project will interconnect to the Valley Electric Association (VEA) system[4]. The interconnection would require an approximately 10-mile-long generation tie-line (gen-tie line) from the HHSEGS project site to the proposed Crazy Eyes Tap Substation[5], where the project would interconnect to the VEA electric grid. The gen-tie line would originate at the HHSEGS's onsite switchyard, cross the state line, avoiding the mesquite vegetation to the south, and continue east for approximately 1.5 miles until reaching Tecopa Road. At Tecopa Road, the route would head northeast paralleling Old Spanish Trail Highway until it reaches the Crazy Eyes Tap Substation, which would be located immediately east of the Tecopa Road/SR 160 intersection. The Crazy Eyes Tap Substation would interconnect to the existing VEA Pahrump-Bob Tap 230-kV line.

Natural Gas Pipeline

A 12-inch-diameter natural gas pipeline would be required for the project. Kern River Gas Transmission Company (KRGT) proposes to construct the pipeline from the HHSEGS meter station, to be located in the HHSEGS common area, extending 32.4 miles to KRGT's existing mainline system just north of Goodsprings in Clark County, Nevada. (CH2 2012ee)

A meter station, approximately 300 by 300 feet, including the pig receiver facilities, would be constructed and would be surrounded by a 6-foot-tall chain-link fence with three strands of barbed wire (approximately 7 feet high total). The meter station would be shaded by a canopy to cover the meter runs and associated instrumentation and valving. A data acquisition and control (DAC) building would be located within the meter station. Data acquisition, control, uninterrupted power supply (UPS), and communication equipment would be installed inside the DAC building. Yard lights would be installed on the DAC building and meter building exterior. The light fixtures would be shielded or hooded and directed downward.

As indicated earlier, the natural gas pipeline would be located in Nevada, primarily on federal land managed by the BLM and will be analyzed in a separate environmental document prepared by BLM.

SURROUNDING AREA

Inyo County has a total land area of approximately 6.5 million acres and is the second largest county in California. Although the county contains a large land area, only 1.9 percent of the land is held in private ownership. Federal agencies own 91.6 percent, the State of California owns 3.5 percent, the Los Angeles Department of Water and Power (LADWP) owns 2.7 percent, and Inyo County and other local agencies (including reservation lands) make up the remaining 0.3 percent.

[4] In January 2013, VEA will become a participating transmission owner (PTO) and will turn operational control of its facilities over to the California Independent System Operator (CAISO).

[5] In the HHSEGS Application for Certification (and in the Preliminary Staff Assessment, CEC 2012u), this substation was referred to as the Tap Substation.

The project site is located on private land within a community identified in the General Plan as Charleston View. The Charleston View area contains various parcels of different sizes and is sparsely populated. The 2010 U.S. Census data[6] indicates there are 68 residents living in California within six miles of the project site.

Existing land uses immediately adjacent to and nearby the proposed HHSEGS project site within Charleston View include:

- North: The area to the north of the project site consists of lands within California and Nevada. These areas contain undeveloped land owned and managed by the BLM.
- South: The area immediately adjacent to the project site consists of the Charleston View rural residential community that was approved in the 1960s that consists of several lots that are predominately 2.5 acres in size. The area is sparsely populated and consists of scattered residences, trailers and outbuildings.
- East: Consists of a large area of land within Nevada that is predominately undeveloped and is managed by BLM. There are also scattered private inholdings within these BLM lands. A 550-acre firearms training institute (Front Sight Firearms Training Institute) is located approximately two miles northeast of the project site in Nevada. A portion of the land to the east lies within California and is partially developed for residential use as part of the Charleston View area. In addition, the recently approved St. Therese Mission located slightly southeast of the project site is currently under construction.
- West: Larger undeveloped parcels in private ownership and undeveloped land owned and managed by BLM.

The project site and surrounding area do not contain land identified as Important Farmlands (California Department of Conservation, 2008).

A military airspace area, called R-2508 Special Use Airspace Complex, lies approximately 10 to 15 miles west of the project site. The R-2508 Complex provides the largest single area of overland Special Use Airspace (SUA) in the United States and is an important national military asset that provides an area for realistic military training. The airspace and associated land area consists of bombing ranges, supersonic flight corridors, low altitude high speed maneuver areas, radar testing areas, warfare training areas, and refueling training areas. The R-2508 Special Use Airspace Complex includes more than 20,000 square miles and consists of the overlying Restricted Area R-2508, five underlying restricted areas, and ten Military Operations Areas (MOA).

The Department of Defense administered a Joint Land Use Study (JLUS) that was coordinated by the Governor's Office of Planning and Research. The JLUS was a collaborative effort between local communities, active military installations, and other stakeholders to encourage a collaborative planning process to ensure that land uses surrounding the SUAs are compatible and strategies are developed to reduce the impact of existing community and military activities on each other. Compatibility issues considered as part of this study include alternative energy development. The concern of alternative sources of energy projects include compatibility issues related to glare or

[6] Source: U.S. Census Bureau, 2010 Census

vertical obstruction or other interference with military operations.

GENERAL PLAN LAND USE

PROJECT SITE

The 2001 Inyo County General Plan Update was approved by the Inyo County Board of Supervisors on December 11, 2001. The general plan identifies the project area as the Charleston View area. The general plan land use designation on the proposed site is Open Space and Recreation (OSR) and Resort/Recreational (REC) and the zoning is Open Space 40-acre minimum (OS-40).

The OSR general plan designation allows for existing and planned public parks, ball fields, horse stables, greenbelts, and similar compatible uses and typically has a minimum parcel size of 40 acres. The permitted uses for the Open Space zone includes single-family dwellings, farms and ranches for a variety of agricultural activities (including livestock), animal hospitals or kennels, wildlife refuges, and wilderness areas and uses. Additional accessory and conditional uses are allowed in the Open Space zone related to dwellings and signs as well as public, quasi public, agricultural and mining uses.

As part of a statewide initiative to help identify the transmission projects needed to accommodate California's renewable energy goals, called the Renewable Energy Transmission Initiative (RETI), the Energy Commission and stakeholders identified areas within California that could be developed for renewable energy (Competitive Renewable Energy Zones or CREZs).

Recognizing that the county would potentially be subject to large renewable energy development, Inyo County requested to participate in the RETI Stakeholder Steering Committee (SSC) and identified areas within the county that could be potential CREZs. At that time, the Charleston View area was identified as a potential CREZ by the Inyo County Board of Supervisors and later, on August 17, 2010, the Inyo County Board of Supervisors adopted a Renewable Energy Ordinance, Title 21, to provide a framework for renewable energy projects and to ensure that potential adverse impacts from such development were addressed.

To further support potential renewable energy projects, Inyo County Board of Supervisors adopted a Solar and Wind Renewable Energy General Plan Amendment (REGPA) on April 26, 2011, which identified on a programmatic level, the Charleston View area as well as 14 other areas within the county for potential development of renewable energy. This REGPA was in place at the time the HHSEGS AFC was submitted to the Energy Commmission on August 5, 2011. On September 6, 2011, the Inyo County Board of Supervisors rescinded the County's REGPA due to a legal challenge from the Sierra Club and the Center for Biological Diversity, which effectively eliminated the overlay zone that was discussed in the AFC. As a result of the revocation of the REGPA, the proposed project site is now subject to the original general plan designations of OSR and REC.

SURROUNDING AREA

Lands adjacent to the project site in California and Nevada include both private lands as well as public lands that are managed by BLM. The area directly to the south is identified in the general plan as a Resort/Recreational (REC) designation with a portion designated Rural Residential Medium Density (RRM), while areas further to the south and along the western portion are designated as OSR. The majority of the parcels in the Charleston View area directly south of the site contain scattered residences that vary in parcel size from two to 40 acres. Larger parcels are dominant further out from the project site.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Energy Commission staff has analyzed the information provided in the Application for Certification (AFC) and has acquired information from other sources to determine consistency of the proposed HHSEGS project with applicable land use LORS and the proposed project's potential to have significant adverse land use-related impacts.

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Significance criteria used in this document are based on Appendix G of the CEQA Guidelines and performance standards or thresholds identified by Energy Commission staff, as well as applicable LORS utilized by other governmental regulatory agencies.

An impact may be considered significant if the proposed project results in:

- Conversion of Farmland or Forest Land.
    - Conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide or Local Importance (Farmland) as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use.[7]
    - Conflict with existing zoning for agricultural use, or a Williamson Act contract.
    - Conflict with existing zoning for, or cause rezoning of, forest land [as defined in Pub. Resources Code §12220 (g)), timberland (as defined by Pub. Resources Code §4526), or timberland zoned Timberland Production (as defined by Gov. Code §51104(g)).
    - Result in the loss of forest land or conversion of forest land to non-forest use.
    - Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use[8] or conversion of forest land to non-forest use.

[7] FMMP defines "land committed to non-agricultural use" as land that is permanently committed by local elected officials to non-agricultural development by virtue of decisions which cannot be reversed simply by a majority vote of a city council or county board of supervisors.

[8] A non-agricultural use in this context refers to land where agriculture (the production of food and fiber) does not constitute a substantial commercial use.

- Physical disruption or division of an established community.
- Conflict with any applicable habitat conservation plan, natural community conservation plan, or biological opinion.
- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction, or that would normally have jurisdiction, over the project adopted for the purpose of avoiding or mitigating environmental effects. This includes, but is not limited to, a General Plan, redevelopment plan, or zoning ordinance.
- Result in incremental impacts that, although individually limited, are cumulatively considerable when viewed in connection with other project-related effects or the effects of past projects, other current projects, and probable future projects.[9]

In general, a power plant and its related facilities may also be incompatible with existing or planned land uses, resulting in potentially significant impacts, if they create unmitigated noise, dust, or a public health or safety hazard or nuisance; result in adverse traffic or visual impacts; or preclude, interfere with, or unduly restrict existing or future uses. Refer to other sections of this document for a detailed discussion of any additional potential project-related impacts and recommended conditions of certification.

DIRECT/INDIRECT IMPACTS AND MITIGATION

This section discusses the applicable potential project impacts and associated methods and thresholds of significance referenced above. As part of this analysis, staff has also considered if there are any environmental justice populations in the vicinity of the project and whether land use impacts would occur as a result of the proposed HHSEGS project.

AGRICULTURE AND FOREST

Would the project convert Farmland to non-agricultural use?

The Department of Conservation Farmland Mapping and Monitoring Program (FMMP) produces *Important Farmland Maps* and statistical data used for analyzing impacts on California's agricultural resources. The FMMP is required to prepare, update, and maintain *Important Farmland Series Maps* and other soils and land capability information. The *Important Farmland Maps* depict categories of Prime Farmland, Farmland of Statewide Importance, Unique Farmland, Farmland of Local Importance, Grazing Land, Urban and Built-up Land, Other Land and Water. The FMMP designates the proposed HHSEGS project site and the construction laydown area as "Other Land" which is defined as land not included in any other mapping category (CDOC 2008).

The proposed HHSEGS project site does not contain, and would therefore not convert,

[9] Cumulative impacts refer to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts. The individual effects may be changes resulting from a single project or a number of separate projects and can result from individually minor, but collectively significant actions taking place over a period of time (CEQA Guidelines §15355; 40 CFR 1508.7)

any farmland with FMMP designations of Prime Farmland, Farmland of Statewide Importance, Unique Farmland, or Farmland of Local Importance to non-agricultural use. Therefore, the proposed HHSEGS project would have no impact with respect to farmland conversion.

Would the project conflict with existing zoning for agricultural use or a Williamson Act contract.

The California Land Conservation Act, commonly referred to as the Williamson Act, enables local governments to enter into contracts with private landowners for the purpose of restricting specific parcels of land to agricultural or related open space uses. (Chapter 7, Agricultural Land, Gov. Code § 51200-51297.4) There are no existing agricultural uses present on the proposed project site or laydown area. The proposed HHSEGS project is not located on land that is under a Williamson Act contract and as a result would not conflict with any Williamson Act contracts.

Would the project conflict with existing zoning for, or cause rezoning of, forest land (as defined in Pub. Resources Code §12220(g)), timberland (as defined by Pub. Resources Code §4526), or timberland zoned Timberland Production (as defined by Gov. Code §51104(g)).

The proposed project site and laydown area are not zoned for forest land, timberland, or for timberland production. In addition, there is no land zoned for such purposes within one mile of the project site. Therefore, there would be no conflict with, or cause for, rezoning of forest land or timberland and as a result there would be no impact to forest land or timberland.

PHYSICAL DISRUPTION OR DIVISION OF AN ESTABLISHED COMMUNITY

The proposed HHSEGS project and laydown area would be located in an area that is designated as open space in unincorporated Inyo County. The power plant and laydown area would be located entirely on leased private property, on a 3,097-acre site. The nearest residence to any of the power blocks is approximately 3,500 feet south of the Solar Plant 2 power block, and about 950 feet south of the project's southern boundary. There are scattered dwellings and trailers located beyond these residents to the south and east of the project site.

There would not be a need to relocate any residences as a result of the HHSEGS project. The HHSEGS project would be located entirely within an area that does not contain any residential development. Therefore, the HHSEGS project would not physically divide or disrupt any community within the Charleston View area. In addition, the proposed project would not involve the displacement of any existing development or result in new development that would physically divide an existing community.

The project's linear facilities would not present new physical barriers. The proposed transmission and gas lines would originate from the HHSEGS property in California and traverse the California-Nevada border before connecting to facilities within Nevada.

CONFLICT WITH ANY APPLICABLE HABITAT OR NATURAL COMMUNITY CONSERVATION PLAN

The HHSEGS project is not located within any Habitat Conservation Plan or Natural Community Conservation Plan and there will be no conflicts as a result of the proposed project.

CONFLICT WITH ANY APPLICABLE LAND USE PLAN, POLICY OR REGULATION

Energy Commission staff evaluates (Cal. Code Regs. Tit. 20, § 1744) the information provided by the applicant in the AFC (and any amendments), project design, site location, and operational components to determine if elements of the proposed project would conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project, or that would normally have jurisdiction over the project except for the Energy Commission's exclusive authority. As part of the licensing process, the Energy Commission must determine whether a proposed facility complies with all applicable state, regional, and local LORS (Pub. Resources Code § 25523[d][1]). The Energy Commission must either find that a project conforms to all applicable LORS or make specific findings that a project's approval is required for public convenience and necessity even where the project is not in conformity with all applicable LORS (Pub. Resources Code § 25525). When determining LORS compliance, staff is required to give "due deference" to a local agency's assessment of whether a proposed project is consistent with that agency's zoning and general plan (Cal. Code Regs. Tit. 20, § 1714.5). On past projects, staff has requested that the local agency provide a discussion of the findings and conditions that the agency would make when determining whether a proposed project would comply with the agency's LORS, were they the permitting authority. Any conditions recommended by an agency are considered by Energy Commission staff for inclusion in the proposed conditions of certification for the project.

As part of staff's analysis of local LORS compliance and to determine the county's view of the project's consistency with its general plan and zoning code, staff has reviewed Inyo County's General Plan, Zoning Ordinance and Renewable Energy Ordinance with respect to the proposed project and has had personal communications with Inyo County staff regarding LORS compliance. As a follow-up, Inyo County submitted a letter, dated November 29, 2011 (INYO 2011a), to Energy Commission staff that stated the proposed HHSEGS project is inconsistent with the general plan designation and zoning on the project site and indicated that the project is inconsistent with the Renewable Energy Ordinance.

An additional letter submitted by Inyo County to BrightSource Energy, Inc (February 23, 2012, INYO 2012c), reconfirmed Inyo County's determination that the project as proposed is not consistent with the general plan or zoning ordinance.

In addition to determining whether the project complies with local LORS, staff also makes a determination as to whether or not the project would create a significant impact. There may be instances where a project would conflict with LORS and not create a significant impact under CEQA.

Based on staff's independent review and analysis of the AFC and the local land use

LORS, staff concludes that the County of Inyo's General Plan, Zoning Ordinance, Subidivion Ordinance and Renewable Energy Ordinance are applicable to the proposed HHSEGS project.

COMPLIANCE WITH LORS

The AFC identified several LORS (Table 5.6-2) and indicated that the proposed HHSEGS project was in compliance with all applicable local LORS. Since the time of the AFC submittal to the Energy Commission, most of the LORS identified in the AFC have been rescinded as part of the revocation of the Solar and Wind Renewable Energy General Plan Amendment (REGPA) on September 6, 2011.

Land Use Table 2 summarizes the HHSEGS project conformance with applicable LORS.

Land Use Table 2
Project Compliance with Adopted and Applicable LORS

Applicable LORS	Description	Consistency Determination	Basis for Consistency
State			
California Subdivision Map Act	Governs the creation, recognition, consolidation/reconfiguration, adjustment and elimination of parcels on land within California.	No	The project site consists of 172 legally created parcels that will need to be combined to create one to three parcels.
Local			
Inyo County General Plan	Provides comprehensive, long-range plans, policies, and goals to guide the physical development of the county.	No	The project site is designated Open Space and Recreation (OSR) and Resort/Recreational (REC). Large renewable energy projects are not allowed in these land use designations.
Chapter 3 Government Element Goal Gov – 10: Energy Resources Policy Gov-10.1: Development	Encourages development of energy resources on both public and private lands consistent with policies and within the bounds of economic reason and sound environmental health.	Yes	The project is a renewable energy project that is consistent with this general goal and policy.
Chapter 4 Land Use Element Commercial Goal LU-3: Provide commercial land uses that adequately serve the existing and anticipated future needs of the community and surrounding environs.	Policy LU-3.4: Resort/Recreational Designation (REC) This designation provides for a mixture of residential and recreational commercial uses, such as resorts, recreational facilities, motels, campgrounds, trailer parks, restaurants, general stores, service stations, and similar compatible uses. This designation is oriented toward tourist use, however, it also permits permanent residential use and public and quasi-public uses. The Floor Area Ratio (FAR) shall not exceed 0.40. The base residential density shall be 1 du/25 acres. Clustering of	No	A portion of the project site is designated as REC and the project is not consistent with the intent of this policy. Inyo County has indicated that the tourist use is desired in this area. The intensity of the proposed project is not consistent with these goals and policies and a determination as to whether the project can incorporate elements that reduce this conflict has not been made by Inyo County.

	residential units is encouraged, with density of developed area allowed up to 24 du/net acre.		
Chapter 4 Land Use Element Commercial Goal LU-5: Provide adequate public facilities and services for the existing and/or future needs of communities and their surrounding environs, and to conserve natural and managed resources.	Policy LU-5.1: Open Space and Recreation Designation This designation provides for existing and planned public parks, ball fields, horse stables, greenbelts, and similar compatible uses. The FAR shall not exceed 0.20. The minimum parcel size is generally 40 acres.	No	The majority of the project site is designated as OSR. As indicated in the General Plan goals and policies, the project as proposed is inconsistent with those uses and there has been no review by Inyo County to determine appropriate measures to resolve this inconsistency.
Zoning Ordinance of the County of Inyo – Title 18	Provides a framework for development by indicating allowable uses and development standards that support the General Plan.	No	The project site is zoned Open Space with a 40-acre Minimum (OS-40). Large renewable energy projects are not allowed in this zone district.
Inyo County Renewable Energy Ordinance – Title 21	Provides a mechanism for Inyo County to regulate the development of large scale renewable energy projects. Provides procedures outside of those that are within the Title 18 Zoning Ordinance.	No	Renewable energy projects must be found to be consistent with the Inyo County General Plan prior to receiving a renewable energy impact determination or renewable energy permit or prior to entering into a renewable energy development agreement (Section 21.20.060 Consistency with the Inyo County General Plan)
Inyo County Subdivision Ordinance – Title 16	Provides a county process for implementing the California Subdivision Map Act.	No	The project applicant has not submitted a Reversionary Map for county approval. The project applicant has not submitted a request for the abandonment of public road rights-of-way, as requested by Inyo County.

Inyo County General Plan

State law requires each county and city to prepare and adopt a comprehensive and long-range general plan for its physical development (Government Code Section 65300). The general plan must include elements such as land use, circulation, housing, open-space, conservation, safety, and noise as identified in state law (Government Code Section 65302), to the extent that the topics are locally relevant. Once a general plan is adopted, its maps, diagrams, and development policies form the basis for a jurisdiction's zoning, subdivision, and public works actions. Under California law, no specific plan, area plan/community plan, zoning, subdivision map, nor public works project may be approved unless the jurisdiction finds that it is consistent with the adopted general plan.

The Inyo County General Plan comprises several related documents, including the General Plan Summary, Goals and Policies Report, Background Report, Issues and Alternatives Report, and the Environmental Impact Report (EIR). The EIR prepared for the general plan was prepared in order to meet the requirements of CEQA. As part of that analysis, impacts were analyzed and mitigation measures were developed to reduce potential environmental impacts to less than significant levels where feasible. The Inyo County General Plan and EIR were approved on December 11, 2001.

The land use element of the general plan designates the general distribution and intensity of land uses within the planning area while the open-space element describes measures for the preservation of open space for the protection of natural resources, the managed production of resources, and for public health and safety. The HHSEGS project site was identified in the general plan as Open Space and Recreation (OSR) and Resort/Recreational (REC).

As previously indicated, at the time the AFC was submitted to the Energy Commission (August 5, 2011), the County of Inyo had a Solar and Wind Renewable Energy General Plan Amendment (REGPA) in place that had been adopted by the Board of Supervisors on April 26, 2011. The REGPA was applicable to the Charleston View area, where the HHSEGS project site is located, as well as 14 other areas within the county.

The AFC Land Use Section 5.6 refers to this Inyo County General Plan REGPA as the primary planning document applicable to the project site. The REGPA provided the basis for approvals of solar or wind renewable energy facilities and established policies to encourage development of renewable energy in overlay zones in any zoning district under Title 18 of the Inyo County Code. The proposed project was identified by the REGPA as being within the Charleston View overlay zone. Projects that were within these overlay zones were subject to additional site-specific studies and appropriate environmental review according to Inyo County Code Title 21, Renewable Energy Development.

On September 6, 2011, the Inyo County Board of Supervisors rescinded the County's REGPA due to a legal challenge from the Sierra Club and the Center for Biological Diversity, which effectively eliminated the overlay zone that was discussed in the AFC. As a result of the revocation of the REGPA, the proposed project is now subject to the original general plan designations of OSR and REC.

In Chapter 4 of Inyo County's General Plan (Land Use Element), Land Use Policy 5.1 indicates that the OSR designation provides for existing and planned parks, ball fields, horse stables, greenbelts, and similar compatible uses. Although most of the project site is designated as OSR, there are some parcels in the southeastern portion of the site that are designated as REC. In addition, several parcels directly south of the project site are designated as REC, with some being designated as Rural Residential Medium Density (RRM).

The REC designation provides for a mixture of residential and recreational commercial uses, such as resorts, recreational facilities, motels, campgrounds, trailer parks, restaurants, general stores, service stations, and similar and compatible uses. The designation is oriented toward tourist use, but also permits permanent residential use; public and quasi-public uses.

A large solar electric generating system is not identified as an allowed use on lands designated as OSR or REC. The land uses identified as consistent with the project site would include uses that are generally open space uses that provide potential recreational opportunities. The proposed HHSEGS project is a large solar project that includes mirrors and solar power towers that would preclude open space uses on the project site. For these reasons, staff concludes that the proposed project is inconsistent

with Inyo County's General Plan and the corresponding analysis in the General Plan EIR.

As part of the responses to the PSA, the applicant contends that the proposed HHSEGS project is a public or quasi-public use and therefore, is allowed within the REC designation. The Inyo County General Plan, Chapter 8, Recreation Section 8.9, includes some discussion on examples of uses that are considered consistent with the REC designation. These include:

> **Active Recreation Area.** Sites that have been modified with structures or facilities designed for their enjoyment, such as a playground or recreation center. Examples in the County would include Dehy County Park in Independence and the hot springs in Tecopa.
>
> **Open Space.** A publicly owned or managed area that may be enjoyed for recreational activities even though its primary purpose may be some other activity (watershed protection, habitat protection, rangeland).
>
> **Passive Recreation Area.** Areas used in their natural state with few structures or facilities other than parking and trails.
>
> **Recreation Area.** Any public or private space set aside or primarily oriented to recreational use.

Staff confirmed with Inyo County as to the allowed uses within a public or quasi-public area; uses that would potentially be allowed include, churches, communication facilities, public parks and neighborhood-serving utilities such as an electrical substation, a cable routing box, a telephone exchange and similar types of small utilities that serve a neighborhood. It is therefore staff's determination that the HHSEGS project is inconsistent with the REC designation.

An additional response from the applicant indicated that the project as proposed is consistent due to the adoption of the General Plan Amendment 2004-06, which identifies all privately owned parcels with the Natural Resource and OSR designations to be designated as Rural Protection (RP). The significance being that the majority of the project site that is designated as OSR is now designated as RP. The applicant correctly identifies that the RP designation provides for the preservation of natural resources. The applicant further states that the General Plan Government Section indicates that renewable energy resources should be treated as natural resources and therefore, the HHSEGS project, as a natural resource, is allowed in the RP designation.

Staff reviewed this resolution and determined that although the General Plan Amendment did re-designate parcels that were OSR to RP, it was applicable only to properties listed on the attachment to the resolution. The HHSEGS project site does not contain any of the attached listed parcels and the RP designation is not applicable to the project site. The intent of the RP designation is to apply to land or water areas that are essentially unimproved and planned to remain open in character, providing for the preservation of natural resources, the managed production of resources, low intensity agriculture including grazing, park and other low-intensity recreation, wildlife refuges,

hunting and fishing preserves, horse stables, cemeteries, greenbelts and similar compatible uses. This designation would not be appropriate for a large solar project such as the HHSEGS project. Staff confirmed that the General Plan 2004-06 Resolution was not applicable to the HHSEGS project site with Inyo County staff.

In order for the HHSEGS project to be consistent with the general plan, the County of Inyo has indicated that a General Plan Amendment (GPA) would need to be approved.

According to Inyo County, the general plan land use designations that would potentially allow for the proposed HHSEGS project would include State and Federal Lands (SFL), Agriculture (A), or General Industrial (GI). In this instance Inyo County has indicated that the GI designation is the most suitable. On November 17, 2011, staff requested information as to whether the applicant would submit, or planned to submit, an application for local land use entitlements to change the land use designation (CEC 2011g, Data Requests Set 1C). The applicant indicated that they would discuss these requirements with Inyo County to determine whether such filings were necessary (CH2 2011f, Data Responses Set 1C, dated December 19, 2011).

On March 13, 2012, the Inyo County Board of Supervisors conducted a public meeting and received input from several county departments on the potential impact to county services from the construction and operation of the HHSEGS project (INYO 2012i). Several county departments (including Public Works, Sherrif's Department, Assessor, Health & Human Services and Waste Management) identified their concerns over the proposed project and the resources they estimated would be needed to address the potential impacts (INYO 2012i, pp 45-73). During this meeting, the applicant made a presentation to the Board on the benefits of HHSEGS, and were asked several specific questions by Boardmembers over concerns related to socioeconomics, land use, and project schedule (INYO 2012i, pp 80-98). The Board specifically asked if the applicant was going to submit a general plan amendment prior to the Energy Commission's decision. The applicant stated that they would discuss this with appropriate county staff and submit an application (INYO 2012i, pp. 99-101).

Shortly after the PSA publication, Inyo County received a GPA and Zoning Reclassification application from the applicant that was deemed complete on July 10, 2012. The GPA consisted of a Solar Overlay general plan designation for the project site with a Solar Overlay Zone district. The base zoning district and general plan designation would not change as a result of the requested application. This application is similar in nature to the REGPA that Inyo County had initially adopted for several areas within the County, including approximately 33,154 acres in the Charleston View area. As part of this process, Inyo County would review the application and determine appropriate development standards through their public land use entitlement process. As part of that process, Inyo County has initiated Native American Consultation as required under Senate Bill 18.

On August 6, 2012, a letter from the Briggs Alexander Law Corporation was received by the Energy Commission and posted online on August 8, 2012 (BRIGG 2012a). The letter was submitted on behalf of a property owner (Tsiamis) and stated that a 20-acre parcel located within the HHSEGS project site had not been secured (either through purchase or lease agreement) by BrightSource. Purchase or lease of the parcel would

give BrightSource site control, and thus legal authority to seek a GPA and Zone Reclassification from Inyo County. The 20-acre Tsiamis parcel is located on the southeastern portion of the HHSEGS project site (See **Land Use - Figure 3**).

On August 10, 2012, Inyo County submitted a letter to Brightsource Energy, LLC stating that the GPA and Zoning Reclassification was incomplete since it was not signed by all the property owners, or by a designated representative of the owners. In a follow up email sent to a representative of BrightSource, Inyo County Counsel stated that they had not received three of the four property owners signatures located on the HHSEGS project site necessary to process the GPA and Zoning Reclassification (CEC 2012bb, tn 66647, August 13, 2012). Two of the three property owners who have not signed are related to the Wiley Trust, which has an existing lease agreement already in place with the applicant. Status of the remaining third property owner (Tsiamis parcel) remains in question, as the applicant continues to negotiate and finalize a settlement agreement.

On August 29, 2012, the Inyo County Planning Department conducted a public meeting at the Tecopa Senior Center to receive public input on the GPA and Zoning Reclassication for the HHSEGS project. Although, a representative of BrightSource indicated to Inyo County that they were moving forward with negotiations with the Tsiamis parcel, staff has not received official notice of site control. For further information on the issues associated with the Tsiamis parcel as it relates to site control, please see the *Land Use Compatibility* discussion of this **Land Use** section.

The applicant expects to obtain all the required signatures to process the GPA with the county. Once Inyo County receives a complete GPA application, the county will proceed with obtaining public input and continue to work closely with Energy Commission staff to incorporate appropriate anlalysis and development standards. Inyo County would use either the FSA or the Presiding Member's Proposed Decision (PMPD) for their CEQA-level analysis and review of the GPA.

County Of Inyo Zoning Ordinance

The County of Inyo Zoning Code does not specifically identify large solar projects as an allowed use in any one zoning district. However, a letter from the County of Inyo Board of Supervisors (INYO 2011a dated November 29, 2011), states that a large solar project would potentially be consistent with the General Industrial and Extractive zone district (M-1).

The General Industrial and Extractive zone allows for several types of uses including, but not limited to, agricultural, manufacturing, commercial, railroad yards, airports and landing fields and industrial uses. A conditional use permit (CUP) allows for other manufacturing and industrial uses and more intensive uses such as mining and processing of natural resources.

Currently, the project site is zoned Open Space with a 40-acre minimum lot size. The proposed HHSEGS project is not a permitted use within the OS-40 district. According to the Inyo County Zoning Ordinance, the Open Space zone is for areas designated as open space to encourage the protection of mountainous, hilly upland, valley, agricultural, potential agricultural, fragile desert areas, and other mandated lands from fire, erosion, soil destruction, pollution and other detrimental effects of intensive land

use activities.

Permitted uses in the OS zone include single-family dwellings, farms and ranches for a variety of agricultural activities, livestock ranches, animal hospitals or kennels, wildlife refuges and hunting and fishing preserves, and wilderness areas and uses. Various accessory uses are also allowed in support of the permitted uses.

Uses such as public stables, public and quasi-public buildings, golf courses, farm labor, cemeteries, crematories, mausoleums and columbariums, airports, refuse disposal sites, and mining and processing of natural resources are also potentially allowed with a CUP. Renewable energy projects, such as HHSEGS, are not identified as an allowed use on the project site.

In order for the HHSEGS to be consistent with the zone district, a Zone Reclassification would need to be processed to change the OS-40 zone district to the General Industrial and Extractive district (M-1). As part of this process Inyo County would normally require a CUP to ensure applicable development standards were implemented for the proposed project. Because the HHSEGS is a renewable energy project, it is also subject to standards as determined under the county's Title 21 code, Renewable Energy Ordinance process.

As indicated in the general plan discussion, the applicant submitted a GPA and Zoning Reclassification to Inyo County that was initially deemed complete and then determined to be incomplete due to the lack of the project site property owners signatures on the application. The applicant expects to obtain all the appropriate signatures for the GPA and Zone Reclassification, although a discussion of the potential ramifications of not obtaining the signatures is included in the "Land Use Compatibility" subsection in this FSA section.

The proposed Zoning Reclassification submitted to Inyo County requests a Solar Overlay zoning district. Inyo County has provided staff with appropriate development standards for the proposed HHSEGS project. Inyo County has determined that the applicable development standards for the proposed project are the development standards of the M-1 zone district. However, Inyo County's Renewable Energy Ordinance (discussed below), allows the county flexibility with regard to development standards for renewable energy projects.

Although the M-1 zone height requirements for structures and buildings are limited to a maximum of forty (40) feet, the proposed HHSEGS project would exceed this limit by 710 feet with the two 750-foot solar power towers. If Inyo County were the permitting agency, they would require a variance for the exceedance of height restrictions. However, for those projects subject to Title 21 (see following section), the county may determine different development standards based upon the type of renewable project proposed. Other development standards include parking and setback requirements. The parking requirement in the M-1 zone is one parking space for each full-time employee, plus guest parking and loading space as deemed appropriate. The M-1 zone setbacks for the project site would be 25 feet for the front, 15 feet for the rear and 10 feet for the side. In the applicant's data responses Set 2E received on May 4, 2012 (CH2 2012y), the applicant proposes a landscape area of 20 feet deep and a non-paved

roadway setback of 12 feet deep behind the fencing along the project's frontage with Old Spanish Trail Highway. However, a recent letter from Inyo County Department of Public Works has requested right-of-way for road improvements at a minimum of 24 feet wide along the project frontage. Inyo County has told staff that a setback of 25 feet, plus an additional 24-foot right-of-way (ROW) would be required for the proposed HHSEGS. The 24-foot right of way was requested from Inyo County Public Works for future improvements on Old Spanish Trail Highway (see Condition of Certification **TRANS-2** in the **Traffic and Transportation** section of the **FSA**). Because the 24-foot right of way is for future road improvements, Inyo County has indicated that no trees or other large landscaping features should be placed within the ROW and that an additional setback of 25 feet should be required for landscaping/screening.

Inyo County Renewable Energy Ordinance

The County of Inyo has adopted a Renewable Energy Ordinance (Title 21) to support, encourage and regulate the development of solar and wind resources. Proposed renewable energy projects submitted under the previously approved REGPA were also subject to Title 21. Title 21 remains in effect and states that any person proposing to construct a renewable energy facility within Inyo County must either obtain a Renewable Energy Permit, enter into a Renewable Energy Development Agreement with Inyo County or, if the project is under the jurisdiction of another agency, obtain a "renewable impact determination" from the planning commission. These options are in lieu of submitting a rezone to a zone designation that is identified as compatible in the zoning ordinance (Title 18).

Title 21 provides Inyo County options to implement necessary development standards and mitigation measures and also identifies a process where a renewable energy project can be consistent with applicable LORS regardless of the zone district under Title 18. Under Title 21 the project must also be consistent with the County General Plan before an applicant can either obtain a Renewable Energy Permit from, or enter into a Renewable Energy Development Agreement (Section 21.08.100) with, the county prior to commencing construction of the proposed project. For projects not subject to the permit, the Planning Commission issues a Renewable Energy Impact Determination and also determines whether or not the project is consistent with the general plan.

Inyo County can use Title 21 to implement the requirements of a development agreement, renewable energy permit or impact determination that could replace those of the Zoning Code in the following areas: (1) Permitted, conditional, and/or accessory uses related to a facility and its accessory uses and structures; (2) distance between buildings; (3) height, density and intensity; (4) light and glare; (5) noise; and (6) wireless communications facilities directly related to the facility (ICC 21.20.20).

Inyo County staff in their discussions with the applicant, have requested the applicant submit a GPA. In addition to the GPA, the county has requested the applicant to submit either a Zone Reclassification (Title 18), or alternatively under Title 21, enter into a Renewable Energy Development Agreement or apply for a Renewable Energy Permit or impact determination in lieu of a Zoning Reclassification.

To ensure that the proposed project complies with Title 21, the following development standards have been determined applicable to the HHSEGS site:

Height: The height limit in the M-1 zone district is forty feet, although Title 21 can allow a different height depending upon the type of proposed renewable energy project. The solar power towers are 750-feet tall and are therefore, not consistent with the M-1 zoning height requirements. Although the height of the solar power towers is considerably over the height limits, Title 21 allows for the exceedance if the renewable energy project requires such a project feature to operate. The project as proposed does not comply with the height restrictions identified in Inyo County's Zoning Ordinance and staff has determined that an exceedance to the height limits would be required for project operation in accordance with Title 21.

The proposed fencing along the perimeter of the project would consist of a galvanized eight-foot tall chain link security fence. The proposed fencing height is not in compliance with the Inyo County Zoning Ordinance's height limit of six feet (Section 18.78.160 Fences, walls and hedges – Generally). However, Section 18.78.170, Fences, walls and hedges – Exceptions to height limitations, states that the height limitations shall not apply if a greater height is required by another ordinance, or is allowed by a variance specified in connection with the authorization of a conditional use.

Under Title 21, in lieu of the standards in Title 18 concerning permitted, conditional or accessory uses related to the facility and its structures, including setback requirements, other standards that are either necessary or appropriate may be adopted. Staff has determined that the eight foot tall fence would be required for security purposes.

Setbacks: As indicated in the previous Inyo County Zoning Ordinance discussion, Inyo County is requesting a 25-foot setback consistent with the M-1 zone. Staff is proposing Condition of Certification **LAND-3** to ensure that the setback is consistent with the M-1 zone district and Title 21. This setback will be in addition to a 24-foot ROW requirement for Old Spanish Trail Highway (**TRANS-2**) and includes landscaping as required by the Condition of Certification **VIS-2** in the **Visual Resources** section of the **FSA**. The applicant's proposed 20-foot landscaping would be required to be within this 25-foot setback.

Lighting: The Visual Resources section is proposing Condition of Certification **VIS-3** to address project lighting requirements.

Parking: Parking standards in the M-1 District require one parking space for each full-time employee, plus guest parking and loading space as deemed appropriate. However, Title 21 allows for flexibility in determining parking requirements. The applicant has proposed 62 parking spaces (58 for non-handicapped and four for handicapped) in the common area and 26 parking spaces at each power block (24 non-handicapped and four handicapped). The number of employees that will work at the HHSEGS site is 120, which would require an additional 32 parking spaces per county code. Because 40 employees will work during the day shift and 80 will work during the night shift, staff has determined that the proposed parking is adequate and consistent with the intention to provide adequate parking for employees as each shift will have adequate parking for every employee and additional parking for guests and loading.

Signage: Chapter 18.75 of the Zoning Ordinance identifies requirements for signage. The applicant has indicated that during construction, speed limit signs will be posted

that will comply with the M-1District sign height limits of 25-feet and that any additional signs proposed will conform with the requirements of the Inyo County Code. Condition of Certification **LAND-4** has been included to ensure compliance with Chapter 18.75.

Financial Assurances: As part of the Title 21 entitlements, the applicant is required to provide a reclamation/revegetation plan and financial assurances for implementation of this plan, should the applicant fail to implement the reclamation/revegetation plan. In support of this requirement, staff submitted Data Requests 2E (4/5/2012, Docket Log #64606), following receipt of an April 2, 2012 letter from Inyo County (INYO 2012), that asked the applicant how they intend to comply with the financial assurances requirement in Title 21. The applicant's responses (CH2 2012y, dated May 4, 2012) stated that the Energy Commission has not required financial assurances as a condition of certification in the past, and that this requirement would create an undue burden on the applicant and would distinctly single out this facility.

It should be noted that in accordance with the Surface Mining and Reclamation Act of 1975, financial assurances have been used on large mining operations to protect state and local agencies from bearing the costs of reclamation. Should a large solar facility fail and be abandoned, or if a project owner is unable to perform appropriate reclamation/revegetation requirements then the local agencies may be burdened with the cost to remedy the situation. BLM also requires financial assurances on large solar projects to ensure compliance with the terms of their Right-of-Way (ROW) grant, including reclamation of the site upon completion of the term[10]. As a result, the Rice Solar Energy Project (09-AFC-10) and Ivanpah (09-AFC-5C) projects both required posting of a surety bond to ensure restoration of BLM's ROW.

Large solar projects pose new challenges for local agencies. Many local jurisidictions are considering ordinances that would require financial assurances for large scale utility projects. In addition, in response to the increase in large solar projects proposed on both private and public land within California, the California County Planning Directors Assocation, in cooperation with several agencies (including the Energy Commission), published a "*Solar Energy Facility Permit Streamlining Guide*" (February 3, 2012). Although the focus was on large solar projects that are approved by local jurisdictions, the document provided guidance on developing local ordinances and policies that would alleviate several concerns including financial assurances.

Title 21 requires financial assurances that may be in the form of surety bonds, irrevocable letters of credit, trust funds or other mechanism to ensure that reclamation/revegetation plans will proceed and be accomplished in accordance with an approved reclamation plan. The County has expressed intent to require such security if the Energy Commission does not, although the type of financial assurances that it would require is not known at this time.

[10] The BLM has issued policy guidance for determining bonding requirements (Instruction Memorandum (IM) 2009-153, dated June 19, 2009) which provides detailed information about the process for determining the appropriate financial guarantees for intensive land uses on public lands.

Other Considerations

The project site consists of 170 undeveloped parcels with each parcel having property lines delineated on a recorded parcel map. There appears to be some easements for utilities and roadways associated with those parcels that were dedicated to Inyo County. A letter from County of Inyo to BrightSource Energy, Inc. (INYO 2012c, dated February 23, 2012) states that the applicant will need to rectify this by one or more of the following: (1) subdivision, (2) merger, or (3) reversion to acreage. Inyo County has adopted Title 16 Subdivisions Ordinance that provides the county with a process to implement the California Subdivision Map Act.

The applicant provided information in their Supplement Response to Data Adequacy Review (HHSG 2011b, posted September 9, 2011) that stated the parcels would be combined to create either one large single legal parcel or three or more parcels due to ownership interests. In this response, the applicant indicated that given the nature of the heliostats, it was not clear whether or not a merger or reversionary map would be required under Inyo County ordinances or the Subidivision Map Act.

According to Inyo County some of the unimproved road dedications on the project site have become public roads and these particular roads can only be eliminated through a discretionary decision by the Board of Supervisors. Staff reviewed the subdivision parcel maps that are applicable to the project site and the maps show private roadway easements along all of the parcels within the project site. The subdivision maps also contain wording indicating that the roadways were an offer of dedication. If these roadways are in fact public rights-of-way that were recorded as a result of the initial subdivision approval, the Inyo County Board of Supervisors may need to abandon those public rights-of-way prior to the HHSEGS construction. The applicant disputes Inyo County's claims in their entirety.

The question of whether the roads are in fact public rights-of-way that Inyo County would require the land owner to abandon is a legal one whether common law or statutory law applies. Such a determination is beyond the scope of this analysis. The premise is that under common law, the intent of the owner to dedicate road easements and the use of the road easements by the public constitutes acceptance of the dedication and results in public rights-of-way. Under statutory law, pursuant to the California Subdivision Map Act, the road easement dedication must be formally accepted by the jurisidiction (the hearing body of Inyo County).

Inyo County contends that common law applies and has requested a Condition of Certification requiring the applicant to submit a formal request to abandon these public rights-of-way. The applicant contends that statutory law applies and because Inyo County has not formally accepted the road easements pursuant to the California Subdivision Map Act, the road easements are not public rights-of-way.

Because the road abandonment is a legal issue between the land owner and Inyo County, staff has not proposed a condition of certification requiring that roads on the HHSEGS site be abandoned.

Compliance with the General Plan, Zoning Ordinance and Title 21 and Impact Determination

When determining whether a project is consistent, the project is evaluated for consistency with detailed local standards and requirements as well as with the broader context of the general plan and its elements, environmental plans and policies, and regional environmental plans. The project elements that conflict with the plans or policies are evaluated and whether these conflict(s) would result in the project being inconsistent with the land use designation and/or environmental goals and policies of the county. Often in instances where the project is inconsistent, an applicant would also submit a proposed general plan (land use) amendment and/or zone change to the local jurisdiction. As part of this process, the local agency would determine whether all elements of the inconsistency have been addressed. These elements could include density, design, measures to reduce land use compatibility and other items as deemed appropriate by the local agency.

When a general plan and corresponding documents are adopted by a local agency, an environmental analysis identifies those areas that would have potential significant impacts and proposes mitigation measures to the extent feasible to decrease those impacts to a less than significant level. This analysis is considered and incorporated into the general plan through goals and policies and the zoning ordinance supports the land use patterns that were established by the general plan. When a project applicant proposes a land use that is not consistent with the general plan, the local agency requires a GPA and other required land use applications along with a corresponding environmental review to ensure that the project is analyzed through a local public process to determine the associated impacts and appropriate mitigation or project requirements that would decrease any land use impacts.

Inyo County staff have indicated that there are several ways in which the applicant can comply with LORS. In each case, a GPA would be required. Options include either a Zone Reclassification, or in compliance with Title 21, submit a Renewable Energy Permit, or enter into a Renewable Energy Development Agreement in lieu of a Zoning Reclassification. These entitlements would normally be required if the county were approving the project. In this instance, since the county is not the permitting agency, the applicant would be required to obtain a Renewable Energy Impact Determination from the Planning Commission in accordance with Title 21. This determination requires a general plan consistency determination and allows the county to also incorporate appropriate development standards and mitigation measures. Although the Energy Commission is the permitting agency staff considers county land use requirements in their analysis to determine consistency with LORS. Staff has worked with Inyo County to obtain as much information as possible with regard to what would be required if they were the permitting agency.

As indicated in the previous sections, the applicant has submitted a GPA and Zoning Reclassification for a solar overlay on the project site. However, this application has been determined to be incomplete due to the lack of a signature of one property owner (Tsiamis), whose parcel is located on the southeastern portion of the project site (see **Land Use Figure 3**). Currently, the applicant is working with the property owner, but at the time of publication of this **FSA**, applicant has not yet submitted evidence that

Tsiamis' parcel has been secured. Until the applicant has submitted the signatures of all the property owners, Inyo County cannot process the application for the GPA and Zoning Reclassification, and the proposed HHSEGS remains inconsistent with county LORS. Should the county receive a completed application, however, they would use one of the Energy Commission's environmental documents as a basis for their CEQA review of the GPA and Zone Reclassification.

The project as proposed is inconsistent with County of Inyo's LORS. In determining whether this inconsistency would be a significant impact with regard to Land Use, Appendix G of the CEQA Guidelines is considered as well as independent analysis of the county's standards or thresholds. Specifically, the proposed HHSEGS project conflicts with an applicable land use plan, policy, or regulation of an agency with jurisdiction (in this case Inyo County), that was adopted for the purpose of avoiding or mitigating environmental effects.

The HHSEGS project would conflict with Inyo County's General Plan, Zoning Ordinance and the Renewable Energy Ordinance and staff has determined that this is a significant impact. The HHSEGS project is an intensive land use and the project site does not allow such intensive land uses. The project site is zoned to allow for open area recreational uses that are tourist oriented. The land uses in the area surrounding the project are also not consistent with the proposed project.

Without appropriate Inyo County land use approvals described above, the project would be inconsistent with LORS, would have significant land use impacts under CEQA, and would require an override for approval and certification.

Transmission and Natural Gas Lines

Although the HHSEGS project would be located on privately owned land in California, the transmission and natural gas lines, once they leave the eastern edge of the HHSEGS site along the California border, would be located on public land managed by the BLM Southern Nevada District Office. Therefore, the environmental impacts of the transmission and gas pipelines and associated facilities are being analyzed in a separate environmental process in accordance with NEPA, for which BLM will be the lead agency. The Valley Electric Assocation (VEA) project BLM is currently reviewing is called the "Hidden Hills Transmission Project". A Notice of Intent (NOI) for this project was prepared and published by the BLM in the Federal Register on October 11, 2011, and three public scoping meetings were held on November 8, 9 and 10, 2011 in Pahrump, Jean and Boulder City, Nevada. The draft Environmental Impact Statement (EIS) is currently being prepared by BLM, and is expected to be released for public review by late December, 2012 or early January, 2013.

The Hidden Hills Transmission Project would require a 10-mile-long generation tie-line (gen-tie line) from the HHSEGS site to the proposed Crazy Eyes Tap Station,[11] where the project would interconnect to the VEA electric grid. The gen-tie line would originate at the HHSEGS' onsite switchyard, cross the Nevada state line, and continue east for approximately 1.5 miles until reaching Tecopa Road. At Tecopa Road, the route would

[11] In the HHSEGS AFC, and in the Preliminary Staff Assessment (CEC 2012u), this substation was referred to as the "Tap Substation."

head northeast paralleling Tecopa Road until it reaches the Crazy Eyes Tap Substation, which would be located immediately east of the Tecopa Road/SR 160 intersection. The Crazy Eyes Tap Substation would interconnect to the existing VEA Pahrump-Bob Tap 230-kV line.

The Hidden Hills Transmission Project also encompasses a 12-inch-diameter natural gas pipeline. The natural gas pipeline would enter the HHSEGS site in the common area where it would connect with an onsite gas metering station. It would exit the HHSEGS site at the California-Nevada border, and extend 32.4 miles to the Kern River Gas Transmission (KRGT) existing mainline system just north of Goodsprings in Clark County, Nevada.

Laydown Area

The proposed construction laydown area is a permitted use under the County of Inyo Zoning Ordinance, Temporary Use Regulations (Section 18.78.190). The Section indicates that a temporary building or use necessary and incidental to the construction of a building or group of buildings, when located in the same or abutting property and only during the period of construction may be allowed. The laydown area consists of 180 acres located to the west of the site and would be used for equipment laydown, construction parking, construction trailer, a tire cleaning station, heliostat assembly buildings, and other construction support facilities. This area is also designated as OSR and zoned OS-40.

LAND USE COMPATIBILITY

When a jurisdictional authority, such as the County of Inyo, establishes zoning designations to implement its general plan, it is that agency's responsibility to ensure the compatibility of adjacent zoning and permitted uses and incorporate conditions and restrictions that ensure those uses will not result in a significant adverse impact to surrounding properties. As noted in the discussion above under the section titled **Physical Disruption or Division of an Established Community** and in **Land Use Table 2,** development of the proposed project and its associated facilities would not divide an established community.

In general, a power plant and its related facilities may also be incompatible with existing or planned land uses, resulting in potentially significant impacts, if they create unmitigated noise, odor, public health or safety hazards, visual, adverse traffic, interfere with, or unduly restrict, existing or future land uses or cause other environmental impacts which conflict with surrounding land uses and the activities and conditions typically associated with those land uses.

As indicated in staff's previous sections, the HHSEGS project is inconsistent with the general plan designation, zoning ordinance and renewable energy ordinance. Normally this land use inconsistency would be remedied through a general plan amendment and rezone. However, Inyo County's renewable energy ordinance is applicable to the proposed project. As part of any land use entitlements, the county would also consider

the surrounding land uses and make determinations or findings as part of their approvals.

At this time, Inyo County is considering BrightSource's application for a GPA and Rezone to ensure that the project would be consistent with their General Plan and Zoning. Some of the findings that Inyo County would have to make for a GPA include whether or not the proposed project is consistent with the goals and policies of the Inyo County general plan and with the intent of the zoning ordinance. Should Inyo County deny or not act upon the proposed GPA or rezone, the proposed HHSEGS would continue to be inconsistent with Inyo County LORS.

In certain instances the county could determine that a project would create significant impacts with regard to surrounding land use conflicts and still approve a project and corresponding environmental document with overriding considerations. Inyo County has provided input to staff in order to implement appropriate development standards to the extent possible in lieu of their approval process, but the project remains inconsistent with the general plan designation and zone district.

Assessment of Surrounding Land Uses

The nearest residence to the proposed HHSEGS project would be within approximately 300 feet east of the fence line, and the nearest residence to any power block equipment is approximately 3,500 feet south of the Solar Plant 2 power block and about 950 feet south of the project's southern boundary. The St. Therese Mission, a commercial facility that recently broke ground, is located approximately 0.5 mile east from the HHSEGS boundary. The St. Therese Mission will consist of a chapel, columbarium, garden restaurant, visitor's center, playground, restrooms, and an onsite caretaker home. The St. Therese Mission is in the process of constructing the various project buildings.

Please refer to the **Air Quality, Hazardous Materials Management, Noise and Vibration, Public Health, and Transmission Line Safety and Nuisance** sections of this **FSA** for detailed analyses of the air quality, dust, hazardous materials, noise, public health hazards and nuisance impacts on surrounding occupants.

Visual impacts of the project on surrounding land uses are also considered with regard to land use compatibility. The surrounding land uses include the unincorporated community of Charleston View, BLM land and wilderness areas, and the Old Spanish National Historic Trail. The area adjacent to the site in Nevada is largely BLM land with a smaller portion in private ownership. No development has occurred in Nevada close to the project site that would be subject to nuisance impacts.

The HHSEGS project is a large solar thermal power plant with two 750-foot power towers and related facilities. This use is an intensive land use that will be adjacent to land designated as OSR and zoned OS. In addition, the project is proposed near existing residences (nearest residence is approximately 300 feet east of the solar field with remaining Charleston View residences slightly further to the south) and would be visible from the surrounding BLM wilderness areas and the Old Spanish National Historic Trail. The Inyo County Zoning Ordinance requires a variance for structures over 30 feet in the OS zone and 40 feet in the M-1 zone. There are several other requirements related to visual resources in the Inyo County General Plan that are

applicable to this project, discussed in further detail in the **Visual Resources** section of this **FSA**.

From a land use perspective, the proposed project could have a significant impact on surrounding land uses if it poses land use incompatabilities for surrounding parcels. Such land use incompatabilities could occur if there are uses that are inconsistent or would pose substantial changes that would impact surrounding land uses. The project proposes changes to the existing visual character of the area by the addition of 170,000 heliostats, each heliostat consisting of two mirrors approximately 12-feet high by 8.5-feet wide mounted on pylons (total area of 24-feet high by 17-feet wide), and two 750-foot tall solar power towers.

The project would pose a substantial change in the existing visual character and although not many residents surround the proposed project, the visual impacts represent a substantial change in the rural open space character of the area. The height of the power towers are substantially over the height limit in the OS and M-1 zone and cannot be screened from the adjacent residents or the public that use the various recreational and wilderness areas within California and Nevada.

In addition to the visual impacts on surrounding land uses, the applicant needs to demonstrate site control of the Tsiamis parcel, which would provide them with the legal right to seek a GPA and Zoning Reclassification from Inyo County. The applicant has not yet demonstrated that the parcel has been purchased or leased. Therefore, should the applicant fail to obtain the necessary approval to use the Tsiamis parcel, an additional land use incompatibility would exist, and Inyo County may not move forward with approval of the GPA and Zoning Reclassification. An approval of the HHSEGS project without the Tsiamis parcel would ultimately result in the Tsiamis parcel being surrounded on three sides by large heliostats. In addition, the only road providing access to the Tsiamis parcel is the eastern access road that leads into the project site and to the common area. The applicant would need to provide adequate access to the Tsiamis parcel, in compliance with the Subdvision Map Act and Inyo County requirements; it is not clear how that would occur. If the HHSEGS project were to be built around the Tsiamis parcel, it would result in a significant land use incompatibility.

Visual Resources staff has concluded that the project would have significant and unmitigable adverse direct and cumulative impacts. It is staff's conclusion that the proposed project is not compatible with surrounding land uses, and would result in a significant and unmitigable impact that will have an impact on surrounding land uses.

Military Special Use Airspace

A military airspace area, called R-2508 Special Use Airspace Complex, lies approximately 10 to 15 miles from the project site. The airspace and associated land area consists of bombing ranges, supersonic flight corridors, low altitude high speed maneuver areas, radar testing areas, warfare training areas, and refueling training areas.

An Obstacle Evaluation Study (August 16, 2010), was prepared for the HHSEGS project (AFC Appendix 5.12 Traffic and Transportation: Capitol Airspace Group, August 16, 2010) to identify obstacle clearance surfaces established by the Federal Aviation

Administration (FAA) that would limit the height or location of proposed solar towers within the defined study area. As a part of this study Mr. Anthony Parisi, Head of the Sustainability Office for NAVAIR Ranges for the Department of Defense, was contacted to determine whether there would be an impact from the solar power tower development with regard to military mission operations. Mr. Parisi's response indicated that although the initial review did not identify any conflicts with military training, a more formal review under the United States Code 49, Section 44718, may still result in objections from the Department of Defense (DOD).

A follow up email was sent by staff to Mr. Parisi and a confirmation of the assessment that no conflicts were identified was received from Mr. Parisi on February 27, 2012 (CEC 2012l*)*. The Capitol Airspace Group Obstacle Evaluation Study stated that, "Over the past year, the DOD has been objecting to renewable energy projects via the environmental review and local permitting processes". The study also encouraged the applicant to enter into discussions with the FAA and DOD as early as possible to identify and overcome potential objections from the military regarding impacts to long range radar systems and military operations. Mr. Parisi stated that although a more formal review may be conducted, the formal response would likely not be any different. Therefore, at this time, the HHSEGS project is not anticipated to create any land use compatibility impacts with regard to the surrounding airspace and military operations area.

CUMMULATIVE IMPACTS

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (Cal. Code Regs.§15065(a)(3).

The cumulative impact assessment identifies other known projects or land use changes proposed in the vicinity of the project that may either combine with the proposed project to create a land use incompatibility or nuisance impacts with the existing land uses.

The cumulative land use and planning analysis considers past, current and probable future projects that are relatively near the proposed project that would contribute to cumulative impacts by impacting agricultural or forest lands, disrupt or divide an established community, conflict with applicable land use plans, policy or regulation, or conflict with an applicable habitat conservation plan or natural community conservation plan. The geographic scope for the analysis of cumulative land use impacts related to this land use analysis includes the surrounding area in Inyo County and the lands near the California-Nevada state line that extend partially into the Pahrump and Sandy Valley area in Nevada. Staff reviewed known past, current, and probable future projects within California and near the project in Nevada that are in the vicinity of the proposed HHSEGS project that may either combine with the proposed project to create a land use incompatibility or nuisance impacts with the existing land uses.

Refer to the projects identified in **Land Use Table 3, Cumulative Projects** below and

shown on Figure 5.6-3 in the AFC. (please also see **Cumulative Effects Figure 1** and **Figure 2** in the **EXECUTIVE SUMMARY**)

Land Use Table 3
Cumulative Projects

Jurisdiction	Project	Project Description	Location/ Distance from Proposed HHSEGS Project Site	Status of Project
County of Inyo	St. Therese Mission	A 17.5 acre environmental park development that includes a chapel, a meditation garden, a restaurant facility, a visitor's center, an enclosed columbarium, an outdoor garden area, above-ground vaults and an on-site caretaker home.	881 E. Old Spanish Trail; approximately 0.5 mile southeast of project site	**Approved** The applicant has initiated rough grading and laying base work for facilities.
Nye County (Nevada)	Pahrump Airport	International Airport to supplement the McCarran International Airport in Las Vegas. 5,934 acre site adjacent to Pahrump, NV. 7,000 acre sphere of influence.	Approximately 12 miles NW of HHSEGS	Draft EIS was in progress, but suspended June 2010. New reports in June 2010 suggest project on hold.
Nye County (Nevada)	Element Power-Solar	100 MW Photovoltaic, 2,560 acres	6 ½ miles north of proposed HHSEGS in Nevada.	On hold
Nye and Clark County, (Nevada)	Hidden Hills Valley Electric Transmission Project (NVN089669)	A new substation located just east of HHSEGS in Nevada, 230 kV transmission line along Old Spanish Trail Highway to Highway 160. A new 10-acre substation at Highway 160 in Nevada.53.7 miles of new 500kV transmission lines to El Dorado substation in Nevada. A new 230 kV transmission line to Pahrump, Nevada. Introduction of significant industrial-scale electric facilities.	Less than one mile from HHSEGS, extending 9.7 miles to Highway 160, Nevada and beyond.	DEIS Pending (BLM lead)
Clark County (Nevada)	Sandy Valley (NVN090476)	Solar Power Tower Plant on BLM-managed land (750 MW).	8 miles east-southeast of HHSEGS near Highway 160.	Plan of Development

Source: Hidden Hills Solar Electric Generating System AFC Figure 5.6-3, Cumulative Projects; St. Therese Mission Notice of Determination (Filed on June 23, 2010), Inyo County Current List of Projects (http://inyoplanning.org/projects.htm). California Energy Commission list of cumulative projects (May 2012)

The St. Therese Mission is the only current project that is being developed in California near the project site (approximately 0.5 miles southeast of HHSEGS). The St. Therese Mission is a 17.5 acre campus-style environmental park functioning primarily as a columbarium with garden niches and outdoor seating for reflection. It is a low-profile development with structure heights meeting the limitations of the Open Space designation and was found to be consistent with both the Inyo County General Plan and Zoning Ordinance[12]. It is slated to use desert plantings and colors in order to blend in with its environment. The County has reserved the right for additional 10 foot right-of-way along Old Spanish Trail Highway for turning lanes. Therefore it is assumed the project will be set back from the roadway. There are no other projects in California in the project area that are planned, proposed, or recently approved.

The Pahrump Valley General Aviation Airport is proposed to be located approximately 10 to 12 miles northwest of the HHSEGS site in Nye County, Nevada on BLM land. The Pahrump Valley Aviation Airport is currently going through environmental review. The EIS will analyze two 650-acre alternative airport sites, both located on BLM-administered federal public lands. Recent information on the status has revealed that BLM has had some concern over the land lease and the financial viability of the project and it may currently be placed on hold.

The Element Power Solar Project proponent filed a ROW application with the BLM Las Vegas Field Office on September 9, 2010 for the development of a solar photovoltaic project approximately seven miles north of HHSEGS. The ROW application covers approximately 2,560 acres of land in Nye County. According to the BLM solar project listing, the ROW application is on hold until 2013 and is not identified as a BLM priority project. Although the project may proceed forward, there is a possibility that the project may not be constructed due to issues identified in the BLM screening process.

BLM is currently preparing a Draft EIS for the Valley Electric Associatino (VEA) Hidden Hills Transmission Project. The transmission lines and associated facilities will be constructed on BLM-managed property in Nevada. The project includes new transmission lines/poles and upgrades to existing lines along with a new Tap (Gamebird) Substation, located at the intersection of Old Spanish Trail Highway (Tecopa) and Highway 160. The Hidden Hills Transmission Project would also include a new 12-inch diameter natural gas pipeline extending 32.4 miles from the HHSEGS site to the Kern River Gas Transmission (KRGT) existing mainline system just north of Goodsprings in Clark County, Nevada.

Another project under consideration is the proposed BrightSource Energy (BSE) Sandy Valley project. This project will use BSE's proprietary "power tower" technology on BLM land in Nevada, approximately five miles east of the proposed HHSEGS site. BSE has submitted their ROW application to BLM and is currently awaiting approval.

CUMULATIVE IMPACTS ANALYSIS

The following land use areas have been analyzed with regard to cumulative land use impacts.

[12] Notice of Determination, Inyo County, Conditional Use Permit #2010-02//St.Therese Mission, June 23, 2010.

Agriculture and Forest

The project as proposed does not have any impacts to agricultural or forest lands or conflict with any land that is zoned for agricultural purposes and therefore, does not contribute to cumulative impacts related to this land use area.

Physical Disruption or Division of an Established Community

Because the HHSEGS project does not directly physically divide an established community it would not contribute to a cumulative impact in this land use area.

Conflict with Any Applicable Habitat or Natural Community Conservation Plan

The HHSEGS project does not conflict with any habitat or natural community conservation plans and will not contribute to any cumulative impacts in this land use area.

Conflict with Any Applicable Land Use Plan, Policy or Regulation

The HHSEGS currently conflicts with Inyo County's general plan, zoning and renewable energy ordinance. The nearest project to HHSEGS in California is the St. Therese Mission. No other projects have been approved or planned in the area. The St. Therese Mission is consistent with existing land uses and was found to have less than significant impacts with regard to land use.

In California, the proposed HHSEGS project will not contribute to significant cumulative impacts. Although the project is currently inconsistent with applicable land use plans and policies, there are no other projects that can be considered together with the HHSEGS project that would create cumulative impacts with regard to land use conflicts.

The other proposed projects identified for cumulative impact analysis include projects in Nevada: Pahrump Airport, Element Power Solar, VEA Hidden Hills Transmission Project, and the Sandy Valley solar power tower project. All of these projects are several miles away from the HHSEGS project site, although staff has noted that they are all on BLM designated lands.

BLM has designated areas that allow for solar development, while other areas provide limited potential for solar development. BLM is currently analyzing large solar utility projects throughout California and Nevada, as well as other western states, and is in the process of preparing a programmatic Solar Energy Development EIS (PEIS). The PEIS will consider, among other things, how the projects would interfere with existing land uses (grazing, wild horse and burro management, military uses, and minerals production). In addition, BLM will be considering how solar facilities could impact the use of nearby specially designated areas such as wilderness areas, areas of critical environmental concern (ACEC), or special recreation management areas. When the PEIS is completed, it will assist BLM in making landscape-based siting decisions that will help to avoid land disturbance and land use impacts. Currently, BLM is reviewing projects that submit ROW applications and performing environmental review for each of these projects on an individual basis.

The projects that are proposed in Nevada would have cumulative land use impacts if considered with the HHSEGS project, they conflicted with applicable Nye or Clark

County general plans or policies, the Resource Management Plan prepared by BLM, or were close enough to the HHSEGS project site that they would contribute to impacts related to land use conflicts in the area surrounding the project site.

The area where the Nevada projects are proposed are within the 1998 Las Vegas Resource Management Plan (RMP), which is currently being updated. An RMP is a set of comprehensive, long-range decisions regarding the use and management of resources administered by BLM. In general, an RMP provides an overview of goals, objectives, and needs associated with public land management and establishes what land uses can occur on the public lands, where they can occur, and under what conditions.

RMPs include specific areas of critical environmental concern (ACEC) as well as recreational management areas and visual resource management areas. An area designated as an ACEC, Stump Springs, is approximately 2.3 miles east of the project site. Areas of ACEC are special management areas designated by BLM to protect significant historic, cultural, or scenic values, fish and wildlife resources, natural process or systems, and natural hazards. In southern Nevada, twelve ACECs protect and preserve irreplaceable significant cultural resource sites that include prehistoric rock art sites, prehistoric village and habitation sites, and historic mining, town, railroad, and trail sites.

The Stump Springs ACEC is identified as an area set aside for cultural purposes as it is believed to be located on a segment of the Old Spanish National Historical Trail and/or the Mormon Trail and was used previously by the Native Americans who lived in and around Pahrump Valley.

In addition, the area surrounding the project site in Nevada is designated as lying within a visual resource management area that is classified as a Class IV area. Class IV areas provide for management activities which require major modification of the existing character of the landscape and allows for a high level of of change to the landscape charachteristic.

The proposed projects in Nevada, when combined with the HHSEGS project, would not conflict with any of the RMP designations and the area adjacent and further out from the project site is in a visual resource area that BLM has designated as allowing for a high level of landscape change. It should be noted that the projects in Nevada are expected to go through environmental review and the impacts related to those projects have not yet been determined by BLM. The proposed VEA Hidden HillsTransmission Project EIS will also be considering impacts of the HHSEGS project as a connected action under NEPA.

Staff has determined that the HHSEGS project, when considered together with the surrounding projects in Nevada, would not contribute to a significant cumulative impact to land use inconsistencies within the area surrounding the project site.

FACILITY CLOSURE

At some point in the future, the proposed power plant facility would permanently cease operation and close down. At that time, it would be necessary to ensure that closure is carried out in such a way that public health, safety and the environment are protected from adverse impacts.

The AFC states the planned lifetime of the plant is 25-30 years; however, if the plant is still economically viable, it can operate longer. It is also possible that the plant could become economically noncompetitive earlier than 25-30 years, and be permanently closed at that time. When the time comes to consider permanently closing the plant, a decommissioning process would commence, whereby a plan would be developed detailing the closure procedure to ensure that public health, safety and the environment are protected. At least 12 months prior to decommissioning, the applicant would prepare a Facility Closure Plan for Energy Commission review and approval. The review and approval process would be publicly noticed, and allow participation by interested parties and other regulatory agencies, including Inyo County. At the time of closure, all pertinent LORS would be identified, and the closure plan would discuss conformance of decommissioning, restoration, and remediation activities with these LORS. All of these activities would be under the authority of the Energy Commission. There are two other circumstances in which a facility closure can occur; unplanned temporary closure or unplanned permanent closure.

An unplanned temporary closure occurs when the facility is closed suddenly and/or unexpectedly, on a short-term basis, due to unforeseen circumstances such as a natural disaster or an emergency. An unplanned permanent closure occurs if the project owner closes the facility suddenly and/or unexpectedly, on a permanent basis. An on-site contingency plan will be required (see **GENERAL CONDITIONS** section of this **FSA**) to ensure that all necessary steps to mitigate public health and safety impacts and environmental impacts are taken in a timely manner for such unexpected events.

The County of Inyo's Title 21, Renewable Energy Ordinance, states that a reclamation plan is required to ensure that after the project is decommissioned or otherwise ceases to be operational the county will have assurances that the area will be restored and revegetated. The Energy Commission requires these assurances as part of the licensing process and although the applicant has not initiated this process under Title 21, Inyo County will be able to provide input on the facility closure plan and on-site contingency plan when these plans are submitted. In addition, in order to ensure that the financial assurances aspect of Title 21 is resolved (as discussed in the Inyo County Renewable Energy Ordinance section in this analysis), staff is recommending Condition of Certification **LAND-2** requiring establishment of appropriate financial assurances for site reclamation.

NOTEWORTHY PUBLIC BENEFITS

While the development of the proposed project is intended to address the requirements of federal and state mandates to develop renewable energy, it would not yield any noteworthy public benefits related to land use.

RESPONSE TO PUBLIC AND AGENCY COMMENTS

Commission staff has received several letters from the County of Inyo. In a letter dated November 29, 2011, the County of Inyo requested participation in the Energy Commission process and provided information as it relates to land use and socioeconomics. The letter also provided information on the applicable Inyo County code that should be considered in staff's analysis. Among other things, the County indicated that the project was subject to the Inyo County Renewable Energy Ordinance (Title 21), that the project conflicts with the general plan designation and the zoning for the site and the power towers would require a variance from height limitations. The letter also identified ways that the applicant could rectify the inconsistencies.

In a letter dated February 23, 2012 (INYO 2012c), the County of Inyo restated that the proposed project was inconsistent with the general plan and zoning ordinance. Additionally, the letter stated that the project site has easements over many of the 170 parcels on the site that would need to be extinguished through one or more of the following methods: subdivision, merger, or a reversion to acreage. The applicant has indicated in the AFC that they will be requesting a reversion to acreage from the County of Inyo after certification by the Energy Commission.

Inyo County submitted a letter (INYO 2012f, dated March 20, 2012) identifying visual elements such as landscaping, screening, entryways and setbacks. Open Space zoning requires a 50-foot setback, although if the zoning was changed to the county suggested zone of General Industrial and Extractive (M-1) zone district, the setbacks for the project site would be 25 feet for the front, 15 feet for the rear and 10 feet for the side. However, Inyo County indicated that additional setbacks may be necessary and that the 50-foot setback may be appropriate to buffer the project from nearby properties and Old Spanish Trail Highway. Since that time, staff has received additional input from the county and has included the requested development standards.

Several comments were received on the PSA during the public review period. Staff has reviewed these comments and has incorporated applicable edits and discussion into this FSA. To review staff's responses, please refer to **Appendix 1** at the end of this section (PSA Response to Comments).

CONCLUSIONS

The proposed HHSEGS would be located within the Charleston View area in unincorporated Inyo County.

Staff concludes the HHSEGS:

- Would not convert any Farmland (as classified by the Farmland Mapping and Monitoring Program) to non-agricultural use, conflict with existing agricultural zoning or Williamson Act contracts or convert forest land to non-forest use.
- Would not conflict with existing zoning for agricultural use or a Williamson Act contract.

- Would not conflict with existing zoning for, or cause rezoning of, forest land, timberland, or timberland zoned Timberland Production.
- Would not result in the loss of forest land or conversion of forest land to non-forest use.
- Would not directly or indirectly divide an established community or disrupt an existing or recently approved land use.
- Would conflict with applicable land use plan, policy, or regulation of an agency with jurisdiction, or that would normally have jurisdiction, over the project, adopted for the purpose of avoiding or mitigating environmental effects.
- Would not conflict with any applicable habitat conservation plan or natural community conservation plan.
- Would not result in incremental impacts that, although individually limited, are cumulatively considerable when viewed in connection with other project-related effects or the effects of past projects, other current projects, and probable future projects.
- Would create a land use incompatibility due to significant and unavoidable visual impacts.

Staff concludes that the HHSEGS project would not be consistent with the County of Inyo General Plan, Zoning Ordinance and Renewable Energy Ordinance. The proposed project conflicts with all of the applicable land use plans. Staff has determined that the substantial size of the project, the degree of variance from local planning designations, and the presence of other potential impacts is a conflict with these LORS, and therefore causes a significant environmental impact under CEQA Guidelines Appendix G (Land Use and Planning).

BrightSource is currently in the process of obtaining the signatures of all the property owners on the project site so the county can process the GPA and Zone Reclassification. Should BrightSource resubmit a completed application and should it be approved by Inyo County, the project would be consistent with the County of Inyo General Plan and Zoning Ordinance. However, approval of the application will not resolve the issue of placing the project structures across lot lines or whether the abandonment of public rights-of-way on the project site is required.

PROPOSED FINDINGS OF FACT

Based on the evidence, staff makes the following findings:

1. The HHSEGS project site is designated "Open Space and Recreation" and “Recreation” under the Inyo County General Plan and “Open Space with a 40-acre Minimum” in the Inyo County Zoning Code.

2. A solar thermal power plant is not an allowed use in the "Open Space and Recreation" and “Recreation” general plan designations and the “Open Space” zone.

3. The HHSEGS facility will not conform with applicable provisions of the Inyo County general plan, zoning code or renewable energy ordinance.

4. The HHSEGS project would not be consistent with the Inyo County Subdivision ordinance or California statutes without the proposed conditions of certification.

5. The Inyo County Board of Supervisors holds exclusive authority to abandon public roads and land use actions, such as merging lots or reverting acreage.

6. The HHSEGS would create a land use incompatibility due to significant and unavoidable visual impacts.

PROPOSED CONDITIONS OF CERTIFICATION

LAND-1 The project owner shall comply with the Subdivision Map Act (Pub. Resources Code Section 66410-66499.58) by adhering to the provisions of Title 16, Subdivisions, Inyo County Code of Ordinances to ensure legality of parcels and site control.

Verification: At least 30 days prior to construction of the HHSEGS project, the project owner shall submit evidence to the CPM, indicating approval of the reversionary map by Inyo County, or written approval of another process (i.e., to adjust lot lines) that is acceptable to the county. The submittal to the CPM shall include evidence of compliance with all conditions and requirements associated with the approval of the Reversionary Map or Certificate of Merger by the county. If all parcels or portions of parcels are not owned by the project owner at the time of the merger, a separate deed shall be executed and recorded with the county recorder. A copy of the recorded deed shall be submitted to the CPM, as part of the compliance package.

LAND-2 The project owner shall submit evidence of a financial assurance mechanism or agreement to the CPM and Inyo County for review (i.e. bond, letters of credit, trust funds, etc.) and comment to ensure sufficient financial assurances are in place to fully restore the project site to pre-project conditions. The CPM shall have final approval to ensure the agreement allows the Energy Commission to use the decommissioning fund to restore the property to pre-project conditions in the event that the project owner, or its successors or assigns, does not properly decommission the project or restore the property to pre-project conditions within a reasonable time following the cessation of business operations or the abandonment of the project or property for whatever reason.

The agreement shall provide that the amount of the decommissioning fund shall be calculated to fully implement the decommissioning activities as described in the preliminary and the final closure plan for the HHSEGS project and the property. The project owner shall pay for the county to retain a third party expert to review the final closure plan, and confirm the adequacy of the decommissioning fund. The decommissioning fund shall be adjusted for inflation (every three years) and for any updates to the final closure plan.

With regard to the inflationary adjustment, the agreement shall specify either a process or the most appropriate inflationary index(es) to capture the actual costs to perform the necessary decommissioning work. The agreement also shall provide that, in the event that the decommissioning fund is inadequate to fully decommission the project or restore the property, the project owner, its successors or assigns, shall be liable for any amount expended by the county over the decommissioning fund balance and shall provide for termination of the decommissioning fund upon the completion of implementation of the final closure plan. The project owner shall maintain the approved financial assurance mechanism from a financial institution throughout the life of the proposed HHSEGS project and during closure activities.

Verification: At least 30 days prior to site mobilization and prior to any notice to proceed with construction issued by the CPM, the project owner shall provide the CPM with documentation of an approved financial assurance or agreement satisfactory to Inyo County and CPM. The project owner shall also provide evidence to the CPM on an annual basis, documentation from a financial institution that a financial assurance has been maintained and is valid.

LAND-3 The project owner shall provide a 25-foot wide setback -- in an addition to the 24-foot right-of-way (ROW) -- along the entire project frontage on Old Spanish Trail Highway (also known as “Tecopa Road”). Landscape screening shall only be planted within the 25-foot setback, with no trees or large landscaping features placed within the 24-foot ROW.

Verification: At least thirty (30) days prior to construction of the HHSEGS project, the project owner shall submit a site plan to the CPM for review and approval that is to scale and shows the required setback and associated landscaping features.

LAND-4 The project owner shall ensure that any proposed signs comply with the Chapter 18.75 Sign section of the Inyo County Zoning Ordinance.

Verification: At least thirty (30) days prior to the installation of any sign(s), the project owner shall submit evidence to the CPM for review and approval that the proposed signs will conform to the guidelines. The submittal shall show the location of all proposed sign(s) and include evidence of review and comment by the County of Inyo.

REFERENCES

BLM 2011 – Bureau of Land Management, 2011 Renewable Energy Priority Projects, website accessed on February 9, 2012: http://www.blm.gov/wo/st/en/prog/energy/renewable_energy/priority_projects.html

BLM 2012 – Bureau of Land Management, *Hidden Hills Transmission Project Environmental Impact Statement Scoping Report*, dated January 2012.

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CEC 2011g – California Energy Commission/M. Monasmith (tn: 62911) Data Requests, Set 1C. 11/17/2011

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CH2 2011d – CH2MHill/J. Carrier (tn: 63168) Data Response, Set 1C. 12/19/2011

Clark County, Nevada, Land Use Planning 2008 – *South County Land Use Plan*, adopted on August 20, 2008, website accessed on February 15, 2012: http://www.clarkcountynv.gov/depts/comprehensive_planning/land_use/Pages/default.aspx

County of Inyo 2001 – General Plan Goals and Policies Report, Guide to Inyo County Communities, Chapter 2.

County of Inyo 2001 – General Plan Goals and Policies Report, Land Use Element, Chapter 4.

County of Inyo 2001 – General Plan Goals and Policies Report, Conservation/Open Space Element, Chapter 8.

County of Inyo 2012 – Title 18 Zoning Code.

County of Inyo 2012 – Title 21, Renewable Energy Ordinance.

County of Inyo 2012 – List of Current Projects, website accessed on February 7, 2012: http://inyoplanning.org/projects.htm.

County of Inyo 2010i – Notice of Determination and Draft Mitigated Negative Declaration, Conditional Use Permit #2010-02 for St. Therese Mission, June 23, 2010.

HHSEGS 2010 – Hidden Hills Solar Electric Generating System Application for Certification Volume 1 & 2, dated August 2011. Submitted to CEC/Docket Unit on August 5, 2010, *tn: 61756.*

HHSG 2011a – BrightSource Energy/J. Woolard (tn: 61756) Application for Certification, Volume 1 & 2. 08/5/2011

HHSG 2011b – BrightSource Energy/C. Jensen (tn: 62125) Supplement to AFC for HHSEGS. 09/07/2011

INYO 2011a – Inyo County/J. Hart (tn: 63054) Request for Agency Participation.11/29/2011

INYO 2012b – Inyo County/K. Carunchio (tn: 63719) Letter from Inyo County regarding Preliminary Estimates for the Fiscal Impacts of the Constrution and Operation. 02/16/2012

INYO 2012c – Inyo County/J. Hart (tn: 63772) Inyo County letter to BrightSource re: General Plan Amendment. 02/23/2012

INYO 2012d – Inyo County/J. Hart (tn: 63869) Inyo County Letter Regarding Reclamation Plan. 2/27/2012

INYO 2012e – Inyo County/J. Hart (tn: 64136) Inyo County Letter to BrightSource Energy. 3/9/2012

INYO 2012f – Inyo County/J. Hart (tn: 64221) Inyo County Letter to CEC's Melissa Mourkas Regarding Aesthetics and Visual Impacts. 3/20/2012

INYO 2012h – Inyo County/D. Wilson (tn: 65181) Inyo County Dept. of Public Works letter and exhibit re: setbacks and turn-lanes on Tecopa Road. 5/9/2012

INYO 2012i – Inyo County/D. Wilson (tn: 65282) Inyo County Board of Supervisors transcript from March 13, 2012 BrightSource presentation. 5/17/2012

INYO 2012j – Inyo County/M. Fortney (tn: 66310) Inyo County Comments on PSA. 7/17/2012

MAC 2012c -- Cindy MacDonald (tn: 66290) Cindy McDonald's PSA Comments. 07/23/2012

MAC 2012b -- Cindy MacDonald (tn: 66291) Cindy McDonald's Supplemental Comments and Analysis. 07/23/2012

Nye County, Nevada 2010 – Renewable Energy Resource Development, Pending Solar Rights-Of-Way Applications, November 5, 2010, website accessed on February 15, 2012: http://www.nye-renewables.com/solar.htm

Office of Energy Efficiency and Renewable Energy, Department of Energy, Bureau of Land Management and Department of the Interior 2010 – *Programmatic Environmental Impact Statement* and *Supplement*, website and documents accessed February 8, 2012: http://solareis.anl.gov/documents/index.cfm, dated December 2010 and October 2011.

LAND USE

List of Comment Letters

		Land Use Comments?
1	Inyo County	**X**
2	Bureau of Land Management	
3	National Park Service	
4	The Nature Conservancy	
5	Amargosa Conservancy	
6	Basin & Range Watch	
7	Pahrump Paiute Tribe	
8	Richard Arnold, Pahrump Piahute Tribe	
9	Big Pine Tribe of Owens Valley	
10	Intervenor Cindy MacDonald	**X**
11	Intervenor Center for Biological Diversity	
12	Intervenor, Old Spanish Trail Association	
13	Applicant, BrightSource Energy, Inc.	**X**

Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
1	**July 17, 2012**	**Inyo County**	
1.7		Requirements of Resolution 2012-29 and Title 21 as it pertains to financial assurances for reclamation/revegetation	Staff has proposed Condition of Certification **LAND-2** to address the applicable Inyo County LORS regarding financial assurances.
1.28		Suggested revisions regarding the status of the applicant's general plan amendment and zoning reclassification. Additional language requested related to lot lines and public roads on the project site.	Staff has revised the discussion accordingly and has provided more detail with regard to the lot lines and public roadways on the project site.
1.29		Suggested findings of fact regarding public roadways, property lines, Inyo County Subdivision Ordinance and the exclusive authority of the Board of Supervisors to abandon public roads and merging or reverting acreage.	Partially revised as requested.

1.3O		Suggested revisions to Condition of Certification LAND-2	Staff will revise some of the language in the Condition of Certification **LAND-2**. However, the final approval of any required submittals lie within the CPM's authority with input from Inyo County.
1.31		Request for a new condition related to the abandonment of public roads on the project site.	Revised as requested.
Comment #	**DATE**	COMMENT TOPIC	**RESPONSE**
10	**July 21, 2012**	**Intervenor Cindy MacDonald**	
10.1		Question as to whether the additional acreage in the lease agreement between the applicant and land owner should be included in the CEQA analysis.	The proposed project is located on 3,096 total acres (plus a temporary construction laydown are of 180 acres). No additional acreage is proposed to be developed as part of this project and staff is not aware of any plans to develop additional acreage.
10.2		Who would have jurisdiction over additional acreage in lease agreement?	The Energy Commission does not have jurisdiction over any additional acreage that is "not a part of the project" and is agreed to between the lessee and lessor. If a future revision to the HHSEGS project included additional acreage, the Energy Commission would be required to analyze the impacts under CEQA at such time a license amendment was submitted. However, staff is not aware of any plans to develop additional acreage.
10.3		Can CEC assume jurisdiction on the additional acreage?	As indicated above, the Energy Commission cannot assume jurisdiction of any additional acreage "not a part of the project" that is agreed to in a lease. Staff is not aware of any plans to develop additional acreage for the HHSEGS project and to assume that the additional acreage will be developed is speculative and outside the scope of the CEQA analysis.

10.4		Can the applicant or landowner develop the additional acreage if the CEC has no jurisdiction?	As indicated above, if the applicant/landowner (or future project owner) were to revise the HHSEGS project they would be subject to the Energy Commission's license amendment process and CEQA review. If the Energy Commission does not have jurisdiction over development, then Inyo County, as lead agency would perform the CEQA review on all non-public lands in the county.
10.5		Can CEC propose limits on water use for the additional acreage?	No. Please see prior answers. The additional acreage is not a part of the required HHSEGS CEQA analysis.
10.6		What are the reasonably forseeable impacts to the additional acreage as a result of the HHSEGS project?	Staff has analyzed the reasonably forseeable impacts of the proposed HHSEGS project, including the area surrounding the proposed project as it relates to housing, commercial and industrial development as well as growth inducement. The additional acreage is not proposed for development as part of the HHSEGS project.
10.7		Who is legally responsible and has jurisdiction for evaluating and analyzing growth inducing impacts in Nevada as a result of the HHSEGS project?	Energy Commission staff has analyzed growth inducing impacts along with other impacts that occur in Nevada as a result of HHSEGS -- Please see the **Socioeconomics** section of the **FSA** for more details.
10.8		Why didn't the CEC include a specific recommendation for setting aside additional private land in the Condition of the Permit?	The 6,800 acres that is referred to is the approximate acreage of compensatory mitigation that is required for the project impacts. The actual amount of acreage is 6,480 acres and was determined by staff in consultation with the California Department of Fish and Game (CDFG) and U.S. Fish and Wildlife Service (USFWS). This requirement is a Condition of Certification, **BIO-12**. Please see the **Biological Resources** section.

10.9		Why would CEC staff assume that 6,800 acres could be used for mtiigation when the applicant does not own lands for that purpose?	All projects that are analyzed under CEQA that significantly impact biological resources require mitigation. The location of mitigation is determined by the type of biological resources that are being impacted. Lands may be purchased outside of Inyo County if they have been approved by CDFG and USFWS. Please see Condition of Certification **BIO-12** in the Biological Resources section.
10.1O		If the 6,800 acres was set aside for mitigation purposes, it should be considered temporary. What happens to the land when the project is terminated?	All lands set aside for mitigation purposes require some type of conservation easement or other legal instrument to ensure that the lands remain viable for the biological resources in perpetuity regardless of whether the project is terminated or abandoned. Please see Condition of Certification **BIO-12**.
10.11		How does it serve the public interest to use private lands for protection/preservation when the protection can be immediately withdrawn once the applicant terminates the lease?	As indicated above, lands used for biological preservation due to a project's impacts, must remain viable to mitigate the project. Certain restrictions and requirements are legally binding based upon state and federal laws that protect such resources. Please see the Biological Resources and other pertinent sections relating to mitigation requirements.
10.12 through 10.16		Questions pertaining to temporary worker housing.	The text "from temporary worker housing" was a typo in **SOILS-8**. Please refer to the Response to Comments table in the **Soils and Surface Water** section of this **FSA**.
10.17		Is the reference to a 3,900 acre project a typo or accurate?	The 3,900 acre reference is incorrect. The land use section identifies the project site acreage as 3,097 acres, with a temporary construction laydown area of 180 acres.
10.18		If accurate, what other project elements are within the 700 acres?	As indicated above, the 3,900 acreage reference is incorrect.

10.19		What is the acreage of the switchyard should it be moved offsite?	The switchyard is proposed to be located on the project site, in the Common Area.
10.2O		Question pertaining to other design elements that will be utilizing the additional 700 acres.	As indicated in response 10.17 and 10.18, the reference of 3,900 acres is incorrect. The accurate project site acreage is 3,097 acres.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
13	**July 23, 2012**	**Applicant, BrightSource Energy, Inc. -- Land Use**	
13.6	**p.217**	Suggested change to PSA page 4.6-1 re: CEQA	Revised as requested.
13.7	**p.217**	Suggested change to PSA page 4.6-2 re: LORS	Staff has identified the Subdivision Map Act as an appropriate LORS.
13.8	**p.217**	Suggested change to PSA page 4.6-2 re: designation of communities	Revised as requested.
13.9	**p.217**	Suggested change to PSA page 4.6-3 re: Tecopa Rd.	Revised as requested.
13.1O	**p.217**	Suggested change to PSA page 4.6-3 re: orchard	Revised as requested.
13.11	**p.217**	Suggested change to PSA page 4.6-4 re: Natural Gas pipeline	Revised as requested.
13.12	**p.217**	Suggested change to PSA page 4.6-4, deletion request of 2nd paragraph, last sentence re: "use"	Revised as requested.
13.13	**p.217**	Suggested change to PSA page 4.6-5, Surrounding Area, 3rd bullet -- insertion request re: BLM lands	Revised as requested.
13.14	**p.218**	Suggested change to PSA page 4.6-5, Surrounding Area, 3rd bullet re: St. Therese Mission inclusion	Revised as requested.
13.15	**p.218**	Suggested change to PSA page 4.6-5, General Plan Land Use, 1st paragraph -- request to discuss Inyo County's Renewable Wind and Solar Energy General Plan Amendment + request to "revise" discussion to include "Rural Protection" land use designation and 2004 amendment to Inyo County General Plan	Staff has incorporated additional information on Charleston View and the Renewable Energy GPA. Staff has reveiwed Resolution No. 2004-61 and has determined that this is not applicable to the project site or surrounding area. Please see additional discussion in the Compliance With LORS (Inyo County General Plan) subsection.

13.16	**p.218**	Suggested change to PSA page 4.6-6, Surrounding Area, re: "Rural Protection" for surrounding parcels	The area surrounding the project is not designated as Rural Protection. Staff has reviewed Resolution No. 2004-61 and has determined that it is not applicable to the project site or surrounding area.
13.17	**p.218**	Suggested change to PSA page 4.6-10, Land Use Table 2 -- LORS, deletion request re: CA Subdivision Map Act	Staff has identified the California Subdivision Map Act as an applicable state LORS. Recent Energy Commission decisions, including Rice Solar, Abengoa and Ivanpah contain conditions of certification related to the Subdivision Map Act and the applicable local jurisdiction ordinances.
13.18	**p.218**	suggested change to PSA page 4.6-10, Land Use Table 2 -- LORS, request for discussion on Inyo County General Plan	Comment noted.
13.19	**p.218**	Suggested change to PSA page 4.6-10, Land Use Table 2 -- LORS, Chapter 3 Gov't Element Goal Gov-10: Energy Resoces Policy Gov-10.1: Development.	Revised as requested.
13.2O	**p.218**	Suggested change to PSA page 4.6-10, Land Use Table 2 -- LORS, Chapter 3 Gov't Element Goal Gov-10: Energy Resoces Policy Gov-10.1: Development.	Revised as requested.
13.21	**p.218**	Suggested change to PSA page 4.6-10, Land Use Table 2 -- LORS, Chapter 4 Land Use Element Commerical, Goal LU-3.	Staff has reviewed the Inyo County General Plan and has determined that public/quasi-public uses do not allow large renewable solar projects that are privately owned. Staff has also confirmed allowable public/quasi-public uses within the REC designation with Inyo County staff.
13.22	**p.219**	County has supported renewable energy and County Resolution 2004-61 re-designated the project site from Open Space to Rural Protection. All references to the OS designation should be deleted.	Staff has reviewed Inyo County Resolution 2004-61 and has determined that it is not applicable to the proposed HHSEGS project site.

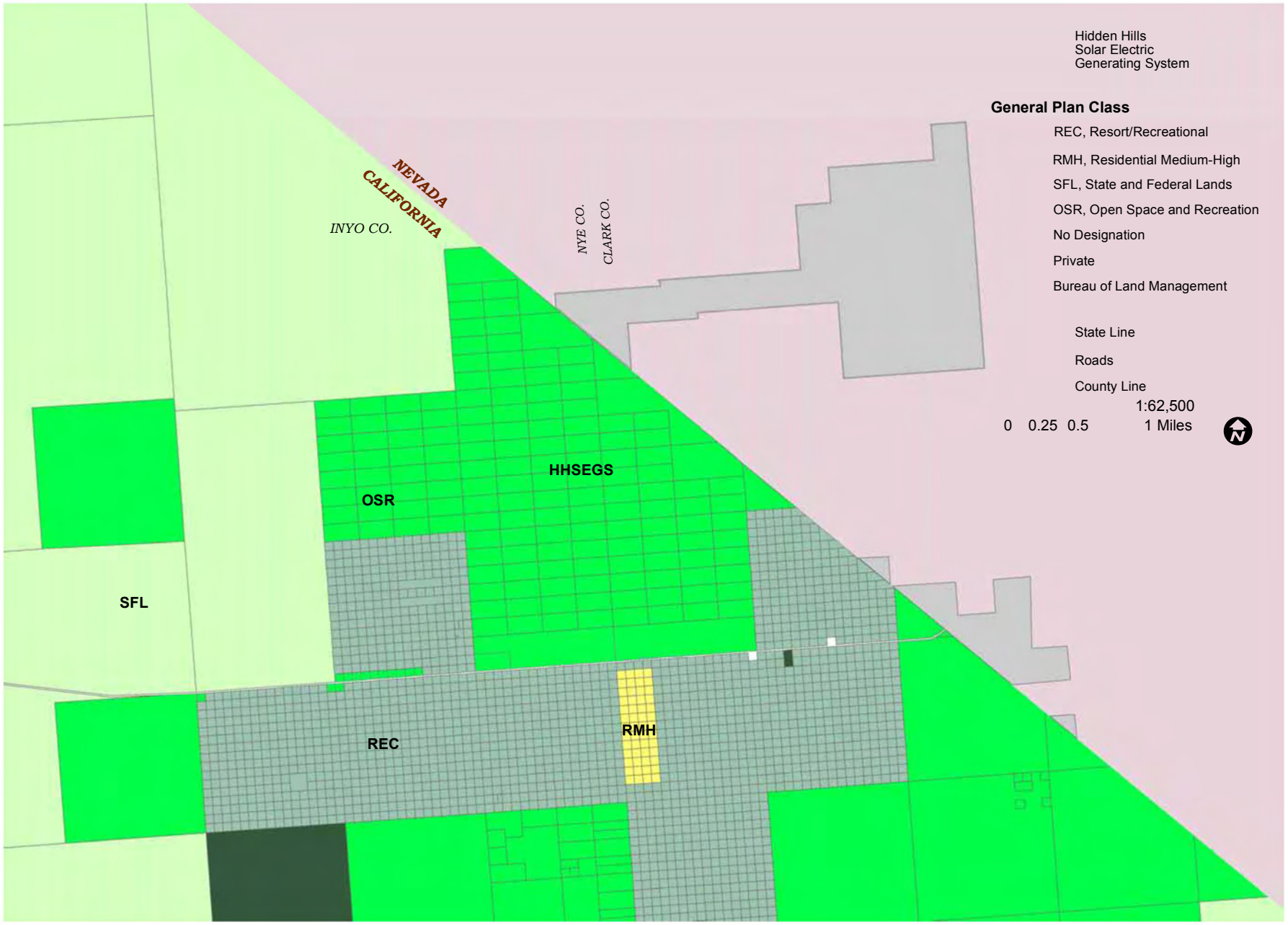
13.23	**p.219**	Page 4.6-11, Land Use Table 2 reference to Title 18 should recognize that OS-40 district allows for mining and processing of natural resources, so the HHSEGS is consistent with this allowed use.	The OS-40 district purpose is to designate those areas that are open space and to establish standards for preservation and protection. The OS-40 district does allow mining and processing as a conditional use for mining natural resources. However, in the General Plan Government Chapter 3, Mineral Resources and Energy Resources are identified as two separate Goals and include specific separate policies. The HHSEGS project is a renewable energy project and consists of an intensely developed area with heliostats and 750-foot solar towers. Inyo County has indicated that the M-1 district (General Industrial and Extractive) is the appropriate district for the proposed project structures. Staff has reveiwed the M-1 district and has determined that the M-1 district is the appropriate district for the HHSEGS project.
13.24	**p.219**	Page 4.6-12, replace "OSR" with "RP" (Rural Protection).	The Rural Protection designation is not applicable to the proposed HHSEGS project site.
13.25	**p.219**	Page 4.6-12, replace "OSR" with "RP" (Rural Protection).	The Rural Protection designation is not applicable to the proposed HHSEGS project site.
13.26	**p.219**	Page 4.6-13, 1st paragraph, 1st sentence: Applicant disagrees with the PSA's characterization of whether renewable energy projects are permitted uses in the general plan designation and contends that the REC land use designation allows for public/quasi-public uses, which is applicable to the HHSEGS project.	Comment noted. Additional discussion addressing this topic is included in the **Land Use** section of **FSA**.
13.27	**p.219**	1) Request to insert the word expressly in language on Page 4.6-13 , County of Inyo Zoning Ordinance. 2) Delete discussion on setback requirements for traffic/transportation due to glint and glare.	1) Comment noted. 2) Revised as requested.

13.28	**p.220**	Page 4.6-15, 1st paragraph: Requested revision to discussion pertaining to Title 21 requirements.	Comment noted.
13.29	**p.220**	Delete 2nd paragraph, page 4.6-16.	Staff has not identified this discussion as an applicable LORS.
13.3O	**p.220**	Delete 3rd paragraph, page 4.6-16.	Staff has not identified this discussion as an applicable LORS.
13.31	**p.220**	Delete 4th paragraph, page 4.6-16.	Comment noted.
13.32	**p.220**	Page 4.6-16, Other Considerations, add sentence regarding conditionally offered nonexclusive easements	Staff has reviewed the recorded parcel maps for the project site. Roadway easements have been recorded in the public record for access to parcels.
13.33	**p.220**	Page 4.16, Other Considerations, add a sentence indicating that there is no evidence that the County formally accepted non exclusive easements.	Staff has reviewed the recorded parcel maps for the project site. Roadway easements have been recorded in the public record for access to parcels.
13.34	**p.220**	Request to delete 1st full paragraph on Page 4.6-17, discussing the applicant's Supplemental Response to Data Adequacy.	Staff reveiwed the Supplemental Response to Data Adequacy and has revised slightly to ensure it uses the same language that was contained in the Supplemental Response provided by the applicant.
13.35	**p.220**	Page 4.6-17, 2nd full paragraph: Request to add the sentence that the applicant disputes County's claims in their entirety.	Staff has added additional discussion in this section of the **FSA**, and also incorporated the applicant's requested revision accordingly.
13.36	**p.220**	Page 4.6-20, 4th full paragraph: This paragraph should be deleted. The County has no jurisdiction.	Revised discussion.
13.37	**p.220**	Page 4.6-20, 5th full paragraph: Question regarding findings and that the County has not made any findings.	Revised as requested.

13.38	**p.220**	Page 4.6-21, 3rd paragraph, 3rd sentence: Please revise this sentence for accuracy. The BLM lands in Nevada adjacent to the site is not designated wilderness area.	Revised as requested.
13.39	**p.220**	Page 4.6-21, 4th paragraph, 3rd sentence: Please revise for accuracy. There are no residences adjacent to the project site.	Revised as requested.
13.4O	**p.220**	Page 4.6-21, 5th paragraph: Please delete this paragraph as it describes visual impacts, not land use impacts, and therefore this discussion is irrelevant to the land use impact analysis.	Visual impacts are appropriately considered when analyzing land use conflicts, and are relevant to land use compatibility determinations/analyses.
13.41	**p.220**	Page 4.6-22, Military Special Use Airspace: Section should be revised to state that the Department of Defense has reviewed the project, and concluded that the project will not have any military mission impacts.	Staff has a Record of Conversation (February 27, 2012, tn 63867, CEC 2012l) that confirms staff's assessment of the Department of Defense's review determination. No revision is necessary.
13.42	**p.220**	Requested language identifying Noteworthy Public Benefits on Page 4.6-28.	Please refer to the **Socioeconomics** section of this **FSA** for discussion regarding public benefits.

LAND USE - FIGURE 1

Hidden Hills Solar Electric Generating System (HHSEGS) - General Plan Designations

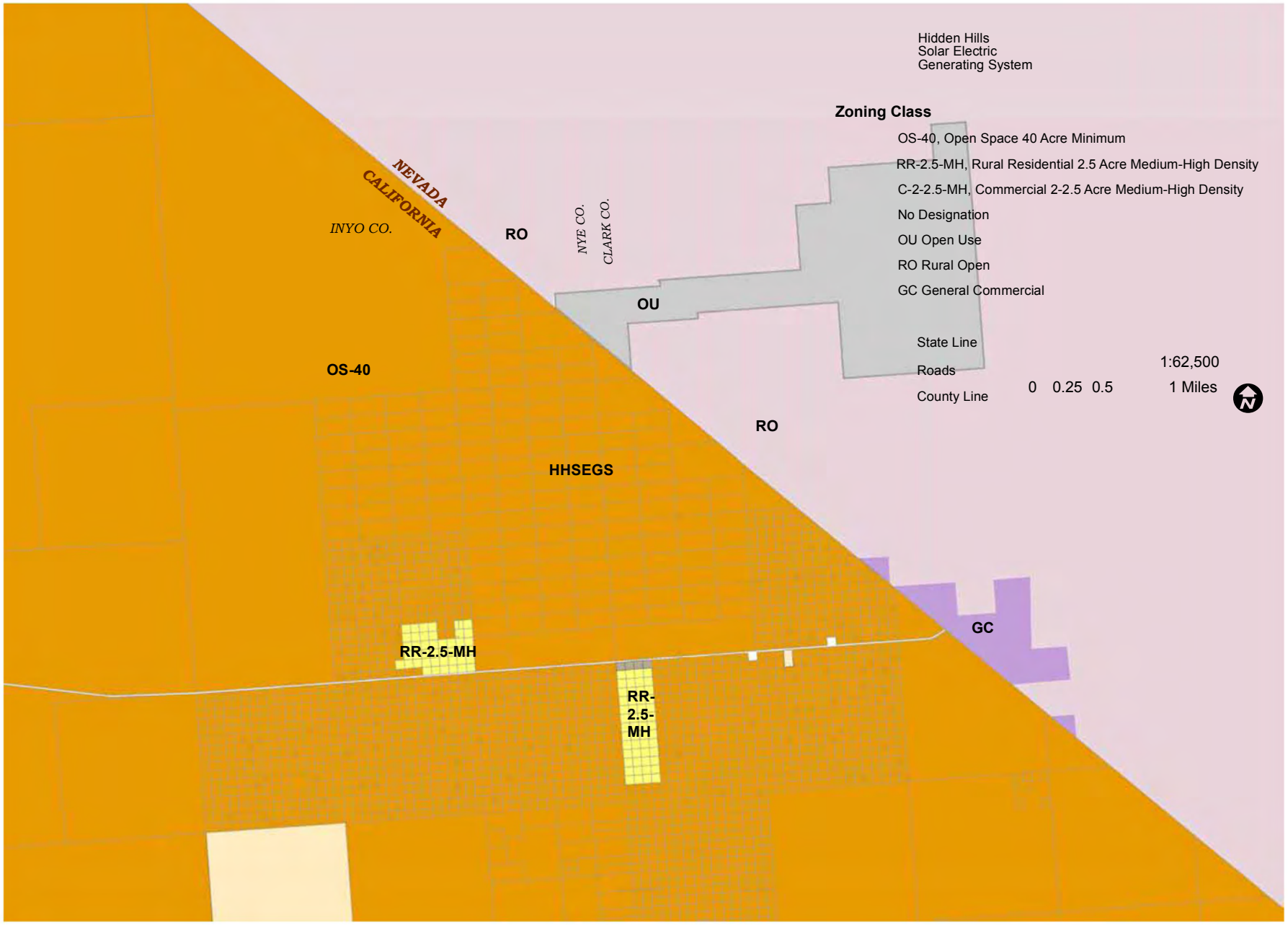


CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL, Inyo County Assessor and Planning

LAND USE - FIGURE 2

Hidden Hills Solar Electric Generating System (HHSEGS) - Zoning Designations

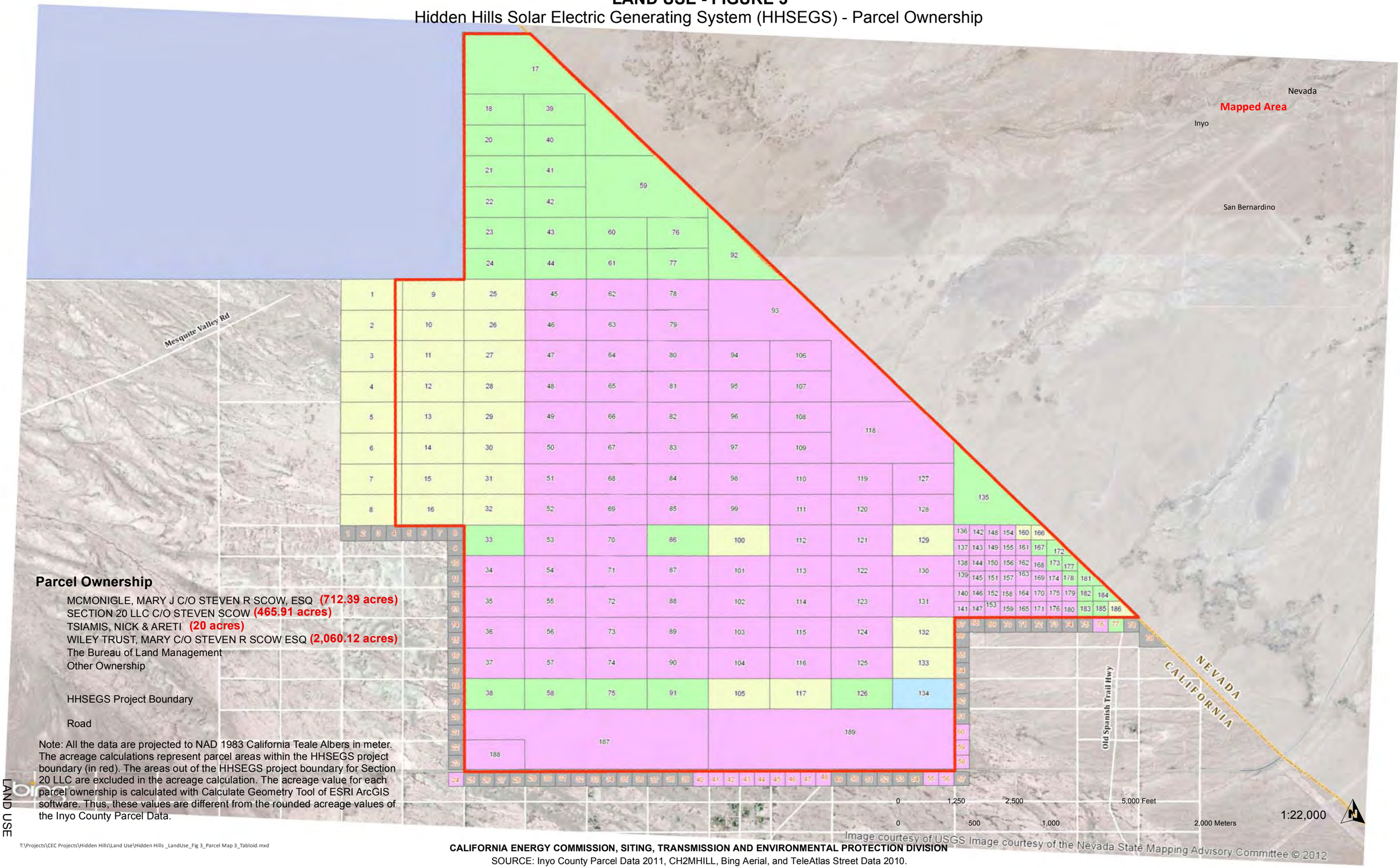


CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL, Inyo County Assessor and Planning

LAND USE - FIGURE 3

Hidden Hills Solar Electric Generating System (HHSEGS) - Parcel Ownership



Parcel Ownership

MCMONIGLE, MARY J C/O STEVEN R SCOW, ESQ **(712.39 acres)**
SECTION 20 LLC C/O STEVEN SCOW **(465.91 acres)**
TSIAMIS, NICK & ARETI **(20 acres)**
WILEY TRUST, MARY C/O STEVEN R SCOW ESQ **(2,060.12 acres)**
The Bureau of Land Management
Other Ownership

HHSEGS Project Boundary

Road

Note: All the data are projected to NAD 1983 California Teale Albers in meter. The acreage calculations represent parcel areas within the HHSEGS project boundary (in red). The areas out of the HHSEGS project boundary for Section 20 LLC are excluded in the acreage calculation. The acreage value for each parcel ownership is calculated with Calculate Geometry Tool of ESRI ArcGIS software. Thus, these values are different from the rounded acreage values of the Inyo County Parcel Data.

LAND USE

T:\Projects\CEC Projects\Hidden Hills\Land Use\Hidden Hills _LandUse_Fig 3_Parcel Map 3_Tabloid.mxd

CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Inyo County Parcel Data 2011, CH2MHILL, Bing Aerial, and TeleAtlas Street Data 2010.

NOISE AND VIBRATION

Testimony of Shahab Khoshmashrab

SUMMARY OF CONCLUSIONS

The Hidden Hills Solar Electric Generating System (HHSEGS), if built and operated in conformance with the proposed conditions of certification below, would comply with all applicable noise and vibration laws, ordinances, regulations and standards, and would produce no significant adverse noise impacts on people within the affected area, directly, indirectly, or cumulatively. The applicant has proposed appropriate mitigation, in the form of good design practice and selection of appropriate project equipment that would avoid any significant adverse impacts.

INTRODUCTION

The construction and operation of any power plant creates noise or unwanted sound. The character and loudness of this noise, the times of day or night that it is produced, and the proximity of the facility to sensitive receptors all combine to determine whether the facility would meet applicable noise control laws and ordinances and whether it would cause significant adverse environmental impacts. In some cases, vibration may be produced as a result of power plant construction practices such as blasting or pile driving. The ground-borne energy of vibration has the potential to cause structural damage and annoyance.

The purpose of this analysis is to identify and examine the likely noise and vibration impacts from the construction and operation of the HHSEGS project, and to recommend procedures to ensure that the resulting noise and vibration impacts would be adequately mitigated to comply with applicable laws, ordinances, regulations and standards (LORS). For an explanation of technical terms used in this section, please refer to **Noise Appendix A**, immediately following.

For noise and vibration impacts on biological resources, please see the **BIOLOGICAL RESOURCES** section of this Final Staff Assessment (**FSA**).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHODS AND THRESHOLDS FOR DETERMINING SIGNIFICANCE

California Environmental Quality Act

The California Environmental Quality Act (CEQA) requires that significant environmental impacts be identified and either eliminated or mitigated to the extent feasible. Section XI of Appendix G of CEQA's guidelines (Cal. Code Regs., tit. 14, App. G) describes some characteristics that could signify a potentially significant impact. Specifically, a significant effect from noise may exist if a project would result in:

1. exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;

2. exposure of persons to or generation of excessive ground borne vibration or ground borne noise levels;

3. substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project; or

4. substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

The Energy Commission staff, in applying Item 3, above, to the analysis of this and other projects, has concluded that a potential for a significant noise impact exists where the noise of the project plus the background exceeds the background by more than 5 dBA at the nearest sensitive receptor.

Staff has concluded that a permanent increase in background noise levels up to and including 5 dBA in a residential setting is insignificant; an increase of more than 10 dBA, however, is significant. An increase of above 5 and up to10 dBA should be considered adverse, but could be either significant or insignificant, depending upon the particular circumstances of a case.

Factors to be considered in determining the significance of an adverse impact as defined above include:

1. the resulting noise level[1];

2. the duration and frequency of the noise;

3. the number of people affected; and

4. the land use designation of the affected receptor sites.

Noise due to construction activities is usually considered to be insignificant in terms of CEQA compliance if:

- the construction activity is temporary; and
- the use of heavy equipment and noisy[2] activities is limited to daytime hours.

Staff uses the above method and threshold to protect the most sensitive populations.

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[1] For example, a noise level of 40 dBA would be considered quiet in many locations. A noise limit of 40 dBA would be consistent with the recommendations of the California Model Community Noise Control Ordinance for rural environments and with industrial noise regulations adopted by European jurisdictions. If the project would create an increase in ambient noise no greater than 10 dBA at nearby sensitive receptors, and the resulting noise level would be 40 dBA or less, the project noise level would be insignificant.

[2] Noise that draws legitimate complaint (for the definition of “legitimate complaint”, see the footnote in Condition of Certification **NOISE-4**)

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Noise Table 1

Laws, Ordinances, Regulations and Standards

Applicable Law	Description
Federal: Occupational Safety & Health Act (OSHA): 29 U.S.C. § 651 et seq.	Protects workers from the effects of occupational noise exposure
U.S. Environmental Protection Agency (USEPA)	Assists state and local government entities in development of state and local LORS for noise
State: California Occupational Safety & Health Act (Cal-OSHA): 29 U.S.C. § 651 et seq., Cal. Code Regs., tit. 8, §§ 5095-5099	Protects workers from the effects of occupational noise exposure
Local: Inyo County General Plan	Establishes acceptable levels for noise, based on land use. Establishes hourly limits for construction activities within 500 feet of existing noise-sensitive land uses.

FEDERAL

Under the Occupational Safety and Health Act of 1970 (OSHA) (29 U.S.C. § 651 et seq.), the Department of Labor, Occupational Safety and Health Administration, (OSHA) adopted regulations (29 C.F.R. § 1910.95) designed to protect workers against the effects of occupational noise exposure. These regulations list permissible noise exposure levels as a function of the amount of time during which the worker is exposed (see **Noise Appendix A, Table A4**, immediately following this section). The regulations further specify a hearing conservation program that involves monitoring the noise to which workers are exposed, assuring that workers are made aware of overexposure to noise, and periodically testing the workers' hearing to detect any degradation.

Guidelines are available from the U.S. Environmental Protection Agency (USEPA) to assist state and local government entities in developing state and local LORS for noise. Because there are existing local LORS that apply to this project, the USEPA guidelines are not applicable.

There are no federal laws governing off-site (community) noise.

The Federal Transit Administration (FTA) has published guidelines for assessing the impacts of ground-borne vibration associated with construction of rail projects, which have been applied by other jurisdictions to other types of projects. The FTA-recommended vibration standards are expressed in terms of the "vibration level," which is calculated from the peak particle velocity measured from ground-borne vibration. The

FTA measure of the threshold of perception is 65 vibrational decibels (VdB), which correlates to a peak particle velocity of about 0.002 inches per second (in/sec). The FTA measure of the threshold of architectural damage for conventional sensitive structures is 100 VdB, which correlates to a peak particle velocity of about 0.2 in/sec.

STATE

California Government Code Section 65302(f) encourages each local governmental entity to perform noise studies and implement a noise element as part of its general plan. In addition, the California Office of Planning and Research has published guidelines for preparing noise elements, which include recommendations for evaluating the compatibility of various land uses as a function of community noise exposure.

The State of California, Office of Noise Control, prepared the Model Community Noise Control Ordinance, which provides guidance for acceptable noise levels in the absence of local noise standards. This model also defines a simple tone, or "pure tone," as one-third octave band sound pressure levels that can be used to determine whether a noise source contains annoying tonal components. The Model Community Noise Control Ordinance further recommends that, when a pure tone is present, the applicable noise standard should be lowered (made more stringent) by five A-weighted decibels (dBA).

The California Occupational Safety and Health Administration (Cal-OSHA) has promulgated occupational noise exposure regulations (Cal. Code Regs., tit. 8, §§ 5095-5099) that set employee noise exposure limits. These standards are equivalent to federal OSHA standards (see **Noise Appendix A, Table A4**).

LOCAL

The project is located within Inyo County. The Public Safety Element of the Inyo County General Plan[3] applies to this project.

Inyo County General Plan Public Safety Element

The Public Safety Element addresses noise and establishes goals, policies and implementation measures that regulate noise occurring within the county's jurisdiction. For residences, schools and churches, the Noise Element establishes a Normally Acceptable Day-Night Noise Level (L_{dn}) of 60 dBA. The Normally Acceptable L_{dn} of 60 dBA equates to an Equivalent Noise Level (L_{eq}) of 54 dBA continuously throughout the day and night.

The General Plan also requires that construction activities occurring within 500 feet of existing noise sensitive uses be limited to the hours of 7:00 a.m. to 7:00 p.m. Monday through Saturday (INYO2001a).

[3] The Inyo County General Plan may be accessed online at the following link - http://inyoplanning.org/general_plan/index.htm.

SETTING AND EXISTING CONDITIONS

HHSEGS would be located on approximately 3,097 acres of privately owned land leased in Inyo County, California, adjacent to the Nevada border. The project site is approximately eight miles south of Pahrump, Nevada, and approximately 45 miles west of Las Vegas, Nevada.

The area is sparsely populated, with a few scattered residences south and southeast of the HHSEGS site. The nearest residence to the proposed HHSEGS's nearest power block (Solar Plant 2, as shown in **Noise Figure 1**) would be approximately 3,500 feet south of this power block. This residence is referred to as CR1 in this analysis.

The St. Therese Mission, a commercial facility, referred to as location M1 in this analysis, has broken ground on 17.5 acres, approximately 1.7 miles from the nearest power block (see **Noise Figure 1**). It will consist of a chapel, columbarium, garden, restaurant, visitor's center, playground, restrooms, and an onsite caretaker home.

AMBIENT NOISE MONITORING

In order to establish a baseline for the comparison of predicted project noise with existing ambient noise, the applicant has presented the results of an ambient noise survey (HHSG 2011a, AFC § 5.7.4.1; Table 5.7-5). Ambient noise levels were measured at M1 (St. Therese Mission) and a nearby residence shown as location M2 in **Noise Figure 1**. M2 is not the closest residence; however, this location was used for the noise monitoring because, according to the applicant, the owners of M2 were the first to agree to provide access to their property for the monitoring equipment. The monitoring information gathered at M2 was used to establish existing noise levels at the closest residence, CR1. Because the existing ambient environment surrounding M2 and CR1 are similar, staff concludes this method used to establish existing noise levels at CR1 is reasonable.

The noise survey was conducted continuously from May 18 to May 27, 2011. The survey was performed using acceptable equipment and techniques. The noise survey monitored existing noise levels at or near the following noise-sensitive receptors, shown in **Noise Figure 1**.

Noise Table 2 summarizes the ambient noise measurements (HHSG 2011a, AFC § 5.7.4.1; Table 5.7-5).

Noise Table 2
Summary of Measured Noise Levels

Measurement Sites	Measured Noise Levels, dBA		
	Average During Daytime Hours (7 a.m. to 10 p.m.) L_{eq}	Average During Nighttime Hours (10 p.m. to 7 a.m.) L_{eq}	Average L_{dn}
M2, Used for Nearest Residence, **CR1**, 3,500 Feet South of Nearest Power Block	45[1]	40[1]	51
M1, St. Therese Mission, 1.7 Miles East of Nearest Power Block	42[1]	34[2]	47

Source: HHSG 2011a, AFC § 5.7.4.1; Table 5.7-5
1. Staff calculations of average of the daytime hours
2. Staff calculations of average of the nighttime hours.

DIRECT AND INDIRECT IMPACTS AND MITIGATION

Noise impacts associated with the project can be created by short-term construction activities and normal long-term operation of the project.

CONSTRUCTION IMPACTS AND MITIGATION

Construction noise is usually a temporary phenomenon. Construction of the HHSEGS project is expected to be typical of similar projects in terms of equipment used and other types of activities (HHSG 2011a, AFC § 5.7.5.2).

COMPLIANCE WITH LORS

Construction of an industrial facility such as a power plant is typically noisier than permissible under usual noise ordinances. In order to allow the construction of new facilities, construction noise during certain hours of the day is commonly exempt from enforcement by local ordinances.

The applicant has predicted construction noise levels at 50 feet and one mile away for various construction activities. Staff has used these levels to calculate the noise levels at CR1 and M1. They are shown here in **Noise Table 3**.

Noise Table 3: Predicted Construction Noise Levels

Receptor	Type of Construction Activity	Highest Construction Noise Level L_{eq} (dBA) [1]	Measured Existing Ambient, Average Daytime L_{eq} (dBA) [2]	Cumulative, Construction Plus Ambient	Change
CR1	Concrete Pouring	41	45	46	+1
	Steel Erection & Mechanical	50		51	+6
	Site Cleaning, Excavation, & Cleanup	53		54	+9
M1	Concrete Pouring	33	42	43	+1
	Steel Erection & Mechanical	43		46	+4
	Site Cleaning, Excavation, & Cleanup	44		46	+4

Sources: [1] EPA, 1971, Barnes et al., 1976, HHSG 2011a, AFC Table 5.7-6, and staff calculations
[2] Noise Table 2, above

The applicable local noise LORS do not limit the loudness of construction noise, but staff compares the projected noise levels with ambient levels (please see the following discussion under **CEQA Impacts**).

The applicant commits to performing noisy construction work during the times specified in the Inyo County General Plan, during the hours of 7:00 a.m. to 7:00 p.m. Monday through Saturday (HHSG 2011a, AFC § 5.7.7.3). To ensure that these hours are, in fact, enforced, staff proposes Condition of Certification **NOISE-6**.

Therefore, the noise impacts of the HHSEGS project construction activities would comply with the noise LORS.

CEQA IMPACTS

Since construction noise typically varies with time, it is most appropriately measured by, and compared with, the L_{eq} (energy average) metric. As seen in **Noise Table 3** above, last column construction noise would elevate the existing ambient noise levels at the noise-sensitive receptors by no more than 9 dBA. An increase of above 5 and up to10 dBA could be either significant or insignificant, depending upon the particular circumstances of a case. Because construction would be temporary, most construction activities would occur during the daytime hours, and typical industry noise abatement

measures would be implemented for noise-producing equipment, staff believes construction noise during the daytime hours would not have a significant adverse impact on the project's noise-sensitive receptors.

To ensure project construction would create less than significant adverse impacts at the most noise-sensitive receptors, in addition to Condition of Certification **NOISE-6**, staff proposes Conditions of Certification **NOISE-1** and **NOISE-2**, which would establish a public notification and noise complaint process to resolve any complaints regarding construction noise.

In light of the following proposed conditions of certification below, the noise impacts of the HHSEGS project construction activities would be less than significant.

Steam Blows

Typically, the loudest noise encountered during construction, inherent in building any project incorporating a steam turbine, is created by the steam blows. After erection and assembly of the feed water and steam systems, the piping and tubing that comprise the steam path have accumulated dirt, rust, scale, and construction debris such as weld spatter, dropped welding rods, and the like. If the plant were started up without thoroughly cleaning out these systems, all this debris would find its way into the steam turbine, quickly destroying the machine.

In order to prevent this, before the steam system is connected to the turbine, the steam line is temporarily routed to the atmosphere. Traditionally, high pressure steam is then raised in the boiler or a temporary boiler and allowed to escape to the atmosphere through the steam piping. This flushing action, referred to as a "high pressure steam blow", is quite effective at cleaning out the steam system. A series of short steam blows, lasting two or three minutes each, are performed several times daily over a period of two or three weeks. At the end of this procedure, the steam lines are connected to the steam turbine, which is then ready for operation. Alternatively, high pressure compressed air can be substituted for steam.

High pressure steam blows, if unsilenced, can typically produce noise levels as high as 129 dBA at a distance of 50 feet; this would amount to roughly 90 dBA at CR1 and roughly 81 dBA at M1. Unsilenced steam blows could be disturbing at the nearest noise-sensitive receptors, depending on the frequency, duration, and noise intensity of venting. With a silencer installed on the steam blow piping, noise levels are commonly attenuated to 89 dBA at 50 feet; steam blow at the southern power block (Solar Plant 2), nearer to the noise-sensitive receptors, would amount to roughly 50 dBA at CR1 and roughly 41 at M1 (staff calculation). These levels are acceptable. Thus, staff proposes Condition of Certification **NOISE-7** (below) in order to limit steam blow noise to 89 dBA at 50 feet, and to limit this activity to daytime hours.

A quieter steam blow process, referred to as "low pressure steam blow" and marketed under names such as QuietBlow™ or Silentsteam™, has become popular. This method utilizes lower pressure steam over a continuous period of about 36 hours. Resulting noise levels reach about 86 dBA at 50 feet.

Linear Facilities

Construction of linear facilities typically moves along at a rapid pace, thus not subjecting any one receptor to noise impacts for more than two or three days. Further, construction activities would be limited to daytime hours (please see Condition of Certification **NOISE-6**).

Vibration

The only construction operation likely to produce vibration that could be perceived off site would be pile driving. The applicant anticipates that pile driving might be required for construction of the HHSEGS project (HHSG 2011a, AFC § 5.7.5.2.3).

Pile driving will not cause perceptible vibration at any of the project's receptors due to their relatively long distances to construction activities.

Information from other projects examined by staff shows the noise from pile driving could be expected to reach 104 dBA at a distance of 50 feet. The noise level from pile driving at Solar Plant 2 would thus be projected to reach a level of roughly 65 dBA at CR1 and 57 dBA at M1 (staff calculations). Assuming daytime noise levels at CR1 of 45 dBA and at M1 of 42 dBA, adding pile driving noise to the daytime ambient levels would produce increases of 20 dBA at CR1 and 15 dBA at M1. An increase of 15-20 dBA would likely constitute an annoyance. Thus, pile driving using traditional techniques can potentially cause a significant noise impact at the nearest noise-sensitive receptors. Staff recommends that pile driving be performed using a quieter process. Staff has identified several commercially available technologies that reduce pile driving noise by 20 to 40 dBA compared to traditional pile driving techniques. These include padded hammers, "Hush" noise-attenuating enclosures, vibratory drivers, and hydraulic techniques that press the piles into the ground instead of hammering them (Eaton 2000, Gill 1983, Ken-Jet, Kessler & Schomer 1980, NCT, WOMA 1999, Yap 1987). To ensure that pile driving noise will be performed with quieter equipment, staff proposes Condition of Certification **NOISE-8**. Also to ensure that pile driving noise will not cause annoyance, pile driving will be limited to daytime hours. To ensure this, staff proposes Condition of Certification **NOISE-6**, below.

Worker Effects

The applicant has acknowledged the need to protect construction workers from noise hazards and has recognized applicable LORS that would protect construction workers (HHSG 2011a, AFC § 5.7.5.2.1). To ensure that construction workers are, in fact, adequately protected, staff has proposed Condition of Certification **NOISE-3**.

OPERATION IMPACTS AND MITIGATION

The primary noise sources of the HHSEGS project would be the power blocks, where the steam turbine generators, air-cooled condensers, electric transformers, and various pumps and fans would be located. The northern power block would be located in, or, near the center of Solar Plant 1 (see **Noise Figure 1**), surrounded by a series of heliostats. This power block would be approximately 2 miles from CR1. The southern power block would be located in, or, near the center of Solar Plant 2 (see

Noise Figure 1), surrounded by a series of heliostats. This power block would be approximately 3,500 feet from CR1. The overall noise generated by the project's various noise sources would be based on the configuration of the sources, the number and power rating of the equipment, and any noise-reducing measures incorporated. Staff compares the projected project noise with applicable LORS, in this case the Inyo County noise LORS[4]. In addition, staff evaluates any increase in noise levels at sensitive receptors due to the project in order to identify any significant adverse impacts (see **CEQA Impacts**, below). The project would avoid the creation of annoying tonal (pure-tone) noises by balancing the noise emissions of various power plant features during plant design (Condition of Certification **NOISE-4**).

Compliance with LORS

The applicant performed noise modeling to determine the project's noise impacts on sensitive receptors (HHSG 2011a, AFC § 5.7.5.3.2). The applicant has predicted the operational noise levels at the nearest sensitive receptors; they are shown in **Noise Table-4** below. The County's Noise Element establishes a Normally Acceptable Day-Night Noise Level (L_{dn}) of 60 dBA. The Normally Acceptable L_{dn} of 60 dBA equates to an Equivalent Noise Level (L_{eq}) of 54 dBA continuously throughout the day and night. The applicant predicts the project's operational noise levels at receptor CR1 to be 54 dBA L_{eq} and at receptor M1 to be 52 dBA L_{eq} (**Noise Table 4** below). These levels are consistent with the LORS requirements. To ensure compliance with this LORS, staff proposes Condition of Certification **NOISE-4**. (For the reasons explained below, under **CEQA IMPACTS**, Condition of Certification **NOISE-4** limits the project's noise levels to lower than those predicted, at CR1 and M1.)

Also to ensure compliance, staff proposes Conditions of Certification **NOISE-1** and **NOISE-2** which would establish a public notification and noise complaint process requiring the applicant to resolve any problems caused by operational noise.

With implementation of the conditions of certification below, noise due to the operation of the HHSEGS project would be in compliance with the applicable LORS.

CEQA IMPACTS

The HHSEGS project would operate during the daylight hours (when the sun is shining). Thus, staff compares the project's noise levels to the existing daytime ambient noise levels at the project's noise-sensitive receptors. (Please see below for limited nighttime activities.) Typically, daytime ambient noise consists of both intermittent and constant noises. The noise that stands out during this time is therefore best represented by the average noise level, referred to as L_{eq}. Staff's evaluation of the above noise surveys shows that the daytime noise environment in the project area consists of both intermittent and constant noises. Thus, staff compares the project's noise levels to the daytime ambient L_{eq} levels at the project's noise-sensitive receptors. The applicant has predicted the operational noise level at CR1 and M1; they are shown here in **Noise Table 4**.

[4] Title 21, Chapter 21.20.20, (Development Standards for Renewable Energy Development) of the Inyo County Code - http://qcode.us/codes/inyocounty/

Noise Table 4: Predicted Operational Noise Levels at the Identified Sensitive Residential Receptors

Receptor	Project Alone Operational Noise Level (dBA) [1]	Measured Existing Ambient, Daytime L_{eq} (dBA) [2]	Cumulative L_{eq} (dBA)	Increase in Existing Ambient (dBA)
CR1	54	45	55	+10
M1	52	42	52	+10

Sources: [1] HHSG2011a, AFC § 5.7.5.3.2
[2] Noise Table 2, above

Combining the ambient noise level of 45 dBA L_{eq} (**Noise Table 4**, above) with the project noise level of 54 dBA at CR1 would result in 55 dBA L_{eq}, 10 dBA above the ambient. Combining the ambient noise level of 42 dBA L_{eq} (**Noise Table 4**, above) with the project noise level of 52 dBA at M1 would result in 52 dBA L_{eq}, 10 dBA above the ambient.

As described above (in **METHODS AND THRESHOLDS FOR DETERMINING SIGNIFICANCE**), staff regards an increase of above 5 and up to10 dBA to be adverse, but considers it to be either significant or insignificant, depending upon the particular circumstances of a case. The project would operate during the daytime hours and would not operate at night, when people are trying to sleep. Typically, staff considers an increase of up to 10 dBA to be less than significant if the noise occurs during the day. In the PSA staff concluded that a 10 dBA increase in the exisiting ambient levels at CR1 and M1 would cause a less-than-significant impact because the project would operate during the day and because staff's impression was that most of the people residing in the project vicinity commute to work; leaving their homes every weekday morning and returning home in late afternoons/evenings. After the writing of the PSA, staff learned that this situation may not exist in Charleston View, represented by CR1, and the residents may typically go about their normal daily activities mostly within the boundaries of this community.

Thus, in this **FSA** staff has further evaluated, in more details, the effect of a 10 dBA increase in the ambient noise levels at the project's sensitive noise receptors. In determining whether or not a project would create a significant adverse noise impact, one of the other factors that staff considers is the character of the existing noise regime that people are accustomed to, versus the character of the noise created by the noise source (i.e.; power plant). This is especially important in a rural environment with a generally quiet noise regime. The existing daytime noise environment in the project area is considered quiet and Charleston View is located in a rural setting. People residing near the proposed project site (i.e.; the residence of Charleston View) are more accustomed to natural sounds and noises from light human activities than to industrial noises; currently, the environment is dominated by non-industrial noise sources.

Therefore, the project's industrial noise character combined with an increase of 10 dBA at the project's noise-sensitive receptors would likely prove to cause annoyance, considering the presence of people in Charleston View during the day. Thus, staff considers the above noise impacts at CR1 and M1 to be significant.

In order to reduce the projected noise levels shown in **Noise Table 4** to a level that would result in a less than 10 dBA increase at CR1 and M1, additional mitigation measures (beyond those embedded in the design of the project) may be required. Staff believes that adequate feasible mitigation measures are available to reduce the project noise alone by up to 3 dBA at CR1, but any reduction beyond that would likely be extremely difficult to achieve, considering the quiet character of the noise environment and the lack of intervening structures or topographical/natural barriers between the project site and the noise-sensitive receptors. Thus, staff concludes that the projected project noise levels must be reduced.

A reduction of 3 dBA at CR1 would result in a project noise level of 51 dBA. Combining the ambient noise level of 45 dBA L_{eq} (**Noise Table 5**, below) with the project noise level of 51 dBA at CR1 would result in 52 dBA L_{eq}, 7 dBA above the ambient. A reduction of 3 dBA at M1 would result in a project noise level of 49 dBA. Combining the ambient noise level of 42 dBA L_{eq} (**Noise Table 5**, below) with the project noise level of 49 dBA at M1 would result in 50 dBA L_{eq}, 8 dBA above the ambient.

Noise Table 5: Staff-Proposed Operational Noise Levels at the Identified Sensitive Residential Receptors

Receptor	Project Alone Operational Noise Level (dBA) [1]	Measured Existing Ambient, Daytime L_{eq} (dBA) [2]	Cumulative L_{eq} (dBA)	Increase in Existing Ambient (dBA)
CR1	51	45	52	+7
M1	49	42	50	+8

Sources: [1] Noise Table 2, above

In order to ensure the applicant adheres to these levels, staff has revised Condition of Certification **NOISE-4** to require the project's noise to comply with the levels shown in **Noise Table 5**, rather than those in **Noise Table 4** (as appeared in the PSA).

Adverse impacts on residential receptors can also be identified by comparing predicted power plant noise levels with the nighttime ambient background noise levels at the nearest sensitive residential receptors. The project would have limited nighttime activities related to maintenance. Given the solar nature of this project, activity at night will be limited to primarily maintenance related activities such as mirror washing, with lower noise levels than those from operational activities (during the day). Mirror washing activities are expected to be similar in sound level to a heavy truck. Mirror washing will move around the project area returning to a particular group of mirrors approximately every two weeks, not having the potential to cause annoyance at the noise-sensitive residential receptors, due to its short-term nature. Therefore, staff considers this impact to be less than significant.

However, in the event that mirror washing noise becomes disturbing, the impact can be reduced by such measures as limiting the mirror washing hours near the residential receptors to the early evening hours rather than the late night hours. Also, the plant may not always operate at 100 percent of full power output, especially in the morning hours immediately following the sunrise due to the unavailability of adequate solar insolation.

This can provide an additional opportunity for mirror washing. The mirrors located near the residents can be washed during those hours instead of at night.

If further mitigation is needed, noise can be reduced by such measures as replacing the diesel-powered reflector cleaning vehicle and conventional combustion engine-powered portable lighting plant with an electric-powered vehicle and battery-powered portable lighting plant.

Tonal Noises

One possible source of annoyance could be strong tonal noises. Tonal noises are individual sounds (such as pure tones) which, while not louder than permissible levels, stand out in sound quality. To ensure that tonal noises do not cause public annoyance, staff proposes Condition of Certification **NOISE-4**, which would require mitigation measures, if necessary, to ensure the project would not create tonal noises.

Linear Facilities

All water pipes and gas pipes would be underground and therefore silent during plant operation. Noise effects from electrical interconnection lines typically do not extend beyond the lines' right-of-way easements and would be inaudible to receptors.

Vibration

Vibration from an operating power plant could be transmitted through two primary means: ground (ground-borne vibration), and air (airborne vibration).

The operating components of the HHSEGS plant would consist of high-speed steam turbine generators and various pumps and fans. All of these pieces of equipment must be carefully balanced in order to operate; permanent vibration sensors would be attached to the turbines and generators. Based on experience with numerous previous projects employing similar equipment, staff agrees with the applicant that ground-borne vibration from the HHSEGS project would be undetectable by any likely receptor.

Airborne vibration (low frequency noise) can rattle windows and objects on shelves and can rattle the walls of lightweight structures. However, none of the project equipment is known to produce noticeable low frequency noise beyond the project site boundaries. Staff concludes that the HHSEGS would not cause perceptible airborne vibration effects at any offsite noise-sensitive receptor.

Worker Effects

The applicant acknowledges the need to protect plant operating and maintenance workers from noise hazards and commits to compliance with all applicable LORS (HHSG 2011a, AFC § 5.7.5.3.1). Signs would be posted in areas of the plant with noise levels exceeding 85 dBA (the level that OSHA recognizes as a threat to workers' hearing), and hearing protection would be required and provided. To ensure that plant operation and maintenance workers are adequately protected, staff proposes Condition of Certification **NOISE-5**. For further discussion of proposed worker safety conditions of certification, please see **WORKER SAFETY AND FIRE PROTECTION** section of this document.

CUMULATIVE IMPACTS AND MITIGATION

Section 15130 of the CEQA Guidelines (Cal. Code Regs., tit. 14) requires a discussion of cumulative environmental impacts. Cumulative impacts are two or more individual impacts that, when considered together, are considerable or that compound or increase other environmental impacts. The CEQA Guidelines require that the discussion reflect the severity of the impacts and the likelihood of their occurrence, but need not provide as much detail as the discussion of the impacts attributable to the project alone.

The St. Therese Mission is the only proposed project near the HHSEGS site to potentially result in a cumulative noise effect. The facility developer estimates that as many as 1,200 visitors per month could visit the facility. The noise generated from such visitors would be predominately associated with vehicular traffic. Other features associated with the St. Therese Mission project are not anticipated to be significant sources of noise. Therefore, it is unlikely that HHSEGS, when combined with other projects, would create direct cumulative noise impact in the project area. Therefore, the project's cumulative noise impact is considered to be less than significant.

FACILITY CLOSURE

In the future, upon closure of the HHSEGS, all operational noise from the project would cease, and no further adverse noise impacts from operation of the HHSEGS would be possible. The remaining potential temporary noise source is the dismantling of the structures and equipment and any site restoration work that may be performed. Since this noise would be similar to that caused by the original construction, it can be treated similarly. That is, noisy work could be performed during daytime hours, with machinery and equipment properly equipped with mufflers. Any noise LORS that were in existence at that time would apply. Applicable conditions of certification included in the Energy Commission decision would also apply unless modified.

STAFF PROPOSED FINDINGS OF FACT

1. Construction and operation of the HHSEGS would not significantly increase noise levels above existing ambient levels in the surrounding project area.

2. Construction noise levels are temporary and transitory in nature and would be mitigated to the extent feasible by employing measures such as sound reduction devices and limiting construction to daytime hours in accordance with the Public Safety Element of the Inyo County General Plan.

3. Measures contained in the Conditions of Certification and compliance with local LORS would assure that noise from construction and operation is mitigated to below the level of significance.

4. Operational noise would not cause significant impacts to nearby residences.

5. The project owner would implement measures to protect workers from injury due to excessive noise levels.

6. The HHSEGS would not create ground or airborne vibrations which could cause significant off-site impacts.

7. Implementation of the Conditions of Certification identified below, ensure that project-related noise emissions would not cause significant impacts to sensitive noise receptors.

CONCLUSIONS

Staff concludes that the HHSEGS project, if built and operated in conformance with the proposed conditions of certification below, would comply with all applicable noise and vibration LORS and would produce no significant direct or cumulative adverse noise impacts on people within the project area, directly, indirectly, or cumulatively.

PROPOSED CONDITIONS OF CERTIFICATION

PUBLIC NOTIFICATION PROCESS

NOISE-1 Prior to the start of ground disturbance, the project owner shall notify all residents within one mile of the project site boundaries, by mail or by other effective means, of the commencement of project construction. At the same time, the project owner shall establish a telephone number for use by the public to report any undesirable noise conditions associated with the construction and operation of the project. If the telephone is not staffed 24 hours a day, the project owner shall include an automatic answering feature, with date and time stamp recording, to answer calls when the phone is unattended. This telephone number shall be posted at the project site during construction where it is visible to passersby. This telephone number shall be maintained throughout the operational life of the project.

Verification: At least 15 days prior to ground disturbance, the project owner shall transmit to the compliance project manager (CPM) a statement, signed by the project owner's project manager, stating that the above notification has been performed, and describing the method of that notification. This communication shall also verify that the telephone number has been established and posted at the site, and shall provide that telephone number.

NOISE COMPLAINT PROCESS

NOISE-2 Throughout the construction and operation of the project, the project owner shall document, investigate, evaluate, and attempt to resolve all project-related noise complaints. The project owner or authorized agent shall:

- use the Noise Complaint Resolution Form (below), or a functionally equivalent procedure acceptable to the CPM, to document and respond to each noise complaint;
- attempt to contact the person(s) making the noise complaint within 24 hours;

- conduct an investigation to determine the source of noise in the complaint;
- if the noise is project related, take all feasible measures to reduce the source of the noise; and
- submit a report documenting the complaint and actions taken. The report shall include: a complaint summary, including the final results of noise reduction efforts and, if obtainable, a signed statement by the complainant, stating that the noise problem has been resolved to the complainant's satisfaction.

Verification: Within five days of receiving a noise complaint, the project owner shall file a Noise Complaint Resolution Form, shown below, with the CPM, which documents the resolution of the complaint. If mitigation is required to resolve the complaint, and the complaint is not resolved within a three-day period, the project owner shall submit an updated Noise Complaint Resolution Form when the mitigation is performed and complete.

EMPLOYEE NOISE CONTROL PROGRAM

NOISE-3 The project owner shall submit to the CPM for review and approval a noise control program. The noise control program shall be used to reduce employee exposure to high (above permissible) noise levels during construction in accordance to the applicable OSHA and Cal-OSHA standards.

Verification: At least 30 days prior to the start of ground disturbance, the project owner shall submit the noise control program to the CPM. The project owner shall make the program available to Cal-OSHA upon request.

NOISE RESTRICTIONS

NOISE-4 The project design and implementation shall include appropriate noise mitigation measures adequate to ensure that the operation of the project will not cause the noise levels due to plant operation alone to exceed an average of 51 dBA L_{eq} measured at or near monitoring location CR1 and an average of 49 dBA L_{eq} measured at or near monitoring location M1.

No new pure-tone components shall be caused by the project. No single piece of equipment shall be allowed to stand out as a source of noise that draws legitimate complaints[5].

When the project first achieves a sustained output of 90 % or greater of rated capacity, the project owner shall conduct a 25-hour community noise survey at monitoring locations CR1 and M1, or at a closer location acceptable to the CPM. This survey shall also include measurement of one-third octave band

[5] A legitimate complaint refers to a complaint about noise that is caused by the HHSEGS project as opposed to another source (as verified by the CPM). A legitimate complaint constitutes a violation by the project of any noise condition of certification (as confirmed by the CPM), which is documented by an individual or entity affected by such noise.

sound pressure levels to ensure that no new pure-tone noise components have been caused by the project.

The measurement of power plant noise for the purposes of demonstrating compliance with this condition of certification may alternatively be made at a location, acceptable to the CPM, closer to the plant (e.g., 400 feet from the plant boundary) and this measured level then mathematically extrapolated to determine the plant noise contribution at the affected residence. The character of the plant noise shall be evaluated at the affected receptor locations to determine the presence of pure tones or other dominant sources of plant noise.

If the results from the noise survey indicate that the power plant noise at the affected receptor sites exceed the above values, mitigation measures shall be implemented to reduce noise to a level of compliance with these limits.

If the results from the noise survey indicate that pure tones are present, mitigation measures shall be implemented to eliminate the pure tones.

Verification: The survey shall take place within 30 days of the project first achieving a sustained output of 90 % or greater of rated capacity. Within 15 days after completing the survey, the project owner shall submit a summary report of the survey to the CPM. Included in the survey report will be a description of any additional mitigation measures necessary to achieve compliance with the above listed noise limits, and a schedule, subject to CPM approval, for implementing these measures. When these measures are in place, the project owner shall repeat the noise survey.

Within 15 days of completion of the new survey, the project owner shall submit to the CPM a summary report of the new noise survey, performed as described above and showing compliance with this condition.

OCCUPATIONAL NOISE SURVEY

NOISE-5 Following the project's attainment of a sustained output of 90 % or greater of its rated capacity, the project owner shall conduct an occupational noise survey to identify any noise hazardous areas in the facility.

The survey shall be conducted by a qualified person in accordance with the provisions of Title 8, California Code of Regulations, sections 5095-5099 (Article 105) and Title 29, Code of Federal Regulations, section 1910.95. The survey results shall be used to determine the magnitude of employee noise exposure.

The project owner shall prepare a report of the survey results and, if necessary, identify proposed mitigation measures to be employed in order to comply with the applicable California and federal regulations.

Verification: Within 30 days after completing the survey, the project owner shall submit the noise survey report to the CPM. The project owner shall make the report available to OSHA and Cal-OSHA upon request.

CONSTRUCTION RESTRICTIONS

NOISE-6 Heavy equipment operation and noisy construction work relating to any

project features, including pile driving, shall be restricted to the times delineated below:

Mondays through Saturdays: 7 a.m. to 7 p.m.

Construction activities may be performed outside the above hours, with CPM approval.

Haul trucks and other engine-powered equipment shall be equipped with adequate mufflers. Haul trucks shall be operated in accordance with posted speed limits. Truck engine exhaust brake use shall be limited to emergencies.

Verification: Prior to ground disturbance, the project owner shall transmit to the CPM a statement acknowledging that the above restrictions will be observed throughout the construction of the project.

At least 5 days prior to pouring of concrete outside of the above hours, the project owner shall submit a statement to the CPM, specifying the time of night and the number of nights for which concrete pouring will occur, the approximate distance of this activity to CR1 an M1, and the expected sound levels at these receptors. Also prior to pouring of concrete beyond the above hours, the project owner shall notify all residents within one mile of the project site boundaries, by mail or by other effective means, of the commencement of this activity.

STEAM BLOW RESTRICTIONS

NOISE-7 If a traditional, high-pressure steam blow process is used the project owner shall equip steam blow piping with a temporary silencer that quiets the noise of steam blows to no greater than 89 dBA measured at a distance of 50 feet. The steam blows shall be conducted between 8:00 a.m. and 5:00 p.m. unless arranged with the CPM such that offsite impacts would not cause annoyance to receptors. If a low-pressure, continuous steam blow process is used, the project owner shall submit to the CPM a description of the process, with expected noise levels and planned hours of steam blow operation.

Verification: At least 15 days prior to the first steam blow, the project owner shall notify all residents or business owners within one mile of the project site boundary. The notification may be in the form of letters, phone calls, fliers, or other effective means as approved by the CPM. The notification shall include a description of the purpose and nature of the steam blow(s), the planned schedule, expected sound levels, and explanation that it is a one-time activity and not part of normal plant operation.

PILE DRIVING MANAGEMENT

NOISE-8 The project owner shall perform pile driving using a quieter process than the traditional pile driving techniques to ensure that noise from this operation does not cause annoyance at monitoring locations CR1 and M1.

Verification: At least 15 days prior to first pile driving, the project owner shall submit to the CPM a description of the pile driving technique to be employed, including calculations showing its projected noise impacts at monitoring locations CR1 and M1.

Exhibit 1 - Noise Complaint Resolution Form

Hidden Hills Solar Electric Generating System Power Project
(11-AFC-2)

NOISE COMPLAINT LOG NUMBER _____

Complainant's name and address:

Phone number: _____

Date complaint received: _____
Time complaint received: _____

Nature of noise complaint:

Definition of problem after investigation by plant personnel:

Date complainant first contacted: _____

Initial noise levels at 3 feet from noise source _____ dBA Date: _____

Initial noise levels at complainant's property: _____ dBA Date: _____

Final noise levels at 3 feet from noise source: _____ dBA Date: _____

Final noise levels at complainant's property: _____ dBA Date: _____

Description of corrective measures taken:

Complainant's signature: _____ Date: _____

Approximate installed cost of corrective measures: $ _____
Date installation completed: _____
Date first letter sent to complainant: _____ (copy attached)
Date final letter sent to complainant: _____ (copy attached)

This information is certified to be correct:
Plant Manager's Signature: _____

(Attach additional pages and supporting documentation, as required).

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NOISE APPENDIX A

FUNDAMENTAL CONCEPTS OF COMMUNITY NOISE

To describe noise environments and to assess impacts on noise sensitive area, a frequency weighting measure, which simulates human perception, is customarily used. It has been found that A-weighting of sound intensities best reflects the human ear's reduced sensitivity to low frequencies and correlates well with human perceptions of the annoying aspects of noise. The A-weighted decibel scale (dBA) is cited in most noise criteria. Decibels are logarithmic units that conveniently compare the wide range of sound intensities to which the human ear is sensitive. **Noise Table A1** provides a description of technical terms related to noise.

Noise environments and consequences of human activities are usually well represented by an equivalent A-weighted sound level over a given time period (L_{eq}), or by average day and night A-weighted sound levels with a nighttime weighting of 10 dBA (L_{dn}). Noise levels are generally considered low when ambient levels are below 45 dBA, moderate in the 45 to 60 dBA range, and high above 60 dBA. Outdoor day-night sound levels vary over 50 dBA depending on the specific type of land use. Typical L_{dn} values might be 35 dBA for a wilderness area, 50 dBA for a small town or wooded residential area, 65 to 75 dBA for a major metropolis downtown (e.g., San Francisco), and 80 to 85 dBA near a freeway or airport. Although people often accept the higher levels associated with very noisy urban residential and residential-commercial zones, they nevertheless are considered to be levels of noise adverse to public health.

Various environments can be characterized by noise levels that are generally considered acceptable or unacceptable. Lower levels are expected in rural or suburban areas than what would be expected for commercial or industrial zones. Nighttime ambient levels in urban environments are about seven decibels lower than the corresponding average daytime levels. The day-to-night difference in rural areas away from roads and other human activity can be considerably less. Areas with full-time human occupation that are subject to nighttime noise, which does not decrease relative to daytime levels, are often considered objectionable. Noise levels above 45 dBA at night can result in the onset of sleep interference effects. At 70 dBA, sleep interference effects become considerable (Effects of Noise on People, U.S. Environmental Protection Agency, December 31, 1971).

In order to help the reader understand the concept of noise in decibels (dBA), **Noise Table A2** has been provided to illustrate common noises and their associated sound levels, in dBA.

Noise Table A1
Definition Of Some Technical Terms Related To Noise

Terms	Definitions
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a Sound Level Meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this testimony are A-weighted.
L_{10}, L_{50}, & L_{90}	The A-weighted noise levels that are exceeded 10%, 50%, and 90% of the time, respectively, during the measurement period. L_{90} is generally taken as the background noise level.
Equivalent Noise Level, L_{eq}	The energy average A-weighted noise level during the Noise Level measurement period.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 4.8 decibels to levels in the evening from 7 p.m. to 10 p.m., and after addition of 10 decibels to sound levels in the night between 10 p.m. and 7 a.m.
Day-Night Level, L_{dn} or DNL	The Average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10 p.m. and 7 a.m.
Ambient Noise Level	The composite of noise from all sources, near and far. The normal or existing level of environmental noise at a given location (often used for an existing or pre-project noise condition for comparison study).
Intrusive Noise	That noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.
Pure Tone	A pure tone is defined by the Model Community Noise Control Ordinance as existing if the one-third octave band sound pressure level in the band with the tone exceeds the arithmetic average of the two contiguous bands by 5 decibels (dB) for center frequencies of 500 Hz and above, or by 8 dB for center frequencies between 160 Hz and 400 Hz, or by 15 dB for center frequencies less than or equal to 125 Hz.
Source: Guidelines for the Preparation and Content of Noise Elements of the General Plan, Model Community Noise Control Ordinance, California Department of Health Services 1976, 1977.	

Noise Table A2
Typical Environmental And Industry Sound Levels

Noise Source (at distance)	A-Weighted Sound Level in Decibels (dBA)	Noise Environment	Subjective Impression
Civil Defense Siren (100')	140-130		Pain Threshold
Jet Takeoff (200')	120		Very Loud
Very Loud Music	110	Rock Music Concert	
Pile Driver (50')	100		
Ambulance Siren (100')	90	Boiler Room	
Freight Cars (50')	85		
Pneumatic Drill (50')	80	Printing Press Kitchen with Garbage Disposal Running	Loud
Freeway (100')	70		Moderately Loud
Vacuum Cleaner (100')	60	Data Processing Center Department Store/Office	
Light Traffic (100')	50	Private Business Office	
Transformer (200')	40	Quiet Residential Area Library	Quiet
Soft Whisper (5')	30	Quiet Bedroom	
	20	Recording Studio	
	10		Threshold of Hearing
Source: Handbook of Noise Measurement, Arnold P.G. Peterson, 1980			

SUBJECTIVE RESPONSE TO NOISE

The adverse effects of noise on people can be classified into three general categories:

- Subjective effects of annoyance, nuisance, dissatisfaction.
- Interference with activities such as speech, sleep, and learning.
- Physiological effects such as anxiety or hearing loss.

The sound levels associated with environmental noise, in almost every case, produce effects only in the first two categories. Workers in industrial plants can experience noise effects in the last category. There is no completely satisfactory way to measure the subjective effects of noise, or of the corresponding reactions of annoyance and dissatisfaction, primarily because of the wide variation in individual tolerance of noise.

One way to determine a person's subjective reaction to a new noise is to compare the level of the existing (background) noise, to which one has become accustomed, with the level of the new noise. In general, the more the level or the tonal variations of a new noise exceed the previously existing ambient noise level or tonal quality, the less acceptable the new noise will be, as judged by the exposed individual.

With regard to increases in A-weighted noise levels, knowledge of the following relationships can be helpful in understanding the significance of human exposure to noise.

1. Except under special conditions, a change in sound level of one dB cannot be perceived.

2. Outside of the laboratory, a three dB change is considered a barely noticeable difference.

3. A change in level of at least five dB is required before any noticeable change in community response would be expected.

4. A ten dB change is subjectively heard as an approximate doubling in loudness and almost always causes an adverse community response. (Kryter, Karl D., The Effects of Noise on Man, 1970).

COMBINATION OF SOUND LEVELS

People perceive both the level and frequency of sound in a non-linear way. A doubling of sound energy (for instance, from two identical automobiles passing simultaneously) creates a three dB increase (i.e., the resultant sound level is the sound level from a single passing automobile plus three dB). The rules for decibel addition used in community noise prediction are:

Noise Table A3
Addition of Decibel Values

When two decibel values differ by:	Add the following amount to the larger value
0 to 1 dB	3 dB
2 to 3 dB	2 dB
4 to 9 dB	1 dB
10 dB or more	0

Source: Architectural Acoustics, M. David Egan, 1988

Sound and Distance

Doubling the distance from a noise source reduces the sound pressure level by 6 dB.

Increasing the distance from a noise source 10 times reduces the sound pressure level by 20 dB.

Worker Protection

OSHA noise regulations are designed to protect workers against the effects of noise exposure, and list permissible noise level exposure as a function of the amount of time to which the worker is exposed:

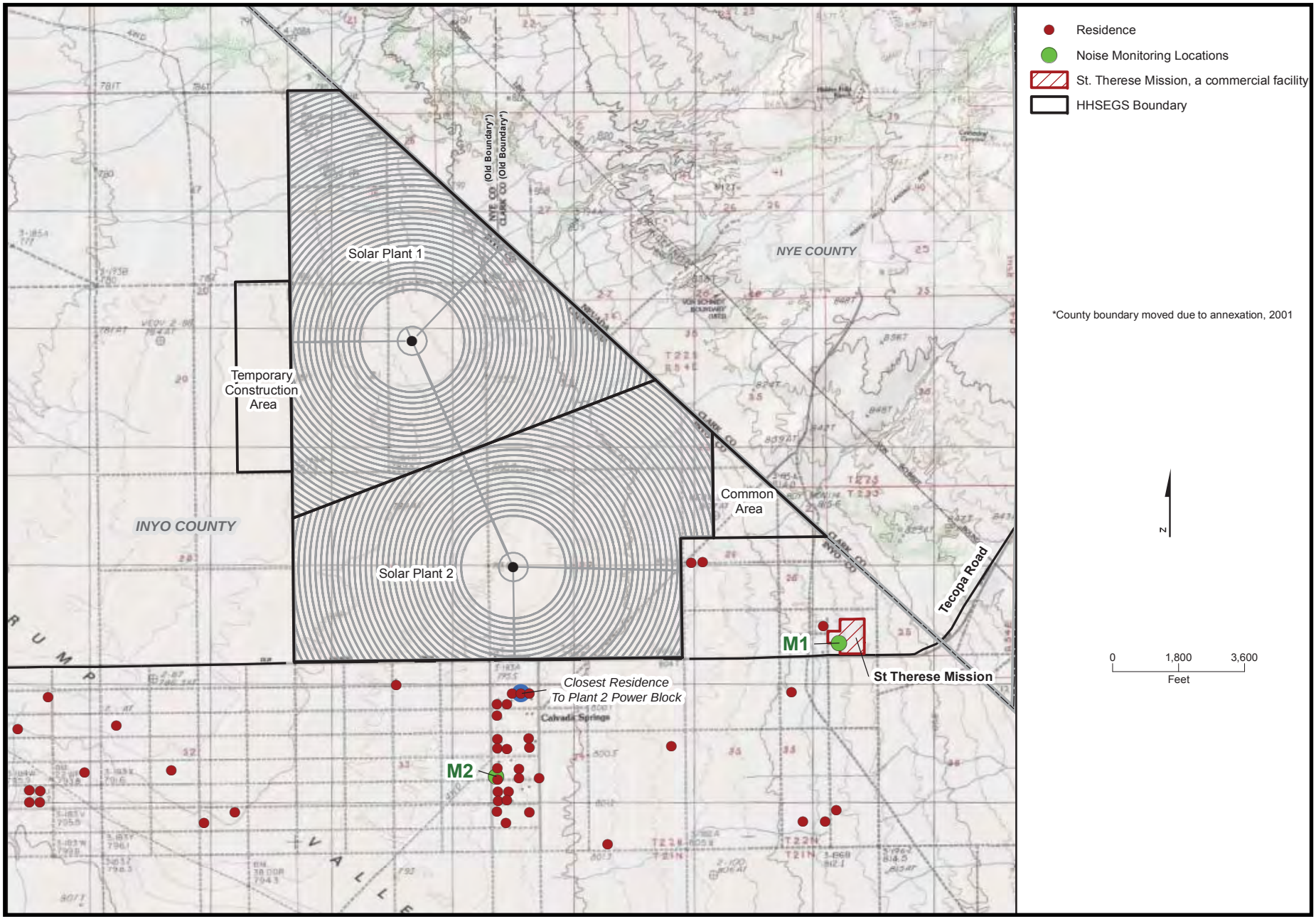
Noise Table A4
OSHA Worker Noise Exposure Standards

Duration of Noise (Hrs/day)	A-Weighted Noise Level (dBA)
8.0	90
6.0	92
4.0	95
3.0	97
2.0	100
1.5	102
1.0	105
0.5	110
0.25	115

Source: 29 C.F.R. § 1910.

NOISE - FIGURE 1

Hidden Hills Solar Electric Generating System (HHSEGS) - Noise Monitoring Locations



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: HHSEG AFC, Figure 5.7-1, August 2011

NOISE

PUBLIC HEALTH

Testimony of Huei-An (Ann) Chu, Ph.D. and Obed Odoemelam, Ph.D.

SUMMARY OF CONCLUSIONS

The California Energy Commission staff analyzed the potential human health risks associated with construction and operation of the proposed Hidden Hills Solar Electric Generating System (HHSEGS) project and does not expect any significant adverse cancer, short- or long-term noncancer health effects from the project's toxic emissions. Staff's analysis of potential health and safety impacts uses a highly conservative methodology that accounts for impacts on the most sensitive individuals in a given population, including newborns and infants. According to staff's assessment, emissions from the HHSEGS would not contribute significantly to morbidity or mortality in any age or ethnic group residing in the project area.

The public health impacts from the line segments (transmission line and natural gas line portions) within the state of Nevada would be assessed by BLM under the requirements of the National Environmental Policy Act (NEPA) of 1969 (HHSG 2011a, pp. 3-2 and 3-3).

INTRODUCTION

The purpose of this Final Staff Assessment (FSA) is to determine if emissions of toxic air contaminants (TACs) from the proposed HHSEGS would have the potential to cause significant adverse public health impacts or to violate standards for public health protection. If potentially significant health and safety impacts are identified, staff would identify and recommend mitigation measures necessary to reduce such impacts to insignificant levels.

The Commission staff address the potential impacts of regulated, or criteria, air pollutants in the **Air Quality** section of this FSA, and assess the impacts on public and worker health from accidental releases of hazardous materials in the **Hazardous Materials Management** and **Worker Safety and Fire Protection** sections. The health and nuisance effects from electric and magnetic fields are discussed in the **Transmission Line Safety and Nuisance** section. Pollutants released from the project's wastewater streams are discussed in the **Soils and Surface Water** and **Water Supply** sections. Releases in the form of hazardous and nonhazardous wastes are described in the **Waste Management** section.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

The federal, state, and local laws and policies applicable to the control of TAC emissions and mitigation of public health impacts for the HHSEGS are summarized in **Public Health Table 1**. Staff's analysis examines the project's compliance with these requirements and summarizes the applicable LORS.

Public Health Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
Clean Air Act section 112 (Title 42, U.S. Code section 7412)	Section 112 of the Clean Air Act addresses emissions of hazardous air pollutants (HAPs). This act requires new sources that emit more than 10 tons per year of any specified HAP or more than 25 tons per year of any combination of HAPs to apply Maximum Achievable Control Technology (MACT).
40 Code of Federal Regulations (CFR) Part 68 (Risk Management Plan)	Requires facilities storing or handling significant amounts of acutely hazardous materials to prepare and submit Risk Management Plans.
State	
California Health and Safety Code section 25249.5 et seq. (Safe Drinking Water and Toxic Enforcement Act of 1986—Proposition 65)	These sections establish thresholds of exposure to carcinogenic substances above which Prop 65 exposure warnings are required.
California Health and Safety Code, Article 2, Chapter 6.95, Sections 25531 to 25541; California Code of Regulations (CCR) Title 19 (Public Safety), Division 2 (Office of Emergency Services), Chapter 4.5 (California Accidental Release Prevention Program)	Requires facilities storing or handling significant amounts of acutely hazardous materials to prepare and submit Risk Management Plans
California Health and Safety Code section 41700	This section states that “a person shall not discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or that endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause injury or damage to business or property.”
California Health and Safety Code Sections 44360 to 44366 (Air Toxics “Hot Spots” Information and Assessment Act—AB 2588)	Requires preparation and biennial updating of facility emission inventory of hazardous substances; risk assessments.
California Public Resource Code section 25523(a); Title 20 California Code of Regulations (CCR) section 1752.5, 2300–2309 and	These regulations require a quantitative health risk assessment for new or modified sources, including power plants that emit one or more toxic air contaminants (TACs).

Applicable Law	Description
Division 2 Chapter 5, Article 1, Appendix B, Part (1); California Clean Air Act, Health and Safety Code section 39650, et seq.	
Local	
The Great Basin Unified Air Pollution Control District (GBUAPCD) Rule 220, Construction or Reconstruction of Major Sources of Hazardous Air Pollutants	Requires the evaluation of the potential impact of TACs from new or modified projects.
The Great Basin Unified Air Pollution Control District (GBUAPCD) Rule 401, Fugitive Dust	This rule is intended to minimize the formation and transport of fugitive dust from anthropogenic activity.

SETTING

This section describes the environment in the vicinity of the proposed project site from the public health perspective. Characteristics of the natural environment, such as meteorology and terrain, affect the project's potential for impacts on public health. An emissions plume from a facility may affect elevated areas before lower terrain areas because of reduced opportunity for atmospheric mixing. Consequently, areas of elevated terrain can often be subjected to increased pollutant impacts compared to lower-level areas. Also, the land use around a project site can influence the surrounding population in terms of distribution and density, which, in turn, can affect public exposure to project emissions. Additional factors affecting potential public health impacts include existing air quality and environmental site contamination. The area around the proposed HHSEGS is rural and sparsely populated, and is primarily zoned as open space (HHSG 2011a, section 1.9.3).

SITE AND VICINITY DESCRIPTION

The proposed HHSEGS site is located on privately owned land in southeastern Inyo County and is directly adjacent to the California-Nevada border, within the Great Basin Valleys Air Basin (GBVAB) and within the Great Basin Unified Air Pollution Control District (GBUAPCD). The two counties of Nevada adjacent to Inyo County are Nye County and Clark County.

The HHSEGS would have two solar fields and associated facilities (Solar Plant 1 and Solar Plant 2). Each solar plant would generate 270 megawatts (MW) of gross energy (or 250 MW of net energy), for a total net output of 500 MW. Each solar plant would include a 750-ft-tall solar power tower and two natural-gas-fired boilers: one auxiliary boiler and one night preservation boiler. The auxiliary boiler would be used to pre-warm the solar receiver steam generator (SRSG) to minimize the amount of time required for startup each morning, to assist during shutdown cooling operation, and to augment the solar

operation when solar energy diminishes under cloudy conditions. The nighttime preservation boiler would be used to maintain minimum system temperatures overnight. The natural gas pipeline proposed for this project would be approximately 12 inches in diameter, and approximately 32.4 miles in total length (HHSG 2011a, section 2.0, CH2 2012ee, p.1).

According to the Application for Certification (AFC), there are no sensitive receptor locations such as daycare centers, hospitals, parks, schools or preschools within 6 miles of the project site (HHSG 2011a section 5.9.3). The St. Therese Mission (a commercial facility) is under construction at a location approximately 0.5 mile southeast of the HHSEGS. The facility is considered a sensitive receptor location because it would include a children's playground and a residential unit.

The nearest residence to any of the power blocks is approximately 3,500 feet south of the Solar Plant 2 power block and about 950 feet south of the project's southern boundary. The closet community to the project site is several dozen residences that comprise Charleston View, south of Tecopa Road (also known as Old Spanish Trail Highway). The closest town to the project is Pahrump, Nevada, located approximately 8 miles directly north of the project area, with a 2010 projected population of 36,441 (HHSG 2011a section 5.6.3.1 and section 5.9.3).

METEOROLOGY AND CLIMATE

Meteorological conditions, including wind speed, wind direction, and atmospheric stability, affect the extent to which pollutants are dispersed into the air as well as the direction of pollutant transport. This, in turn, affects the level of public exposure to emitted pollutants along with the associated health risks. When wind speeds are low and the atmosphere is stable, for example, dispersion is reduced, and localized exposures may increase.

Atmospheric stability is one characteristic related to turbulence, or the ability of the atmosphere to disperse pollutants from convective air movement. Mixing heights (the height marking the extent of the space within which the air is well mixed and from which pollutants can be dispersed to other areas) are lower during mornings because of temperature inversions and increase during the warmer afternoons. Staff's **Air Quality** section presents a more detailed description of meteorological data for the area.

Southeastern Inyo County is characterized by a desert climate: low precipitation, hot summers, and cold winters. The mountain ranges surrounding the project area also have a major influence on the climate as they serve as a meteorological boundary that effectively removes the moisture from the air moving into the area. (HHSG 2011a, section 5.1.3.2)

The wind roses provided in the AFC Figures 5.1-1 thru 5.1-5 (HHSEGS 2011a) show that for most of the year, prevailing winds blow from the proposed project site into Nevada. Approximately 26 percent of prevailing winds are from Nevada. This means that the project area is not significantly impacted by emissions from Nevada. Please refer to the **Air Quality** section of this **FSA** for more details.

EXISTING SETTING

As previously noted, the proposed HHSEGS site is located within the Great Basin Valleys Air Basin (GBVAB) and within the Great Basin Unified Air Pollution Control District (GBUAPCD). By examining average toxic concentration levels from representative air monitoring sites together with the cancer risk factors specific to each carcinogenic contaminant, a lifetime cancer risk can be calculated to provide a background risk level for inhalation of ambient air. When examining such risk estimates, staff considers it important to note that the overall lifetime risk of developing cancer for the average female in the United States is about 1 in 3, or 333,333 in 1 million and about 1 in 2, or 500,000 in 1 million for the average male (American Cancer Society, 2011). From 2004 to 2008, the cancer incidence rates in California are 51.28 in 1 million for males and 39.69 for females. Meanwhile, the cancer incidence rates in Nevada are 50.76 in 1 million for males and 40.41 for females. Also, from 2004 to 2008, the cancer death rates for California are 19.74 in 1 million for males and 14.34 for females. Meanwhile, the cancer death rates in Nevada are 21.47 in 1 million for males and 16.3 for females (American Cancer Society, 2012).

EXISTING PUBLIC HEALTH CONCERNS

When evaluating a new project, staff usually conducts a detailed study and analysis of existing public health issues in the project vicinity. This analysis is prepared to identify the current rates of respiratory diseases (including asthma) and cancer, together with childhood mortality rates in the area around the proposed project site. Such assessment of existing health concerns would provide staff with a basis on which to evaluate the significance of any additional health impacts from the proposed HHSEGS project and assess the need for further mitigation.

The applicant has listed a few studies of cancer and respiratory disease rates in Inyo County and the broader Great Basin Valleys Air Basin (GBVAB). One fact that staff considers particularly important is that asthma diagnosis rates in the GBVAB area are higher than the average rates in California for both adults (age 18 and over) and children (ages 1-17). The percentage of adults diagnosed with asthma was, for example, reported as 9.3 percent in 2005 and 2007, compared to 7.7 percent for the general California population. Rates for children for the same 2005-2007 period were reported as 13.2 percent compared to 10.1 percent for the state in general (Wolstein et al., 2010). The authors did not identify any specific reasons for these higher rates of asthma in Inyo County but staff considers these findings as further support for continuing stringency in controlling the sources of pollutants in the area.

By examining the State Cancer Profiles as presented by the National Cancer Institute, staff found that cancer death rates in Inyo County have remained stable between 2005 and 2009. However, these rates (of 19.06 per 1,000,000, combined male/female) remain about 17 percent higher in Inyo County than the statewide average of 16.31 per 1,000,000 (National Cancer Institute, 2012). As with asthma, there are no specific reasons for these higher cancer rates pointing to the necessity for stringent pollution controls within the air district.

There are no ambient monitoring stations for Toxic Air Contaminants (TACs) in the

GBVAB. Therefore, staff used data from the San Joaquin Valley Air Basin (SJVAB) as the closest representation of the condition in the project area. Air quality and health risk data presented by ARB in Table C-34 of California Almanac of Emissions and Air Quality – 2009 Edition (ARB, 2009a) for the SJVAB for years 1990 and 2005 show a downward trend in Toxic Air Contaminant (TAC) emissions, along with related cancer risks (HHSG 2011a, section 5.9.3).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

This section discusses TAC emissions to which the public could be exposed during project construction and routine operation. Following the release of TACs into the air, water or soil, people may come into contact with them through inhalation, dermal contact, or ingestion via contaminated food or water.

Air pollutants for which no ambient air quality standards have been established are called non-criteria pollutants. Unlike criteria pollutants such as ozone, carbon monoxide, sulfur dioxide, or nitrogen dioxide, non-criteria pollutants have no ambient (outdoor) air quality standards that specify levels considered safe for everyone[1]. Since non-criteria pollutants do not have such standards, a health risk assessment (HRA) is used to determine if people might be exposed to those types of pollutants at unhealthy levels. The risk assessment consists of the following steps:

- identify the types and amounts of hazardous substances that HHSEGS could emit to the environment;
- estimate worst-case concentrations of project emissions in the environment using dispersion modeling;
- estimate amounts of pollutants that people could be exposed to through inhalation, ingestion, and dermal contact; and
- characterize potential health risks by comparing worst-case exposure to safe standards based on known health effects.

Staff conducts its public health analysis by evaluating and then adopting the information and data provided in AFC by each project proponent. Staff also relies upon the expertise and guidelines of the California Environmental Protection Agency (Cal/EPA) Office of Environmental Health Hazard Assessment (OEHHA) to identify contaminants known to the state of California to cause cancer or other noncancer health effects and to also identify the toxicity and cancer potency factors of these contaminants. Staff relies upon the expertise of the California Air Resources Board (ARB) and in addition, the local air districts to conduct ambient air monitoring of TACs and on the California Department of Public Health to evaluate pollutant impacts in specific communities. It is not within the purview or the expertise of the Energy Commission staff to duplicate the expertise and statutory responsibility of these agencies.

[1] Carbon dioxide (CO_2) is also a non-criteria pollutant, but it is also not considered a TAC at normal consideration and is not evaluated in this analysis.

For each project, a screening-level risk assessment is initially performed using simplified assumptions that are intentionally biased toward protection of public health. That is, staff uses an analysis designed to overestimate public health impacts from exposure to project emissions. In reality, it is likely that the actual risks from the source in question would be much lower than the risks as estimated by the screening-level assessment. The risks for such screening purposes are based on examining conditions that would lead to the highest, or worst-case, risks and then using those assumptions in the assessment. Such an approach usually involves the following:

- using the highest levels of pollutants that could be emitted from the plant;
- assuming weather conditions that would lead to the maximum ambient concentration of pollutants;
- using the type of air quality computer model which predicts the greatest plausible impacts;
- calculating health risks at the location where the pollutant concentrations are estimated to be the highest;
- assuming that an individual's exposure to carcinogenic (cancer-causing) agents would occur continuously for 70 years; and
- using health-based standards designed to protect the most sensitive members of the population (i.e., the young, elderly, and those with respiratory illnesses).

A screening-level risk assessment would, at a minimum, include the potential health effects from inhaling hazardous substances. Some facilities may also emit certain substances that could present a health hazard from noninhalation pathways of exposure (OEHHA 2003, Tables 5.1, 6.3, 7.1). When these substances are present in facility emissions, the screening-level analysis would include the following additional exposure pathways: soil ingestion, dermal exposure, and mother's milk (OEHHA 2003, p. 5-3).

The risk assessment process addresses three categories of health impacts: (1) acute (short-term) health effects, (2) chronic (long-term) noncancer effects, and (3) cancer risk (also long-term).

Acute Noncancer Health Effects

Acute health effects are those that result from short-term (one-hour) exposure to relatively high concentrations of pollutants. Such effects are temporary in nature and include symptoms such as irritation of the eyes, skin, and respiratory tract.

Chronic Noncancer Health Effects

Chronic noncancer health effects are those that result from long-term exposure to lower concentrations of pollutants. The exposure period is considered to be approximately from 12 percent to 100 percent of a lifetime, or from 8 to 70 years (OEHHA 2003, p. 6-5). Chronic noncancer health effects include diseases such as reduced lung function and heart disease.

Reference Exposure Levels (RELs)

The analysis for both acute and chronic noncancer health effects compares the maximum project contaminant levels to safe levels known as Reference Exposure Levels, or RELs. These are amounts of toxic substances to which even sensitive individuals could be exposed without suffering any adverse health effects (OEHHA 2003, p. 6-2). These exposure levels are specifically designed to protect the most sensitive individuals in the population, such as infants, the aged, and people with specific illnesses or diseases which makes them more sensitive to the effects of toxic substance exposure. The RELs are based on the most sensitive adverse health effect reported in the medical and toxicological literature and include specific margins of safety. The margins of safety account for uncertainties associated with inconclusive scientific and technical information available at the time of standard setting. They are therefore meant to provide a reasonable degree of protection against hazards that research has not yet identified.

Concurrent exposure to multiple toxic substances may result in health effects that are equal to, less than, or greater than effects resulting from exposure to the individual chemicals. Only a small fraction of the thousands of potential combinations of chemicals have been tested for the health effects of combined exposures. In conformity with the California Air Pollution Control Officers Association (CAPCOA) guidelines, the health risk assessment assumes that the effects of each substance are additive for a given organ system (OEHHA 2003, pp. 1-5, 8-12). Other possible mechanisms due to multiple exposures include those cases where the actions may be synergistic or antagonistic (where the effects are greater or less than the sum, respectively). For these types of exposures, the health risk assessment could underestimate or overestimate the risks.

Cancer Risk and Estimation Process

For carcinogenic substances, the health assessment considers the risk of developing cancer and assumes that continuous exposure to the carcinogen would occur over a 70-year lifetime. The risk that is calculated is not meant to project the actual expected incidence of cancer, but rather a theoretical upper-bound estimate based on the worst-case assumptions.

Cancer risk is expressed in terms of chances per million of developing cancer and is a function of the maximum expected pollutant concentration, the probability that a particular pollutant would cause cancer (called potency factors and established by OEHHA), and the length of the exposure period. Cancer risks for individual carcinogens are added together to yield a total cancer risk for each potential source. The conservative nature of the screening assumptions used means that the actual cancer risks from project emissions would be considerably lower than estimated.
As previously noted, the screening analysis is performed to assess the worst-case risks to public health associated with the proposed project. If the screening analysis were to predict a risk below significance levels, no further analysis would be necessary and the source would be considered acceptable with regard to carcinogenic effects. If however, the risk were to be above the significance level, then further analysis, using more realistic site-specific assumptions, would be performed to obtain a more accurate estimate.

Significance Criteria

Energy Commission staff assesses the maximum cancer impacts from specific carcinogenic exposures by first estimating the potential impacts on the maximum exposed individual. This is a person hypothetically exposed to project emissions at a location where the highest ambient impacts were calculated using the worst-case assumptions as described above. Since the individual's exposure would produce the maximum impacts possible around the source, staff uses this risk estimate as a marker for acceptability of the project's carcinogenic impacts.

Acute and Chronic Noncancer Health Risks

As described earlier, non-criteria pollutants are evaluated for short-term (acute) and long-term (chronic) non-cancer health effects, as well as the noted cancer impacts from usually long-term exposures. The significance of project-related impacts is determined separately for each of the three health effects categories. Staff assesses the noncancer health effects by calculating a hazard index. A hazard index is a ratio obtained by comparing exposure from facility emissions to the safe exposure level (i.e. Reference Exposure Level, or REL) for that pollutant. A ratio of less than 1.0 suggests that the worst-case exposure would be below the limit for safe levels and would thus be insignificant with regarding to health effects. The hazard indices for all toxic substances with the same type of health effect are added together to yield a Total Hazard Index for the source. The Total Hazard Index is calculated separately for acute effects and chronic effects. A Total Hazard Index of less than 1.0 would indicate that cumulative worst-case exposures would not lead to significant noncancer health effects. In such cases, noncancer health impacts from project emissions would be considered unlikely even for sensitive members of the population. Staff would therefore presume that there would be no significant noncancer project-related public health impacts. This assessment approach is consistent with those in the risk management guidelines of both California OEHHA and U.S. EPA.

Cancer Risk

Staff relies upon regulations implementing the provisions of Proposition 65, the Safe Drinking Water and Toxic Enforcement Act of 1986, (Health & Safety Code, §§25249.5 et seq.) for guidance in establishing its significance levels for carcinogenic exposures. Title 22, California Code of Regulations section 12703(b) states that "the risk level which represents no significant risk shall be one which is calculated to result in one or less excess cancer cases within an exposed population of 100,000, assuming lifetime exposure." This risk level is equivalent to a cancer risk of 10 in 1 million, which is also written as 10×10^{-6}. In other words, under state regulations, an incremental cancer risk of greater than 10 in 1 million from a project should be regarded as suggesting a potentially significant carcinogenic impact on public health. The 10 in 1 million risk level is also used by the Air Toxics "Hot Spots" (AB 2588) program as the public notification threshold for air toxic emissions from existing sources.

An important distinction between staff's and the Proposition 65 risk characterization approach is that the Proposition 65 significance level applies separately to each cancer-causing substance, whereas staff determines significance based on the total risk from all the cancer-causing pollutants to which the individual might be exposed in the given case. Thus, the manner in which the significance level concept is applied by staff is

more conservative (health-protective) than that applied by Proposition 65. The significant risk level of 10 in 1 million is also consistent with the level of significance adopted by many California air districts. In general, these air districts would not approve a project with a cancer risk estimate of more than 10 in 1 million.

As described above, the initial risk analysis for a project is typically performed at a screening level, which is designed to overstate actual risks, so that health protection could be ensured. Staff's analysis also addresses potential impacts on all segments of the population including the young, the elderly, people with existing medical conditions that may render them more sensitive to the adverse effects of toxic air contaminants, and any minority or low-income populations that are likely to be disproportionately affected by impacts. To accomplish this goal, staff uses the most current acceptable public health exposure levels (both acute and chronic) set to protect the public from the effects of air toxics in question. When a screening analysis shows the cancer risks to be above the significance level, refined assumptions would be applied for likely a lower, more realistic risk estimate. If after refined assumptions, the project's risk is still found to exceed the significance level of 10 in 1 million, staff would require appropriate measures to reduce the risk to less than significant levels. If, after all risk reduction measures have been considered, a refined analysis still identifies a cancer risk of greater than 10 in 1 million, staff would deem such a risk to be significant and would not recommend project approval.

DIRECT /INDIRECT IMPACTS AND MITIGATION

Proposed Project's Construction Impacts and Mitigation Measures

Construction of HHSEGS is expected to take place from the second quarter of 2013 to the fourth quarter of 2016 (a total of 29 months). Construction of the commonly shared facilities would occur concurrently with the construction of Solar Plant 1. Solar Plant 2 construction would occur about 3 months behind that of Solar Plant 1. The applicant conducted the Construction Emissions and Impact Analysis for this site and concluded that "no significant public health effects would be expected during construction." (HHSG 2011a, Appendix 5.1F) Staff concurs with the applicant based upon staff's evaluation of the mitigation measures specified by the applicant as necessary to minimize such impacts. Such potential construction risks are normally associated with exposure to fugitive dust and combustion emissions. Fugitive dust emissions could occur from:

- Dust entrained during site preparation and grading/excavation/trenching at the construction site;
- Dust entrained during onsite movement of construction vehicles on unpaved surfaces;
- Fugitive dust emitted from an onsite concrete batch plant; and
- Wind erosion of areas disturbed during construction activities.

Combustion emissions during construction would result from:

- Exhaust from the diesel construction equipment used for site preparation, grading, excavation, trenching, and construction of onsite and offsite (transmission- and gas pipeline-related) structures;

- Exhaust from water trucks used to control construction dust emissions;
- Exhaust from portable welding machines, small generators, and compressors;
- Exhaust from pickup trucks and diesel trucks used to transport workers and materials around the construction areas;
- Exhaust from diesel trucks used to deliver concrete, fuel, and construction supplies to the construction areas; and
- Exhaust from automobiles used by workers to commute to and from the construction areas.

Diesel Exhaust

The operation of construction equipment would result in air emissions from diesel-fueled construction equipment. Diesel exhaust is a complex mixture of thousands of gases and fine particles and contains over 40 substances listed by the U.S. Environmental Protection Agency (U.S. EPA) as hazardous air pollutants (HAPs) and by the California Air Resources Board (ARB) as toxic air contaminants (TACs). The diesel particulate matter (DPM) is primarily composed of aggregates of spherical carbon particles coated with organic and inorganic substances. Diesel exhaust deserves particular attention mainly because of its ability to induce serious noncancer effects and its status as a likely human carcinogen. The DPM emissions from on-site HHSEGS construction activities are summarized in **Public Health Table 2**.

Public Health Table 2
Maximum Onsite DPM Emissions during Construction

Emitting Activity	Pounds per Day	Tons per Year
Construction Equipment	4.4	0.1

Source: HHSG 2011a, Table 5.9-3.

Diesel exhaust is characterized by ARB as “Particulate Matter from Diesel-Fueled Engines”. The impacts from human exposure may include both short- and long-term health effects. Short-term effects can include increased coughing, labored breathing, chest tightness, wheezing, and eye and nasal irritation. Effects from long-term exposure can include increased coughing, chronic bronchitis, reductions in lung function, and inflammation of the lung. Epidemiological studies strongly suggest a causal relationship between occupational diesel exhaust exposure and lung cancer. Diesel exhaust is listed by the EPA as “likely to be carcinogenic to humans.” (US. EPA, 2003)

Based on a number of health effects studies, the Scientific Review Panel (SRP) on Toxic Air Contaminants in 1998 recommended a chronic REL for diesel exhaust particulate matter of 5 micrograms of diesel particulate matter per cubic meter of air (µg/m3) and a cancer unit risk factor of $3x10^{-4}$ $(µg/m3)^{-1}$. The Scientific Review Panel did not recommend a specific value for an acute REL since available data in support of a value was deemed insufficient. On August 27, 1998, ARB listed particulate emissions from diesel-fueled engines as a toxic air contaminant and approved the panel’s recommendations regarding health effects. (OEHHA 2009, Appendix A)

The applicant conducted a health risk assessment for diesel exhaust from construction activities and the results are listed in **Public Health Table 3**. The assessment used the Hot Spots Reporting Program (HARP) - derived risk values for diesel particulate matter together with a nine-year exposure period to calculate this construction-related cancer risk. This approach is as specified in the OEHHA guidelines (OEHHA, 2003). The maximum modeled annual average concentration of diesel particulate matter at any location was calculated to be 0.139 $\mu g/m^3$. The cancer unit risk value from HARP for an assumed 9-year exposure is $5.33x10^{-5}$ per $\mu g/m^3$, which is lower than the cancer unit risk of $3x10^{-4}$ $(\mu g/m^3)^{-1}$ from SRP/ARB since the one from SRP/ARB is derived for longer-term exposures. The calculated cancer risk is approximately 7.41 in one million[2] which is below the significance level of 10 in one million. As described above, construction of the two power plants of HHSEGS is anticipated to take place over a period of 29 months, which is shorter than 9 years assumed in the applicant's calculations. Therefore, the applicant's analysis should be regarded as conservative because of the inherently conservative exposure-related assumptions made in the modeling analysis. (HHSG 2011a Appendix 5.1F) Staff regards the related conditions of certification in the **Air Quality** section as adequate to ensure that the applicant follows the strict construction practices recognized by the industry and regulatory agencies as effective mitigation against construction emissions in general.

The chronic hazard index for diesel exhaust during construction activities is 0.028 as calculated by staff using a chronic noncancer REL of 5 $\mu g/m^3$. This index is lower than the significance level of 1.0 meaning that there would be no chronic noncancer impacts from construction activities. The potential levels of criteria pollutants from operation of construction-related equipment are discussed in staff's **Air Quality** section along with mitigation measures and related conditions of certification. The pollutants of most concern in this regard are PM10, carbon monoxide (CO), sulfur dioxide (SO_2), and nitrogen dioxide (NO_2).

Public Health Table 3
Construction Hazard/Risk from DPMs

Cancer Unit Risk Used $(\mu g/m^3)^{-1}$	**Cancer Risk (in one million)**	**Significance Level**	**Significant?**
$5.33x10^{-5}$ [a]	7.41	10	No
Chronic Noncancer REL $(\mu g/m^3)$	**Hazard Index (HI)**		
5 [b]	0.028	1	No

[a] Obtained by the applicant from HARP for a 9-year exposure period (the derived adjusted method). Source: Applicant.
[b] Source: OEHHA and ARB.

[2] The risk of 7.41 in one million was calculated using the following formula:
Cancer Risk = Concentration of Diesel Exhaust × Cancer Unit Risk = 0.139 $\mu g/m^3$ × $5.33x10^{-5}$ per $\mu g/m^3$ = $7.41x10^{-6}$

HHSEGS is proposed for an area where the disease of Valley Fever[3] (*Coccidioidomycosis)* may sometimes be present. Construction could disturb a certain percentage of approximately 3,277 acres[4] of top soil that could harbor the *Coccidioides* spores possibly exposing humans to the risk of Valley Fever. On-site workers and visitors could be exposed from inhaling these fungal spores from wind-blown dust generated from soil excavation work. To minimize the risk of getting Valley Fever, Center for Disease Control and Prevention (CDC) recommends the following measures:

- Wear an N95 mask if a person must be in or near a dusty environment, such as a construction zone
- Avoid activities that involve close contact to dust including yard work, gardening, and digging
- Use air quality improvement measures indoors such as HEPA filters
- Take prophylactic anti-fungal medication if deemed necessary by a person's healthcare provider
- Clean skin injuries well with soap and water, especially if they have been exposed to soil or dust

The California Department of Public Health (CDPH) also recommends that "those exposed to dust during their jobs or outside activities in these areas should consider respiratory protection, such as a mask, during such activities." (California Department of Public Health)

Based on CDC and CDPH's recommendations, staff recommends that workers in the vicinity of such dust generation areas wet the soil before any excavation activities, wear protective masks and stay indoors during dust storms and close all doors to avoid dust inhalation. Staff also considers the applicant's dust suppression plans adequate to minimize the risk of getting Valley Fever in areas where *Coccidioides* spores are found. Please also refer to staff's **Worker Safety and Fire Protection** section for more information.

As for the concerns of Valley Fever on public health, in the **Air Quality Section** of this FSA, staff recommends some mitigation measures, including **AQ-SC3 (Construction Fugitive Dust Control)**, **AQ-SC4 (Dust Plume Response Requirement)** and **AQ-SC7 (Site Operation Dust Control Plan)** for the purposes of preventing all fugitive dust plumes from leaving the project boundary. As long as the dust plumes are kept within the project boundary, there won't be any significant concern for Valley Fever adversely affecting public health.

Small quantities of hazardous wastes may be generated during construction of the project. The applicant stated that "hazardous waste management plans will be in place so the potential for public exposure is minimal". Please, refer to staff's **Waste**

[3] Valley fever is an infection that occurs when the spores of the fungus *Coccidioides immitis* enter human's lung through inhalation. When people breathe in these *Coccidioides* spores, they are at risk of developing Valley Fever.

[4] 1,483 acres in Solar Plant 1, 1,510 acres in Solar Plant 2, 103 acres in common area, and 180 acres in the temporary construction area (HHSG 2011a, § 5.6.1).

Management section of this **FSA** for more information on the safe handling and disposal of these and all project-related wastes.

Proposed Project's Operational Impacts and Mitigation Measures

Emission Sources

As previously noted, the proposed HHSEGS facility would be a nominal 500-Megawatt (MW) heliostat mirror and power tower thermal solar electrical generating facility comprised of two plants, HHSEGS 1 (250 MW), and HHSEGS 2 (250 MW). The direct emission of air toxics from solar power generation is minimal; however, the facility would start-up each day with input of energy from natural gas-fueled boilers associated with each plant. These boiler-related emissions would be the source of most of the non-solar emission from the facility. The other sources would include specific operational and maintenance activities necessary to operate and maintain the proposed facilities. These include diesel-fueled emergency generators and fire pumps, each power block's 249-MMBtu[5]/hr natural-gas-fired auxiliary boiler and 15 MMBtu/hr nighttime preservation boilers to maintain minimum system temperatures overnight, and small wet-surface air coolers. The auxiliary boiler would be used during the morning startup cycle to help the plant come up more quickly to operating temperature and to provide power to augment solar operation when solar energy diminishes from cloud cover. It is these sources that would be mostly responsible for most toxic exposures within HHSEGS.

Potential pollutants that could be emitted are listed in **Public Health Table 4** and include both criteria and non-criteria pollutants. These pollutants include certain volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs). Criteria pollutant emissions and impacts from such non-solar sources are examined in staff's **Air Quality** analysis. Since the facility would use dry cooling, there would be no emissions of toxic metals or volatile organic compounds from cooling tower mist or drift. Also, there would be no health risk from the potential presence of the Legionella bacterium responsible for Legionnaires' disease.

[5] Million British thermal units, stands for one million BTUs. BTU is a standard unit of measurement used to denote the amount of heat energy in fuels. A BTU is the amount of heat required to increase the temperature of a pint of water (which weighs exactly 16 ounces) by one degree Fahrenheit.

Public Health Table 4
The Main Pollutants Emitted from the Proposed Project

Criteria Pollutants	Non-criteria Pollutants
Carbon monoxide	Acetaldehyde
Oxides of nitrogen	Acrolein
Particulate matter	Ammonia
Oxides of sulfur	Benzene
Volatile Organic Compounds (VOCs)	1,3-Butadiene
	Ethylbenzene
	Formaldehyde
	Hexane
	Naphthalene
	PAHs (as BaP)
	Propylene
	Toluene
	Xylene
	Diesel Particulate Matter

Source: HHSG 2011a, Table 5.9-4 and Table 5.9-5

Tables 5.9-4, 5.1B-15R, 5.1B-16R and 5.1B-17R of the AFC (HHSG 2011a and CH2 2012p) list the specific non-criteria pollutants that may be emitted as combustion byproducts from HHSEGS boilers and its small wet surface air coolers (WSACs). The emission factors for these pollutants were obtained from the Ventura County Air Pollution Control District. **Public Health Table 5** lists each such pollutant and shows how it would contribute to the total risk obtained from the risk analysis. **Public Health Table 6** (modified from Table 5.9-5 of the AFC) lists the toxicity values used to quantify the cancer and noncancer health risks from the project's combustion-related pollutants. The listed toxicity values include RELs, used to calculate short-term and long-term noncancer health effects, and the cancer unit risks, used to calculate the lifetime risk of developing cancer, as published in the OEHHA's Guidelines (OEHHA 2003) and OEHHA / ARB Consolidation Table of OEHHA/ARB Approved Risk Assessment Health Values (ARB 2011).

Public Health Table 5
Types of Health Impacts and Exposure Routes Attributed to Toxic Emissions

Substance	Oral Cancer	Oral Noncancer	Inhalation Cancer	Noncancer (Chronic)	Noncancer (Acute)
Acetaldehyde			✔	✔	✔
Acrolein				✔	✔
Ammonia				✔	✔
Benzene			✔	✔	✔
1,3-Butadiene			✔	✔	
Ethylbenzene			✔	✔	
Formaldehyde			✔	✔	✔
Hexane				✔	
Napthalene		✔	✔	✔	
Polycyclic Aromatic Hydrocarbons (PAHs, as BaP)	✔		✔		
Propylene				✔	
Toluene				✔	✔
Xylene				✔	✔
Diesel Exhaust			✔	✔	

Source: OEHHA / ARB 2011 and HHSG 2011a, Table 5.9-5

Emission Levels

As previously noted, the health risk from exposure to each project-related pollutant is assessed using the “worst case” emission rates and impacts. Maximum hourly emissions are required to calculate acute (one-hour) noncancer health effects, while estimates of maximum emissions on an annual basis are required to calculate cancer and chronic (long-term) noncancer health effects.

The next step in the assessment process is to estimate ambient concentrations using a screening air dispersion model and assuming conditions that would result in maximum impacts. The applicant’s screening analysis for the noted combustion byproducts was performed using the ARB/OEHHA Hotspots Analysis and Reporting Program (HARP). Ambient concentrations were used in conjunction with Reference Exposure Levels (RELs) and cancer unit risk factors to estimate the cancer and noncancer risks from operations. The applicable exposure pathways for the toxic emissions include inhalation, dermal (through the skin) absorption, soil ingestion, and mother’s milk. This method of assessing health effects is consistent with OEHHA’s Air Toxics Hot Spots Program Risk Assessment Guidelines (OEHHA 2003) referred to earlier.

Public Health Table 6
Toxicity Values Used to Characterize Health Risks

Toxic Air Contaminant	Inhalation Cancer Potency Factor $(mg/kg\text{-}d)^{-1}$	Chronic REL ($\mu g/m^3$)	Acute REL ($\mu g/m^3$)
Acetaldehyde	0.010	140	470 (1-hr) 300 (8-hr)
Acrolein	—	0.35	2.5 (1-hr) 0.7 (8-hr)
Ammonia	—	200	3,200
Benzene	0.10	60	1,300
1,3-Butadiene	0.60	20	—
Ethylbenzene	0.0087	2,000	—
Formaldehyde	0.021	9	55 (1-hr) 9 (8-hr)
Hexane	—	7,000	—
Napthalene	0.12	9.0	—
Polycyclic Aromatic Hydrocarbons (PAHs, as BaP)	3.9	—	—
Propylene	—	3000	—
Toluene	—	300	37,000
Xylene	—	700	22,000
Diesel Exhaust	1.1	5	-

Sources: ARB 2011 and HHSG 2011a, Table 5.9-5

The applicant's HRA was prepared using the latest version (1.4d) of the ARB's HARP model (ARB, 2009b), the ARB February 2011 health database (ARB, 2011), and the OEHHA Hot Spots Program Guidance Manual (OEHHA, 2003). Emissions of non-criteria pollutants from the project were analyzed using emission factors previously approved by ARB. Air dispersion modeling combined the emissions with site-specific terrain and meteorological conditions to analyze the mean short-term and long-term concentrations in air for use in the HRA. The EPA-recommended air dispersion model, AERMOD, was used along with 5 years (2006–2010) of compatible meteorological data from the Pahrump and Henderson, Nevada, meteorological stations. The meteorological data combined surface measurements made at Pahrump and Henderson with upper air data from Elko, Nevada. Because HARP was based on a previous EPA-approved air dispersion model, Industrial Source Complex Short Term, Version 3 (ISCST3), the HARP On-Ramp (ARB, 2009b) was used to integrate the air dispersion modeling output from the required air dispersion model, AERMOD, with the risk calculations in the HARP risk module.

Cancer Risk at the Point of Maximum Impact (PMI)

The applicant first presented the numerical cancer risk for the maximally exposed individual (MEI) which is the individual located at the point of maximum impact (PMI) as well as risks to the MEI at a residence (MEIR). Human health risks associated with emissions from the proposed and similar projects are unlikely to be higher at any other

location than at the PMI. Therefore, if there is no significant impact associated with concentrations at the PMI location, it is assumed that there would be insignificant impacts in any other location in the project area. The cancer risk to the MEI at the PMI is referred to as the Maximum Incremental Cancer Risk (MICR). However, the PMI (and thus the MICR) is not necessarily associated with actual exposure because in many cases, the PMI is in an uninhabited area. Therefore, the MICR is generally higher than the maximum residential cancer risk. MICR is based on 24 hours per day, 365 days per year, 70 year lifetime exposure.

Project-Related Impacts within Area Residences

The applicant-calculated cancer risk from maximal residential exposure was for a residence located approximately 1 mile west of the center of Hidden Hills Solar Plant 2, and approximately 300 feet west of the HHSEGS project boundary. Staff's specific interest in the risk to the maximally exposed individual (MEI) in a residential setting is because this risk most closely represents the maximum project-related lifetime cancer risk calculated from the present regulatory assumption of exposure 24 hours per day and 365 days a year over a 70-year lifetime.

Risk to Workers

Cancer risk to potentially exposed workers was presented by the applicant in terms of risk to the maximally exposed individual worker or MEIW. The applicant's assessment is for potential workplace risks, from exposure of shorter duration than for residential risks from 70 years of exposure. Workplace risk is presently assumed by the regulatory agencies to result from exposure lasting 8 hours per day, 245 days per year, over a 40-year period.

As described above, the inhalation cancer potency factors and RELs used to characterize health risks associated with modeled ambient concentrations are taken from the Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values (ARB, 2011) and are presented in **Public Health Table 6**. Health risks potentially associated with ambient concentrations of carcinogenic pollutants were calculated in terms of excess lifetime cancer risks. The total cancer risk at any specific location is found by summing the contributions from the individual carcinogens.

The applicant's screening health risk assessment for the project including emissions from all sources resulted in a maximum acute Hazard Index (HI) of 0.003 and a maximum chronic HI of 0.001 (CH2 2012p, Table 5.9-6R). As **Public Health Table 7** shows, both acute and chronic hazard indices are less than 1.0, indicating that no short- or long-term adverse health effects are expected. As shown in **Public Health Table 7**, total worst-case individual cancer risk was calculated by the applicant to be 2.8 in 1 million at the point of maximum impact (PMI).

Public Health Table 7
Operation Hazard/Risk at Point of Maximum Impact: Applicant Assessment

Type of Hazard/Risk	Hazard Index/Risk	Significance Level	Significant?
Acute Noncancer	0.003	1.0	No
Chronic Noncancer	0.001	1.0	No
Cancer Risk			
PMI[a]	2.8 in one million		No
MEIR[b]	0.5 in one million	10 in one million	No
MEIW[c]	0.4 in one million		No

[a] PMI = Point of Maximum Impact
[b] MEIR = MEI of residential receptors
[c] MEIW = MEI for workers
Source: CH2 2012p, Table 5.9-6R

To evaluate the applicant's analysis, staff used data from 2010 and conducted another analysis of cancer risks and acute and chronic hazards due to combustion-related emissions from the proposed HHSEGS project. The analysis was conducted for the general population, sensitive receptors, nearby residences, and the workers. The sensitive receptors, as previously noted, are subgroups that may be at greater risk from exposure to emitted pollutants, and include the very young, the elderly, and those with existing illnesses. Health risks were also evaluated at the nearest residence because population in the vicinity of a project could be seen as having a greater chance of long-term exposure to TACs at potentially significant levels. The nearest residence to the HHSEGS property boundary is approximately 300 feet west of the project boundary. The nearest residence to any power block equipment is approximately 3,500 feet south of the Solar Plant 2 power block and about 950 feet south of the project's southern boundary. The previously noted St. Therese Mission project, a commercial facility under construction, is approximately 0.5 mile southeast of the HHSEGS site. It is considered a potential sensitive receptor location because the facility would include a chapel, garden, restaurant, a visitor's center that will include a children's playground, and a care-taker residential unit.

The following is a summary of the most important elements of staff's heath risk assessment for HHSEGS:

- The analysis was conducted using the ARB/OEHHA Hotspots Analysis and Reporting Program (HARP), Version 1.4d.

- Emissions would be from the concurrent operation of all four natural-gas-fired boilers, three emergency diesel generators (one in the common facility area), and three diesel fire pump engines (one in the common facility area). Because evaporative drift emissions from the wet surface air coolers (WSACs) would be so low and potential impacts would be minimized through the use of high efficiency drift eliminators and deionized water with very low total dissolved solids (TDS) levels, these units were not included in the HRA.

- Exposure pathways included inhalation, dermal absorption, soil ingestion, and mother's milk.

- The local meteorological data, local topography, grid, residence and sensitive receptors, source elevations and site-specific and building-specific input parameters used in the HARP model were obtained from the AFC and modeling files provided by the applicant.
- The emission factors and toxicity values used in staff's analysis of cancer risk and hazard were obtained from the AFC and are listed in **Public Health Table 6**.
- Cancer risk was determined under the derived (OEHHA) risk assessment method.
- The following receptor locations were quantitatively evaluated in staff's analysis:
    - point of maximum impact (PMI), approximately 1 mile west of the center of Hidden Hills 2 (70-year residential scenario);
    - location of the nearest residence, also approximately 1 mile west of the center of Hidden Hills 2, approximately 300 feet west of the HHSEGS project boundary (70-year residential scenario);
    - St. Therese Mission, approximately 0.5 mile southeast of the HHSEGS site (70-year residential scenario); and,
    - Workers: occupational exposure patterns assuming exposure of 8 hours/day, 145 days/year for 40 years

Results of staff's analysis are summarized in **Public Health Table 8** and are compared to the results estimated by the applicant and presented in the AFC. The results estimated by staff and applicant are very similar, which verified the analysis of the applicant. It can also be seen from these results that the cancer and noncancer risks from HHSEGS operation would be significantly below their respective significance levels meaning that no health impacts would occur within all segments of the surrounding population. Since the project's combustion emissions of concern reflect the efficacy of the applicant's proposed emission controls, (use of natural gas as fuel and oxidative catalyst for emission minimization) staff recommends neither mitigation measures nor related conditions of certification.

As for potential impact in Nevada, the results show that the risks of receptors in California close to HHSEGS are lower than the significance level. Therefore, staff concludes that there won't be any impacts from HHSEGS on either California or Nevada.

Public Health Table 8
Results of Staff's and Applicant's Analyses for Cancer Risk and Chronic Hazard – HHSEGS Operations

	Staff's Analysis (by using data from 2010)			Applicant's Analysis		
Receptor Location	Cancer Risk[a] (per million)	Chronic HI[b]	Acute HI[b]	Cancer Risk[a] (per million)	Chronic HI[b]	Acute HI[b]
PMI	2.64	0.0013	0.0028	2.8	0.001	0.003
Nearest residence[c] MEIR	0.42	0.00031	0.0015	0.5	0.0002	0.002
Worker MEIW	0.4	-	-	0.4	-	-
St. Therese Mission	0.113	0.000059	-	-	-	-

[a] Significant level = 10 per million.
[b] HI = Hazard Index, Significant level = 1.
[c] Location of the nearest residence with a 70-year residential scenario.

CUMULATIVE IMPACTS AND MITIGATION

Within the 6-mile radius of the HHSEGS site, neither newly permitted sources nor other sources of toxic air pollutants are reasonably anticipated in the near future except for the St. Therese Mission project. Additional planned development projects that have not filed applications for air permits include the Pahrump Valley General Aviation Airport (approximately 10 miles away), the Element Power Solar Project (approximately 7 miles northeast of the proposed project), and the Sandy Valley Solar Project (approximately 5 miles east of the proposed project). Potential cumulative impacts of other development projects within 10 miles of the project site are discussed in Appendix 5.1G of the AFC. Since all related toxic emissions would be below significant thresholds and highly localized, staff does not expect their additive impacts to be significant, particularly in light of their distance from the project site.

As discussed above, the contribution of HHSEGS to both cancer risk and chronic and acute noncancer impacts would be very small even in a cumulative context including other regional sources; the estimates of cancer and noncancer risks from the project would be less than significant. Its contribution to area health impacts would thus be less than significant in a cumulative context.

COMPLIANCE WITH LORS

Staff has conducted a human health risk assessment for the proposed HHSEGS project and found no potentially significant adverse impacts for any receptors, including sensitive receptors. In arriving at this conclusion, staff notes that its analysis complies with all directives and guidelines from the Cal/EPA Office of Environmental Health Hazard Assessment and the California Air Resources Board. Staff's assessment is biased towards protection of public health and takes into account the most sensitive

individuals in the population. Using extremely conservative (health-protective) exposure and toxicity assumptions, staff's analysis demonstrates that members of the public potentially exposed to toxic air contaminant emissions of this project—including sensitive receptors such as the elderly, infants, and people with pre-existing medical conditions—will not experience any acute or chronic significant health risk or any significant cancer risk as a result of that exposure.

Additionally, staff has reviewed **Socioeconomics Figure 1**, which shows the environmental justice population is not greater than fifty percent within a six-mile buffer of the proposed HHSEGS and therefore, there would not be a disproportionate **Public Health** impact resulting from construction and operation of the proposed project to an environmental justice population.

Staff believes that it incorporated every conservative assumption called for by state and federal agencies responsible for establishing methods for analyzing public health impacts. The results of that analysis indicate that there would be no direct or cumulative significant public health and safety impact on any population in the area. Staff therefore concludes that construction and operation of the HHSEGS will be in compliance with all applicable LORS regarding long-term and short-term project impacts in the area of public health.

NOTEWORTHY PUBLIC BENEFITS

It is noteworthy that a solar electric generating facility such as the proposed HHSEGS project would emit significantly less TACs to the environment than most other energy sources available in California such as natural gas or biomass, thereby reducing the general public's health risks that would otherwise occur with these other energy sources. At the same time, the proposed HHSEGS would provide much needed electrical power to California residences and businesses, and contribute to electric reliability. Electrical power is not only necessary to maintain a functioning society, but it also benefits many individuals who rely on powered equipment for their health (such as dialysis equipment and temperature control equipment). For example, it is documented that during heat waves in which elevated air-conditioning use causes an electrical blackout, hospitalizations and deaths due to heat stroke are increased.

PUBLIC AND AGENCY COMMENTS ON THE PSA

Staff received some comments regarding soil stabilization chemicals, Valley Fever and health risk assessment. Please refer to **Appendix 1**, PSA Comment matrix – Public Health section, for details.

PROPOSED FINDINGS OF FACT

Based on the analysis, staff recommends the following findings:

- The HHSEGS project would be located in the Great Basin Valleys Air Basin (GBVAB) and within the Great Basin Unified Air Pollution Control District (GBUAPCD).
- During construction, no significant public health effects from diesel exhaust are

expected and no mitigation measures are necessary. Applicant should follow strict construction practices that incorporate safety and compliance with applicable LORS.

- During operation, the potential public health risks associated with operation of the HHSEGS would be insignificant. No significant adverse cancer, short-term or long-term health effects to any members of the public, including low income and minority populations, from project toxic emissions would be expected.
- Staff conducted an adequate analysis of the project's contributions to cumulative public health impacts. The TAC emissions contribution from the HHSEGS project would be relatively small regionally and locally, thus the overall impact of the project on regional and local public health would not be CEQA significant.
- Construction and operation of the HHSEGS would be in compliance with all applicable LORS regarding long-term and short-term project impacts in the area of public health.

CONCLUSIONS

Staff has analyzed the potential public health risks associated with construction and operation of the HHSEGS and does not expect any significant adverse cancer, short-term, or long-term health effects to any members of the public, including low income and minority populations, from project toxic emissions. Staff also concludes that its analysis of potential health impacts from the proposed HHSEGS uses a highly conservative methodology that accounts for impacts to the most sensitive individuals in a given population, including newborns and infants. According to the results of staff's health risk assessment, emissions from the HHSEGS would not contribute significantly or cumulatively to morbidity or mortality in any age or ethnic group residing in the project area.

MITIGATION MEASURES/PROPOSED CONDITIONS OF CERTIFICATION

No conditions are proposed.

ACRONYMS

AFC	Application for Certification
ARB	California Air Resources Board
ATC	Authority to Construct
Btu	British thermal unit
CAA	Clean Air Act (Federal)
CAL/EPA	California Environmental Protection Agency
CAPCOA	California Air Pollution Control Officers Association
CDC	Center for Disease Control and Prevention
CDPH	California Department of Public Health
CEC	California Energy Commission (or Energy Commission)
CEQA	California Environmental Quality Act
CO	Carbon Monoxide
CO_2	Carbon Dioxide
DPMs	Diesel Particulate Matters
FSA	Final Staff Assessment
GBUAPCD	Great Basin Unified Air Pollution Control District
GVAB	Great Valleys Air Basin
HAPs	Hazardous Air Pollutants
HARP	Hot Spots Reporting Program
HRA	Health Risk Assessment
HHSEGS	Hidden Hills Solar Electric Generating System (proposed project)
HI	Hazard Index
lbs	Pounds
LORS	Laws, Ordinances, Regulations and Standards
MACT	Maximum Achievable Control Technology
mg/m^3	milligrams per cubic meter
MMBtu	Million British thermal units
MW	Megawatts (1,000,000 Watts)
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NO_3	Nitrates
NOx	Oxides of Nitrogen *or* Nitrogen Oxides
O_2	Oxygen
O_3	Ozone

OEHHA	Office of Environmental Health Hazard Assessment
PAHs	Polycyclic Aromatic Hydrocarbons
PM	Particulate Matter
PM10	Particulate Matter less than 10 microns in diameter
PM2.5	Particulate Matter less than 2.5 microns in diameter
ppm	Parts Per Million
ppmv	Parts Per Million by Volume
ppmvd	Parts Per Million by Volume, Dry
PSA	Preliminary Staff Assessment (this document)
RELs	Reference Exposure Levels
SO_2	Sulfur Dioxide
SO_3	Sulfate
SOx	Oxides of Sulfur
SJVAB	San Joaquin Valley Air Basin
SRP	Scientific Review Panel
SRSG	Solar Receiver Steam Generator
TACs	Toxic Air Contaminants
TDS	Total Dissolved Solids
VOCs	Volatile Organic Compounds
WSACs	Wet Surface Air Coolers

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PUBLIC HEALTH

List of Comment Letters

		Public Health Comments?
1	Inyo County	
2	Bureau of Land Management	
3	National Park Service	
4	The Nature Conservancy	
5	Amargosa Conservancy	
6	Basin & Range Watch	
7	Pahrump Paiute Tribe	
8	Richard Arnold, Pahrump Piahute Tribe	
9	Big Pine Tribe of Owens Valley	
10	Intervenor Cindy MacDonald	X
11	Intervenor Center for Biological Diversity	
12	Intervenor, Old Spanish Trail Association	
13	Applicant, BrightSource Energy, Inc.	X

Comment #	DATE		COMMENT	RESPONSE
10	**July 21, 2012**		**Intervenor Cindy MacDonald**	
10.1	**p. 3-16 #6**		What are the public health implications (if any) if any of these considerations increase fugitive and windblown dust (PM10/PM2.5 particles) due to lack of site suitability (soils, road surface, aggregate, natural drainage) in terms of applying either of these two CARB pre-certified products?	Soil stabilizers are only one of a suite of mitigation measure used to control onsite fugitive and windblown dust, and will be used where effective and appropriate. Staff also recommends other mitigation measures and best practices, such as **AQ-SC3 (Construction Fugitive Dust Control)**, **AQ-SC4 (Dust Plume Response Requirement)** and **AQ-SC7 (Site Operation Dust Control Plan)**, for the purpose of minimizing all fugitive dust plumes and preventing them from leaving the project boundary. Preventing dust plumes from leaving the project boundary is a way to minimize concern for public health. Please note that dust plumes are transitory and temporary, depending on specific project activities under way, soil conditions, and meteorological conditions.
10.2	**p. 3-22 #3**		What mitigation measures does the CEC Staff recommend to protect public health during the construction and operational phases of the proposed project to insure air quality standards don't exceed significant thresholds of PM10/PM2.5 fugitive and windblown dust emissions for wind speeds occurring in the project area outside the currently undefined definition of "normal"?	The mitigation measures and best practices that address PM10/PM2.5 are included in **AQ-SC1** through **AQ-SC7** and **AQ-SC9** for construction and operation of the project. Please see the **Air Quality** section for details.

10.3	**p. 3-22 #4**		How will the CEC or the GBUAPCD monitor fugitive and windblown dust levels during the operational portion of the proposed project to detect levels and frequency of PM10/PM2.5 emissions exceeding significant thresholds and posing threats to public health?	The mitigation measures include **AQ-SC7** for operation of the project. Please see **Air Quality** section for details.
10.4	**p. 3-23 # 1**		Which regulatory agencies are CEC Staff referring to that recognize this is an appropriate mitigation measure the public can take to protect themselves from Valley Fever?	Staff used regulatory agencies to reflect the fact that the necessary exposure reduction measures are those specified by regulatory agencies such Center for Disease Control and Prevention (CDC) and California Department of Public Health (CDPH) as responsible for minimizing public exposure to dust and the causative agent of Valley Fever. To avoid confusion, in response to public comments staff has edited the **Public Health** section. Please see **Public Health** and **Worker Safety and Fire Protectio**n sections for details.
10.5	**p. 3-23 # 2**		Where have these regulatory agencies posted this policy and does it supersede laws aimed at protecting public health from known infections such as those produced by the fungus responsible for inducing Valley Fever?	Staff edited this section to indicate that these regulatory agencies such as CDC and CDPH recommend measures to reduce the risk of exposure to dust and the causative agent of Valley Fever. Please see **Public Health** section for details.
10.6	**p. 3-23 # 3**		How will tourists passing through and those visiting the area for recreational purposes protect themselves from air borne fungus resulting from project site disturbances as they have no place to go indoors?	As noted before, staff proposed some mitigation measures in the **Air Quality** section to keep any generated windblown dust within the project area to protect the workers and the public, including visitors. Also, based on the recommendations of CDC and CDPH, tourists and others can reduce their risk of getting valley fever by wearing N95 masks. Please note that dust plumes are transitory and temporary, depending on the specific project activities under way, soil conditions, and meteorological conditions.
10.7	**p. 3-23 # 4**		How will customers at the St. Theresa Mission and Front Site Training Institute protect themselves from exposure due to the proposed projects volume of site disturbance during both the construction and operational phase of the proposed project?	Based on the recommendations of CDC, the following measure can be taken to reduce the risk of getting valley fever: • They should stay inside or wear an N95 mask when a dust storm occurs. • The St. Theresa Mission and Front Site Training Institute can use HEPA filters in the heating, ventilation and air conditioning (HVAC) system to improve the indoor quality. • See **Public Health** section for general remedies recommended by CDC and CDPH.
10.8	**p. 3-23 # 5**		What is the feasibility of local residents and others in the area “staying indoors” during times when wind events last for longer than 1 day as is known to occur in the area?	Based on the recommendations of CDC, people venturing out of doors during a dust storm can wear a N95 mask or take prophylactic anti-fungal medication as noted in **Public Health** section. Please note that dust plumes are transitory and temporary, depending on the specific project activities under way, soil conditions, and meteorological conditions.

10.9	**p. 3-23 # 6**		How does the currently proposed mitigation measure of staying indoors during potential exposure times comply with Nuisance Regulation H&SC §41700?	In this specific case, the nuisance impact of concern is from exposure to the causative agent of valley fever through wind-blown dust. To avoid this nuisance, several mitigation measures in the Air Quality Section are implemented in the form of conditions of certification, including **AQ-SC3 (Construction Fugitive Dust Control)**, **AQ-SC4 (Dust Plume Response Requirement)** and **AQ-SC7 (Site Operation Dust Control Plan)**. These are intended to keep the dust plumes within the project boundary. Please note that dust plumes are transitory and temporary, depending on the specific project activities under way, soil conditions, and meteorological conditions.
10.1O	**p. 3-23 # 7**		Considering the proposed project site will experience continued soil disturbance over the project's lifetime due to critically required maintenance activities, is this the only mitigation plan that can be utilized to protect public health for the next 25-30 years if the project is approved?	In the **Air Quality** Section, staff also recommends some mitigation measures which would be implemented as required conditions of certification, including **AQ-SC3 (Construction Fugitive Dust Control)**, **AQ-SC4 (Dust Plume Response Requirement)** and **AQ-SC7 (Site Operation Dust Control Plan**). These are required for the purposes of minimizing dust plumes and preventing fugitive dust plumes from leaving the project boundary. Please note that dust plumes are transitory and temporary, depending on the specific project activities under way, soil conditions, and meteorological conditions.
10.11	**p. 3-29 #1**		What does this chart reflect and model besides cancer risks?	This chart addresses three categories of health impacts: (1) acute (short-term) health effects, (2) chronic (long-term) noncancer effects, and (3) cancer risk (also long-term). In cancer risk assessment, we use the criterion of 10 per million (10 x 10-6) as the significance criterion. If an incremental cancer risk is less than 10 in 1 million from a project, then the lifetime risk of getting cancer is less than significant and no mitigation measures are necessary. In noncancer risk assessment for both acute and chronic health effects, we use 1 as the significance criterion. If a hazard index is less than 1.0, it suggests that the worst-case exposure would be below safe levels and would thus be insignificant with regard to noncancer health effects. We assess these three health impacts for: (1) point of maximum impact (PMI), (2) residential receptors, and (3) workers. Furthermore, we assume that the person is exposed to these levels continuously for a 70-year period for PMI and residential receptors, while we assume exposure of 8 hours/day, 145 days/year for 40 years for workers.
10.12	**p. 3-29 #2**		What chemicals (by specific component) and emissions does this chart represent under "Acute Health Hazard Index" and "Chronic Health Hazard Index"?	According to Table 5.1-30R of the AFC (Summary of Toxic Air Contaminant Emissions from Project Operation), the toxic air contaminants emitted from the natural gas-fired boilers include Acetaldehyde, Acrolein, Benzene, Ethylbenzene, Formaldehyde, Hexane, Napthalene, Polycyclic Aromatics, Propylene, Toluene and Xylene. The toxic air contaminant emitted from emergency engines, fire pump engines and mirror cleaning vehicles and pump engines is Diesel Particulate Matter.
10.13	**p. 3-29 #3**		Does it incorporate just carcinogenic risks exclusively or does it incorporate other health risks such as respiratory conditions? If so, which ones?	Carcinogenic risks and non-carcinogenic risk are always calculated separately by using different assumptions, methodologies and criteria. Different toxic air contaminants may have various health effects. Please refer to **Public Health Table 5 (Types of Health Impacts and Exposure Routes Attributed to Toxic Emissions)** in staff's **Public Health** section for details.

10.14	**p. 3-30 #4**		Did the applicant model or provide any Health Risk of Diesel Exhaust assessment for potential respiratory impacts or other health impacts to workers or local populations resulting from diesel emissions besides cancer? If not, why not?	Yes. The applicant conducted a health risk assessment specifically for diesel exhaust from construction activities: the cancer risk is 7.41 in one million (below the significance level of 10) and the hazard index is 0.028 (well below the significance level of 1.0). The applicant also conducted a health risk assessment for all toxic air contaminants including diesel exhaust from operation activities.
10.15	**p. 3-30 #5**		Did the CEC Staff request any additional Health Screening Risks of Diesel Exhaust from the applicant besides the supplied cancer risk assessment or consult with the applicant in any way prior to the applicant initiating the parameters for the Health Screening Risk modeling? If not, why not?	No, staff did not request the applicant to conduct any additional screening, nor did staff consult with the applicant prior to the applicant conducting and submitting their analysis. Staff reviewed applicant's analysis and found it acceptable because it followed the ARB/CA OEHHA (2003) guidelines (Air Toxics Hot Spots Program Risk Assessment Guidelines, The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments) for health risk assessment and used appropriate assumptions (which require adjusting the 70-year lifetime exposure risk for an exposure period of 9 years). Staff also verified that the risk factors from The Scientific Review Panel (SRP) and non-cancer Reference Exposure Levels (RELs) from OEHHA/ARB (2011) are used appropriately by the applicant. Therefore, staff concluded that the applicant's analysis was appropriately conducted and therefore it was not necessary to request them to conduct any additional health risk assessment. Moreover, staff used data from 2010 and conducted our own, additional health risk assessment to evaluate health risks and compared our results to the applicant's analysis. Please refer to staff's **Public Health** section for details.
10.16	**p. 3-30 #6**		Where is the "produce ingestion pathway" referred to in the GBUAPCD's response or in the AFC files or subsequent documents?	A "produce ingestion pathway" refers to being exposed through consumption of locally grown plant foods. Toxic air contaminants may affect people directly if they inhale or ingest contaminated air, water, or soil. Exposure is also possible via secondary pathways such as a food chain. As a simplified example, TACs released from a boiler may settle onto a vegetable garden and become mixed into the soil. Plants such as fruits and vegetables growing there could absorb the TACs through their roots and into their edible portions. People who then eat the plants (or eat the animals that ate the plants) might then be exposed to the pollutant through ingestion. However, since only small amounts of TACs would be emitted from this project, and produce ingestion is an indirect pathway, staff believes the risk from this pathway is minimal, and it is reasonable to include only the following pathways in health risk assessment: inhalation, dermal (through the skin) absorption, soil ingestion, and mother's milk.
10.17	**p. 7-2 #6**		How does the CEC Staff determine potentially significant impacts, significant impacts and impacts that cannot be mitigated – including those that may affect public health and resources - if these project components have yet to be drawn, evaluated or assessed by qualified professionals in compliance with industry standards?	In cancer risk assessment, Energy Commission staff use 10 in 1 million as the significance criterion. If an incremental cancer risk is less than 10 in 1 million from a project, then the lifetime risk of getting cancer is less than significant and no mitigation measures are necessary. The 10 in 1 million risk level is also used by the Air Toxics "Hot Spots" (AB 2588) program as the public notification threshold for air toxic emissions from existing sources. In noncancer risk assessment for both acute and chronic health effects, Energy Commission staff use 1.0 as the significance criterion. If a hazard index is less than 1.0, it suggests that the worst-case exposure would be below safe levels and would thus be insignificant with regard to noncancer health effects. This assessment approach is consistent with those in the risk management guidelines of both California OEHHA and U.S. EPA. Please see "**METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE**" in **Public Health** section for details.

10.18	**p. 14-18 #7**		If the applicant and/or CEC CPM approve the use of Pennz-Suppress D for dust suppression over the life of the project, what potential impacts will this product have to water, water quality and biological resources in and around the proposed project site?	Staff found that the soil stabilizers for dust control measures which would be used by the applicant are the ones pre-certified by the California Air Resources Board (ARB). One criterion to be eligible for pre-certification by ARB is that they would "not pose a significant hazard to public health and safety or the environment." (ARB Website http://www.arb.ca.gov/eqpr/midwestevalrpttxt.pdf) In other words, soil stabilizing materials used onsite must be non-toxic as required by Energy Commission requirements, by the ARB and by most Air Districts. Therefore, staff recommends use of soil stabilizers to control fugitive dust when necessary.
Comment #	**DATE**		**COMMENT**	**RESPONSE**
13	**July 23, 2012**	**Applicant -- BrightSource Energy, Inc.**		
13.1	**p. 228 Comments #1**			Staff corrected the error.
13.2	**p. 228 Comments #2**			Staff made some changes. Please see **Public Health** section for details.
13.3	**p. 229 Comments #3**			Staff made the change.
13.4	**p. 229 Comments #4**			Staff made the change.
13.5	**p. 229 Comments #5**			Staff made the change.
13.6	**p. 229 Comments #6**			Staff made the change.

SOCIOECONOMICS

Testimony of Jim Adams – Growth-Inducing Impacts
Steven Kerr – Socioeconomics
Richard McCann – Fiscal Impact Analysis

SUMMARY OF CONCLUSIONS

Energy Commission staff concludes that construction and operation of the Hidden Hills Solar Electric Generating System (HHSEGS) would not cause significant direct, indirect, or cumulative adverse socioeconomic impacts on the project area's housing, schools, parks, fire and emergency medical services, or law enforcement. Staff also concludes that the project would not induce a substantial population growth or displacement of population, or induce substantial increases in demand for housing. In addition, the project's natural gas pipeline and electric transmission line would not induce any additional growth in the project area.

The minority population in Socioeconomics Figure 1 does not constitute an environmental justice population as defined by *Environmental Justice: Guidance Under the National Environmental Policy Act* and would not trigger further scrutiny for purposes of an environmental justice analysis.

HHSEGS would both create new fiscal revenues for Inyo County as well as new costs associated with providing project-related services and infrastructure. Staff prepared the report, *Socioeconomic and Fiscal Impacts of the Hidden Hills Solar Electric Generation System on Inyo County,* to determine the benefits and the costs of the HHSEGS to Inyo County, which is included as **Appendix Socio-1** of this document. Staff concluded that the sales tax revenue generated for the county during the construction period would be much greater than the estimated potential county expenditures.

Staff-proposed Condition of Certification **SOCIO-1** would ensure project compliance with state and local laws, ordinances, regulations, and standards (LORS) related to socioeconomics.

INTRODUCTION

Staff's socioeconomics impact analysis evaluates the project's induced changes on existing population, employment patterns, and community services (emergency medical services, police protection, schools, and parks and recreation). Staff discusses the estimated impacts of the construction and operation of the HHSEGS, as described in the Application for Certification (AFC), on local communities, community resources, and public services, and provides a discussion of the estimated beneficial economic impacts of the construction and operation of the proposed project. Staff also looked at the potential for the HHSEGS natural gas pipeline and electric transmission line to induce growth in the project area.

The subject areas of utilities, fire protection, water supply, and wastewater disposal are analyzed in the **Reliability**, **Worker Safety and Fire Protection**, and **Water Supply** sections of this Final Staff Assessment (**FSA**).

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Socioeconomics Table 1 contains socioeconomics laws, ordinances, regulations, and standards (LORS) applicable to the proposed project.

SOCIOECONOMICS Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
State	
California Education Code, section 17620	The governing board of any school district is authorized to levy a fee, charge, dedication, or other requirement for the purpose of funding the construction or reconstruction of school facilities.
California Government Code, sections 65996-65997	Except for a fee, charge, dedication, or other requirement authorized under Section 17620 of the Education Code, state and local public agencies may not impose fees, charges, or other financial requirements to offset the cost for school facilities.
California Revenue & Taxation Code, section 73	Allows property tax exclusion for certain types of solar energy systems. Assembly Bill 1451 extended the current property tax exclusion for new construction of solar energy systems to expire on January 1, 2017. If a project has started construction prior to the expiration date it would be eligible for the exclusion. After the exclusion sunsets, any solar energy system constructed remains exempt from property tax for so long as the property does not change ownership.

SETTING

The proposed HHSEGS is located in Inyo County, California, along the California-Nevada border. The proposed HHSEGS is located approximately 8 miles[1] south of Pahrump, Nevada, and approximately 45 miles west of Las Vegas, Nevada. A sparsely populated, rural residential community, Charleston View, lies immediately south of the proposed project site. For more information about the surrounding land uses please see the **Land Use** section of this document.

Inyo County encompasses a little over 10,000 square miles in area; approximately two percent (2%) is privately owned, and the remaining 98 percent is publicly owned. The Federal Government holds 92 percent of the land, the State of California holds 2 percent, and the City of Los Angeles holds 4 percent (US Census 2010a, INYO 2008). Over the last ten years (2000 to 2010) Inyo County's population has increased by 3.3 percent (17,945 to 18,546) (INYO 2010a). Most of the population growth occurred in the City of Bishop (8.5 percent, 3,575 to 3,879) in the northern tip of the county, while the remainder of the county grew by about 2 percent (14,370 to 14,667). Tecopa grew 51.5 percent (99 to 150) while Shoshone's population decreased by 40.4 percent (52 to 31).

[1] 28 miles is the driving distance from the proposed project to Pahrump via Old Spanish Trail Highway (also known as Tecopa Road) and Nevada State Route 160. The direct distance from southern Pahrump to the proposed project's Solar Field 1 is 8 miles.

While Inyo County is the second largest county in California by land area, it has the state's sixth smallest county population. Given most of Inyo County land is publicly owned, and with its relatively small population, it is reliant on a tax base that is much smaller than many other counties in California. This dynamic has resulted in systemic budgetary challenges for county leaders, especially as they strive to provide services to remote areas within its borders that would not necessarily be a concern in other California counties with larger populations and budgets, such as San Bernardino County directly to the south.

The median age in Inyo County is 45 years old, compared with California's median age of 34.9, and Nye and Clark counties median age of 47.4 and 35.1, respectively (INYO 2008, US Census 2010b). Inyo County's workforce is predominantly employed in the retail trades industry (14.1 percent, 1,200 workers) and in the health care and social assistance industry (14.0 percent, 1,197 workers). About 9 percent of Inyo County's workforce is employed in the construction industry (764 workers).

To assess project impacts, the AFC identified a Region of Influence as including Inyo County in California and Clark and Nye counties in Nevada (HHSG 2011a, pg. 5.10-4). Normally, for the purposes of assessing project impacts, staff defines the "local workforce" during project construction as residing within a two-hour commute of the project. Based on the Electric Power Research Institute's (EPRI's) report, *Socioeconomic Impacts of Power Plants*, construction workers will commute as much as two hours to construction sites from their homes and one hour during operations, rather than relocate. In researching the issue of where construction labor would come from, staff contacted the Kern, Inyo & Mono Counties of California Building Trades Council (BTC) and the United Association Local 525 (Plumbers, Pipefitters, and HVAC Refrigeration Technicians) in Las Vegas (CEC 2011z and 2011aa).

The responses from the BTC and United Association Local 525 both indicate if the project contractor enters into a Project Labor Agreement with the affiliates of the BTC, because of the union structure and their construction workforce dispatch rules, nearly all of the construction workforce would come from California. If the applicant does not enter into a Project Labor Agreement, the construction workforce would mostly come from Clark and Nye counties in Nevada. At the March 13, 2012 Inyo County Board of Supervisors meeting, the applicant stated that they have selected Bechtel as the engineering, procurement, and construction (EPC) contractor for the project, and that Bechtel would likely enter in to a Project Labor Agreement (INYO 2012i, p.109, p. 111). The applicant later clarified that the selection of Bechtel as the EPC contractor is not yet final, but Bechtel is performing preconstruction services under a Master Services Contract (CH2 2012ee, p. 231).

On October 1, 2012, the applicant filed an Updated Workforce Analysis (UWA). The AFC had originally stated that 95 percent of the construction workforce was anticipated to be drawn from Nevada and 5 percent from California. The applicant now anticipates that 70 percent of the construction workforce would be drawn from California and 30 percent from Nevada. The onsite peak construction workforce also increased from 1,033 workers in Month 14, to 2,293 workers in Month 19. The new UWA assumptions of average and peak workforce estimates of 1087 and 2293 workers, respectively, has been incorporated into this FSA. (CH2 2012jj)

Staff defines the study area related to project impacts on population and housing as Inyo County (including its southern towns of Tecopa and Shoshone), and Clark and Nye counties in Nevada. The study area for impacts to sheriff and emergency services is Inyo County. The study area for environmental justice is a six-mile radius buffer from the project site.

USING THE 2010 US CENSUS AND US CENSUS BUREAU'S AMERICAN COMMUNITY SURVEY IN STAFF ASSESSMENTS

The detailed social, economic, and housing information previously collected only in the decennial census was not collected for the 2010 Census (US Census 2011a). This information is now collected through the U.S. Census Bureau's American Community Survey (ACS). Decennial census data is a 100 percent count collected once every ten years and represents information from a single reference point (April 1st). The main function of the decennial census is to provide *counts* of people for the purpose of congressional apportionment and legislative redistricting. ACS estimates are collected from a sample of the population based on information compiled continually and aggregated into one, three, and five-year estimates ("period estimates"), released every year. The primary purpose of the ACS is to measure the changing social and economic *characteristics* of the U.S. population. As a result, the ACS does not provide official counts of the population in between censuses. Instead, the Census Bureau's Population Estimates Program will continue to be the official source for annual population totals, by age, race, Hispanic origin, and sex.

ACS collects data at every geography level from the largest level (nation) to the smallest level available (block group[2]). Census Bureau staff recommends the use of data no smaller than the Census tract[3] level. [4] Data from the five-year estimates is used for our analysis as it provides the greatest detail at the smallest geographic level. Because ACS estimates come from a sample population, a certain level of variability is associated with these estimates. This variability is expressed as a margin of error (MOE). The MOE is used to calculate the coefficient of variation (CV). CVs are a standardized indicator of the reliability of an estimate. While not a set rule, the US Census Bureau considers the use of estimates with a CV more than 15 percent cause

[2] Census Block Group - A statistical subdivision of a census tract. A BG consists of all tabulation blocks whose numbers begin with the same digit in a census tract; for example, for Census 2000, BG 3 within a census tract includes all blocks numbered between 3000 and 3999. The block group is the lowest-level geographic entity for which the Census Bureau tabulates sample data from the decennial census. http://www.census.gov/dmd/www/glossary.html.

[3] Census Tract - A small, relatively permanent statistical subdivision of a county or statistically equivalent entity, delineated for data presentation purposes by a local group of census data users or the geographic staff of a regional census center in accordance with Census Bureau guidelines. Designed to be relatively homogeneous units with respect to population characteristics, economic status, and living conditions at the time they are established, census tracts generally contain between 1,000 and 8,000 people, with an optimum size of 4,000 people. Census tract boundaries are delineated with the intention of being stable over many decades, so they generally follow relatively permanent visible features. http://www.census.gov/dmd/www/glossary.html.

[4] Census Workshop: Using the American Community Survey (ACS) and The New American Factfinder (AFF) hosted by Sacramento Area Council of Governments on May 11 & 12, 2011. Workshop presented by Barbara Ferry, U.S. Census Partnership Data Services Specialist.

for caution when interpreting patterns in the data (US Census 2009a). In situations where CVs for estimates are high, the reliability of estimates improves by aggregating the estimates to a larger geographic area. When projects are proposed in remote locations, there may be very little population within a six-mile buffer of the project site. In these cases, the sample size would most likely be too small to yield estimates with a reasonable CV. Staff would need to expand the study area to include a large enough population that would yield a lower CV.

PROJECT-SPECIFIC DEMOGRAPHIC SCREENING

Staff's demographic screening is designed to determine the existence of a minority, or below-poverty-level population, or both, within a six-mile area of the proposed project site. The demographic screening process is based on information contained in two documents: *Environmental Justice: Guidance Under the National Environmental Policy* Act (CEQ 1997) and *Final Guidance for Incorporating Environmental Justice Concerns in EPA's Compliance Analyses* (US EPA 1998). Due to the change in the sources and methods of collection used by the U.S. Census Bureau, the screening process relies on Year 2010 U.S. Census data to determine the number of minority populations and data from the 2006-2010 ACS to calculate the population below-poverty-level. Staff determined the 2006-2010 ACS data at the county level is appropriate to use for the HHSEGS because the estimates yielded a reasonable CV.

Minority Populations

According to *Environmental Justice: Guidance Under the National Environmental Policy Act*, minority individuals are defined as members of the following groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic. A minority population is identified when the minority population of the potentially affected area is greater than fifty percent or when the minority population percentage is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. The 2010 Census showed the total population within the six-mile buffer of the proposed project site is 782 persons, with a minority population of 179 persons, or about 23 percent of the total population (US Census 2010c). (See **Socioeconomics Figure 1**).

Socioeconomics Table 2 presents the minority population data in the six-mile buffer within California and Nevada, and data for communities and counties in a larger geographic area. On the California side of the six-mile buffer, there are 68 people residing in the Charleston View area, sixteen of whom are minorities, or about 24 percent of the population. The minority population in the Charleston View area is less than the minority population percentage in the general population of Inyo County, which is about 34 percent.

Socioeconomics Figure 1 also shows that the six-mile buffer extends into the southern portion of the Pahrump, Nevada area. As shown in **Socioeconomics Table 2**, within the six-mile buffer on the Nevada side, there are 714 people, 118 of whom are minorities, or about 17 percent of the population. The minority population on the Nevada side of the six-mile buffer is 17 percent, which is less than the percent minority of the general population in Pahrump, Nevada of about 20 percent.

Socioeconomics Figure 1 and Socioeconomics Table 2 do not indicate the presence of an environmental justice population. Based on comparisons with reference

geographies, staff concludes that the minority population in the six-mile buffer is not meaningfully greater than the minority populations in the general population in Inyo County and Pahrump, Nevada. Therefore, the minority population in the six-mile buffer does not constitute an environmental justice population as defined by *Environmental Justice: Guidance Under the National Environmental Policy* Act and would not trigger further scrutiny for purposes of an environmental justice analysis within in this **FSA**.

SOCIOECONOMICS Table 2
Minority Populations within the Project Area

Area	Total:	White alone	Minority	Percent Minority
Six-Mile Buffer- CA and NV	782	603	179	22.89
Six-Mile Buffer- CA Only	68	52	16	23.53
Six-mile Buffer- NV Only	714	596	118	16.53
Shoshone*	31	28	3	9.68
Tecopa*	150	115	35	23.33
Inyo County	18,546	12,296	6,250	33.70
Pahrump*	36,441	29,055	7,386	19.99
Sandy Valley*	2,051	1,608	443	21.60
Clark County	1,951,269	935,955	1,015,314	**52.03**
Nye County	43,946	34,663	9,283	21.12
Notes: *CDP- Census Designated Place, **Bold text**- minority population 50 percent or greater. Source: US Census 2010c.				

Below-Poverty-Level-Populations

Staff has identified the below-poverty-level population based on 2006-2010 American Community Survey 5-year Estimates from the U.S. Census for Inyo County[5]. Approximately 12 percent, or 2,178 people[6] in Inyo County live below the poverty threshold. **Socioeconomics Table 3** presents poverty data for Inyo County, plus Clark and Nye counties.

[5] When projects are proposed in remote locations, there may be very little population within a six-mile radius of the project site and the resulting sample size would be too small to yield estimates with a reasonable CV. Staff determined that data at the county level would be used for this analysis, as it is the smallest geographic area available that retains reasonable accuracy. The data represents a period estimate, meaning the numbers represent an area's characteristics for the specified time period.

[6] 2,178 with an MOE of ±437 and a CV of 12.2. When a CV is 15 or less the Census Bureau considers the estimate fairly precise (US Census 2010a).

SOCIOECONOMICS Table 3
Poverty Data within the Project Area

Area	Total			Income in the past 12 months below poverty level			Percent below poverty level	
	Estimate*	MOE	CV	Estimate	MOE	CV	Estimate	MOE
Inyo County	18,308	±74	0.25	2,178	±437	12.20	11.90	±2.40
Clark County	1,870,566	±930	0.03	219,116	±6,008	1.67	11.70	±0.30
Nye County	43,377	±328	0.46	8,183	±1,065	7.91	18.90	±2.50
Notes:* Population for whom poverty status is determined. Source: US Census 2010d.								

Additional Environmental Justice Population Considerations

Final Guidance for Incorporating Environmental Justice Concerns in EPA's Compliance Analyses (US EPA 1998) also encourages outreach to community-based organizations and tribal governments early in the screening process, in order to identify the presence of distinct minority communities residing both within, and in close proximity to, the proposed project. It also identifies those minority groups that utilize or are dependent upon natural and cultural resources that could be potentially affected by the proposed action. For information regarding the Energy Commission staff's outreach program and consultations with local Native American communities, see the **Cultural Resources** sections of this **FSA**.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

CEQA defines a significant effect on the environment as "a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project" (State CEQA Guidelines Section 15382).

Thresholds of significance serve as the benchmark for determining if a project will result in a significant adverse impact when evaluated against existing conditions (e.g., "baseline" conditions). CEQA and the State CEQA Guidelines do not provide specific, quantifiable thresholds of significance for socioeconomic impact determinations. State CEQA Guideline Section 15064(e) specifies that: "[e]conomic and social changes resulting from the project shall not be treated as significant effects on the environment." However, Section 15064(e) continues by stating that when "a physical change is caused by economic or social effects of a project, the physical change may be regarded as a significant effect in the same manner as any other physical change resulting from the project. Alternatively, economic and social effects of a physical change may be used to determine that the physical change is a significant effect on the environment. If the physical change causes adverse economic or social effects on people, those adverse effects may be used as a factor in determining whether the physical change is significant. For example, if a project would cause overcrowding of a public facility and the overcrowding causes an adverse effect on people, the overcrowding would be regarded as a significant effect."

According to Appendix G of the State CEQA Guidelines, a project may have a significant effect on population, housing, and public services if it would:

- Induce substantial population growth in an area, either directly or indirectly;
- Displace substantial numbers of people and/or existing housing, necessitating the construction of replacement housing elsewhere; or
- Adversely impact acceptable levels of service for police protection, schools, parks and recreation, and hospitals and emergency medical response.

Staff's assessment of the significance of impacts on population, housing, emergency medical services, police protection, schools, and parks and recreation are based on professional judgments, input from local and state agencies, and the industry-accepted two-hour commute range for construction workers and one-hour commute range for operational workers.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Induce Substantial Population Growth

For the purpose of this analysis, staff defines "induce substantial population growth" as workers moving into the project area because of project construction and operation, thereby encouraging construction of new homes or extension of roads or other infrastructure. To determine whether the project would induce substantial population growth, staff analyzes the availability of the workforce and the population within the region, which includes Inyo County in California and Clark and Nye counties in Nevada. Labor projections for Inyo County are reported as part of the Eastern Sierra Region, which also includes labor projections for Alpine and Mono counties. Labor projections for Clark and Nye counties are reported as part of the Las Vegas-Paradise Metropolitan Statistical Area (MSA[7]). Based on information in the BTC letter and the applicant's UWA, staff included construction trades from the Bakersfield MSA (Kern County) and the Riverside-San Bernardino-Ontario MSA (Riverside and San Bernardino Counties) in its assessment of worker availability.

Affected Environment

Socioeconomics Table 4 shows the historical and projected populations for Inyo, Clark, and Nye counties. **Socioeconomics Table 5** shows the total labor by skill for the Eastern Sierra Region (Alpine, Inyo, and Mono counties), Bakersfield MSA (Kern County) and Las Vegas-Paradise MSA.

[7] An MSA contains a core urban area population of 50,000 or more, consists of one or more counties, and includes the counties containing the core urban area, as well as any adjacent counties that have a high degree of social and economic integration (as measured by commuting to work) with the urban core.

Socioeconomics Table 4
Historical and Projected Populations

Area	Population					
	2000[1]	2010[2]	2020	2030	2010-2030	Percent Growth
Inyo County	17,945	18,546	20,495[3]	22,132[3]	4,187	22.58
Clark County	1,375,765	1,951,269	1,905,694[L4] 2,325,456[H4]	1,979,045[L4] 3,066,872[H4]	27,776[L4] 1,115,603[H4]	1.42[L4] 57.17[H4]
Nye County	32,485	43,946	44,417	46,859	2,913	6.63

Notes: - Data not available, [L]Low job growth, [H]High job growth, Inyo County projected population in 2040 (23,520) in 2050 (25,112) and the growth from 2010 – 2050 (6,566, representing 35.4% increase).
Source: [1]US Census 2000, [2]US Census 2010e, [3]CA DOF 2007, [4]NVSBDC 2010.

SOCIOECONOMICS Table 5
Total Labor by Skill in the Project Area (2008-2018)

	Boilermaker[1]	Carpenter	Cement Finisher	Electrician	Equipment Operator	Iron Worker	Laborer	Millwright	Pipefitter[2]	Teamster[3]
Eastern Sierra Region (Alpine, Inyo, and Mono counties)										
Total Workforce, 2008	-	270	860	50	60	-	120	-	50	100
Total Projected Workforce, 2018	-	270	840	40	60	-	130	-	50	110
Growth from 2008	-	0	-20	-10	0	-	10	-	0	10
Percent Growth from 2008	-	0	-2.33	-20	0	-	8.33	-	0	10
Bakersfield MSA (Kern County)										
Total Workforce, 2008	1,160	1,780	470	2,300	1,130	130	3,780	380	810	1,550
Total Projected Workforce, 2018	1,230	1,920	490	2,390	1,240	140	4,340	350	870	1,760
Growth from 2008	70	140	20	90	110	10	560	-30	60	230
Percent Growth from 2008	6.0	7.9	4.3	3.9	21	7.7	14.8	-7.9	7.4	14.8
Riverside-San Bernardino-Ontario MSA (Riverside and San Bernardino Counties)										
Total Workforce, 2008	3,230	18,380	3,780	5,020	4,460	710	17,950	120	4,330	10,340
Total Projected Workforce, 2018	3,080	18,910	3,910	4,850	4,640	710	19,500	120	4,340	11,120
Growth	-150	530	130	-170	180	0	1,550	0	10	780

	Boilermaker[1]	Carpenter	Cement Finisher	Electrician	Equipment Operator	Iron Worker	Laborer	Millwright	Pipefitter[2]	Teamster[3]
from 2008										
Percent Growth from 2008	-4.6	2.9	3.4	-3.4	4	0	8.6	0	0.2	7.5
Las Vegas-Paradise MSA										
Total Workforce, 2008	1,212	17,456	3,196	6,676	2,212	1,220	7,414	138	5,781	2,007
Total Projected Workforce, 2018	1,311	17,360	3,151	6,356	2,233	1,296	6,745	137	5,515	2,241
Growth from 2008	441	-96	-45	-320	21	76	-669	-1	-266	614
Percent Growth from 2008	8.2	-0.55	-1.41	-4.79	0.9	6.23	-9.02	-0.7	-4.6	11.7
Total Projected Workforce, 2018 for All Three MSAs										
	5,621	38,460	8,391	13,636	8,173	2,146	30,715	607	10,775	15,231
Total # of Workers for Project Construction by Craft*										
	273	130	18	365	106	138	127	155	517	29

Notes: - Data not available.
[1]Welders, [2]Plumbers, Pipefitters, and Steamfitters, and [3]Industrial Truck and Tractor Operators.
*Largest number of workers by trade by month plus 397 Non-Craft (Non-union superintendents and construction personnel onsite).needed for project construction (CH2 2012jj).
Source: CA EDD 2010, NDETR 2008, CH2 2012jj.

Construction Impacts

The AFC states that construction (from site preparation and grading to commercial operation) would take approximately 29 months. If approved, construction would begin the second quarter of 2013 and conclude the fourth quarter of 2015. The two solar plants would be constructed concurrently with a planned three-month delay between their start dates (HHSG 2011a, pgs. 2-17 & 2-18). The applicant's Table 5.10-16R2 identifies the number of workers needed at the project site. The workforce need would range from a high of 2,293 workers in month 19, a low of 128 workers in the first month, and an average of 1,087 workers during the entire 29-month construction period (CH2 2012jj).

As stated above, the applicant is working with Bechtel Corporation. If selected as the Engineering, Procurement and Construction (EPC) contractor, Bechtel would likely enter in to an official Project Labor Agreement (PLA) that would use a union workforce. Because of the union structure and their construction workforce dispatch rules, the construction labor would come primarily from California union halls. As shown in **Socioeconomics Table 5**, the labor force within the Eastern Sierra Region, Bakersfield MSA, Riverside-San Bernardino-Ontario MSA, and Las Vegas-Paradise MSA combined would be more than sufficient to accommodate the labor needs for construction of the HHSEGS.

Due to the remoteness of the project site and limited housing, services, and infrastructure, Inyo County has expressed concerns about construction workers moving to the immediate Charleston View area during project construction, potentially contributing to population growth, and impacting county services in the Tecopa area (INYO 2012b). Because staff's analysis shows there is a sufficient labor force already in California and more workers available in the Las Vegas area if needed, the project would not induce substantial permanent population growth. In addition, the amount and location of available housing also determines whether the project would induce population growth. Staff's analysis shows that the project would not impact housing or necessitate construction of additional housing to accommodate the construction and operations workforces (see discussion below).

Operation Impacts

Socioeconomics Table 6 presents the operations force for the crafts specifically needed for the construction of HHSEGS. An operations workforce of 100 workers would be permanently needed for the project.

SOCIOECONOMICS Table 6
HHSEGS Plant Operation Workforce

Operations Workforce	
Solar fields and Power Block Workers	24
Technicians	16
MWM Operators	15
Warehouse & Maintenance Staff	13
Administration & Support Staff	32
TOTAL	100
Note: Total workforce includes only the crafts specifically needed for the HHSEGS. See **SOCIOECONOMICS Table 5** for a list of crafts included in the total workforce figures. MWM = mirror washing machine. Source: CH2 2012jj	

The applicant estimates that most of the operations workforce would come from Las Vegas in Clark County, as well as from the rural areas in southern Inyo County. Some of the operation workforce would come from Pahrump in Nye County and from existing applicant staff (HHSG 2011a, pg. 5.10-28). The labor force within the Eastern Sierra Region, Bakersfield, and Las Vegas-Paradise MSA combined are more than sufficient to accommodate the labor needs for the operation of the HHSEGS. Staff agrees with the applicant's assumptions about the operations workforce and does not expect employees to relocate to the immediate project area, given the robust regional workforce. In addition, the United Association Local 525 letter stated that about 80 to 85 percent of the operations workforce would come from Clark County, with most of the workforce coming from Las Vegas. Pahrump does not have a large union labor supply. The BTC letter had no information on where the operations workforce would come from.

Displace Existing Housing and Substantial Numbers of People, Necessitating the Construction of Replacement Housing Elsewhere

As of April 1, 2010, there was a total of 613,228 housing units in the three-county project area (Inyo, Clark, and Nye counties) within a two-hour commute of the project site, with a combined vacancy of 83,441 units, representing a 13.61% vacancy rate (US Census 2010g). A five percent vacancy is largely accepted as a minimum benchmark for a sufficient amount of housing available for occupancy (Virginia Tech 2006). As **Socioeconomics Table 7** shows, the housing counts in the project area indicate a greater supply of available housing units than demand.

Socioeconomics Table 8 shows a more detailed breakdown of the vacant units in the area. Of the 83,441 vacant units, 32,064 were for rent, 16,025 were for sale, and 12,651 were listed for seasonal, recreational, or occasional use. **Socioeconomics Figure 2** provides a visual reference for the locations of each city and census designated place within about a two-hour commute of the project site listed in **Socioeconomics Tables 7 and 8**.

SOCIOECONOMICS Table 7
Housing Supply Within Two-Hour Commute of the Project Site

Geographic Area	Total	Occupied	Vacant	Percent Vacant
Shoshone CDP, Inyo Co, CA	31	17	14	45.16
Tecopa CDP, Inyo Co, CA	159	92	67	42.14
Beatty CDP, Nye Co, NV	700	508	192	27.43
Pahrump CDP, Nye Co, NV	17,824	14,870	2,954	16.57
Boulder City, Clark Co, NV	7,412	6,492	920	12.41
Enterprise CDP, Clark Co, NV	49,563	39,848	9,715	19.60
Goodsprings CDP, Clark Co, NV	124	108	16	12.90
City of Henderson, Clark Co, NV	113,586	101,314	12,272	10.80
City of Las Vegas, Clark Co, NV	243,701	211,689	32,012	13.14
Moapa Town CDP, Clark Co, NV	379	319	60	15.83
Mount Charleston CDP, Clark Co, NV	504	164	340	67.46
Nelson CDP, Clark Co, NV	43	21	22	51.16
City of North Las Vegas, Clark Co, NV	76,073	66,499	9,574	12.59
Sandy Valley CDP, Clark Co, NV	1,024	808	216	21.09
Searchlight CDP, Clark Co, NV	461	301	160	34.71
Sunrise Manor CDP, Clark Co, NV	70,255	60,874	9,381	13.35
Whitney CDP, Clark Co, NV	16,420	14,153	2,267	13.81
Winchester CDP, Clark Co, NV	14,969	11,710	3,259	21.77
Total	613,228	529,787	83,441	13.61
Source: US Census 2010f, US Census 2010g				

SOCIOECONOMICS Table 8
Vacancy Status Within Two-Hour Commute of the Project Site

Geographic Area	For Rent	For sale	For seasonal, recreational, or occasional use	Other Vacant	Total
Shoshone CDP, Inyo Co, CA	3	1	3	7	14
Tecopa CDP, Inyo Co, CA	4	4	47	12	67
Beatty CDP, Nye Co, NV	106	7	41	38	192
Pahrump CDP, Nye Co, NV	549	509	498	1,398	2,954
Boulder City, Clark Co, NV	276	144	333	167	920
Enterprise CDP, Clark Co, NV	1,925	2,045	2,985	2,760	9,715
Goodsprings CDP, Clark Co, NV	2	1	0	13	16
City of Henderson, Clark Co, NV	3,646	2,335	2,895	3,396	12,272
City of Las Vegas, Clark Co, NV	14,777	6,096	3,083	8,056	32,012
Moapa Town CDP, Clark Co, NV	26	5	5	24	60
Mount Charleston CDP, Clark Co, NV	7	30	267	36	340
Nelson CDP, Clark Co, NV	0	3	12	7	22
City of North Las Vegas, Clark Co, NV	3,410	2,241	769	3,154	9,574
Sandy Valley CDP, Clark Co, NV	10	23	63	120	216
Searchlight CDP, Clark Co, NV	20	16	87	37	160
Sunrise Manor CDP, Clark Co, NV	5,228	1,443	461	2,249	9,381

Geographic Area	For Rent	For sale	For seasonal, recreational, or occasional use	Other Vacant	Total
Whitney CDP, Clark Co, NV	721	514	337	695	2,267
Winchester CDP, Clark Co, NV	1,354	608	765	532	3,259
Total	32,064	16,025	12,651	22,701	83,441
Source: US Census 2010h					

There is little lodging immediately near the project site, or in the towns of Tecopa and Shoshone. The closest area with any meaningful lodging available is in the town of Pahrump, Nevada, approximately a 26-mile drive from the project site. **Socioeconomics Tables 9 and 10** present the available temporary lodging within an approximately one-hour commute range from the project site. **Socioeconomics Table 9** shows there are over 148,000 motel/hotel rooms within one-hour commute of the project site; **Socioeconomic Table 10** shows abundant RV park spaces within a two-hour commute of the project site.

SOCIOECONOMICS Table 9
Hotel/Motel Supply Within One-hour Commute of the Project Site

Geographic Area	Hotels/Motels	Total Number of Rooms
Tecopa, CA	2	33 rooms/4 cabins/13-bed budget hostel
Shoshone, CA	1	17 rooms
Pahrump, NV	3	314 rooms
Las Vegas, NV	numerous	148,935 rooms
Sources: DVCC 2011, PVCC 2011, SV 2011, TN 2011, LVCVA 2011a, LVCVA 2011b.		

SOCIOECONOMICS Table 10
RV Park Supply Within Two-Hour Commute of the Project Site

Geographic Area	RV Parks	Total Number of Spaces
Tecopa, CA	3	219 spaces
Shoshone, CA	1	24 spaces
Pahrump, NV	8	766 spaces
Las Vegas, NV	13	3,555 spaces
Amorgosa Valley, NV	2	143 spaces
Boulder City, NV	4	642 spaces
Beatty, NV	5	161 spaces
Henderson, NV	1	80 spaces
North Las Vegas, NV	1	196 spaces
Searchlight, NV	1	72 spaces
Sources: DVCC 2011, PVCC 2011, SV 2011, TN 2011, LVCVA 2011a, LVCVA 2011b.		

Construction Impacts

The Updated Workforce Analysis indicates that construction work would be scheduled on a five-day per week,10-hour per day basis. This would result in many construction workers commuting to the site either Sunday evening or Monday morning (depending upon if they are day or swing shift workers), seeking nearby lodging for four nights, then heading for home either Friday evening or Saturday morning. (CH2 2012jj, pp.1-2).

Because of the ample lodging available in the three counties and the fact that there is very little available housing in Tecopa and Shoshone, staff agrees that most construction workers would take advantage of existing available lodging within a two-hour commute distance in Nevada, and commute to the project site. Staff's research with Building Trades Councils and unions regarding commuting habits of construction workers shows that union workers do not bring their families with them if they temporarily relocate to a job site. Given the ample lodging options in the three-county region, staff does not anticipate any new housing construction because of the project.

Operation Impacts

The project would require 100 full-time employees during project operation. The applicant anticipates that most of the operational workforce would come from Las Vegas in Clark County and parts of surrounding rural areas in Inyo County and some may come from Pahrump in Nye County. The applicant assumed that 95 percent (95 employees) would come from Nye and Clark counties and 5 percent (5 employees) would come from Inyo County. (HHSG 2011a, pg. 5.10-28) United Association Local 525 also expects that the operations workforce would come mostly from Las Vegas and from Clark County (CEC 2012d). The applicant expects the operational workforce would commute from their existing residences to the project site. Because there are so few housing choices in Tecopa and Shoshone, staff agrees with the applicant's assumptions.

As presented above in **Socioeconomics Tables 7 and 8**, there would be an adequate housing supply in the area to accommodate the project's operational workforce.

Conclusion

The proposed project site and construction laydown area are located in an unincorporated area of Inyo County known locally as Charleston View. The site is not developed, but it contains unimproved dirt roads and trails. The proposed project is a solar power plant, an industrial use, and would not displace existing housing, induce substantial population growth, or necessitate the construction of replacement housing elsewhere. Given the ample lodging options in the three-county region, staff does not expect the project would necessitate any new housing construction to accommodate construction and operations workers.

Inyo County has expressed concerns about the project workforce and its potential to impact county services and housing. County staff has stated that the remote location of the project site raises logistical concerns for county administrators because the majority of their existing available resources such as social services are concentrated within the county's population center of Bishop, 250 miles northwest of the project site.

According to Inyo County staff, illegal camping on private property in the Charleston View area has been a problem at times. Inyo County is concerned that due to the limited supply of temporary lodging and RV parks in nearby Tecopa or Shoshone, construction workers will lease land in the adjacent community of Charleston View to park their RVs, or camp illegally on vacant land near the project site (INYO 2012b). Vacant properties in Charleston View do not have electricity and the availability of water is uncertain. Staff has identified an ample supply of existing housing, hotels/motels, and RV parks in the area for construction workers who may temporarily relocate during project construction. Staff concludes that with the ample housing choices, construction workers would not camp illegally, but would instead reside temporarily in available housing near commercial services, and would not significantly impact Inyo County services. Although staff has not identified a significant impact to housing, with the intention of taking a proactive approach to the County's concerns regarding illegal camping, staff proposes Condition of Certification **SOCIO-2**, requiring that information regarding illegal and unauthorized camping be included with the Worker Environmental Awareness Program (WEAP) training for all personnel. Additional details of the WEAP training can be found in the **Biological Resources** section of this **FSA**.

Staff concludes that the project would not induce substantial population growth in the area or displace substantial numbers of people or housing because there is a sufficient existing labor force in the region and the workforce would reside in existing, available housing.

Public Services

Result in Substantial Physical Impacts to Government Facilities

As discussed under the subject headings below, the HHSEGS would not cause significant impacts to law enforcement, schools, and parks. The Southern Inyo County Fire Protection District (SIFPD) and the applicant are still discussing how best to ensure adequate fire and emergency service for the project. At this time, staff cannot conclude that the proposed project would not significantly impact fire and emergency medical services. Safety and health issues including the applicant's proposed systems and procedures to provide occupational safety and health protection for the HHSEGS workers are discussed in the **Worker Safety and Fire Protection** section of this **FSA**.

Emergency Medical Services

Affected Environment

The project site is within the jurisdiction of the Southern Inyo Fire Protection District (SIFPD). SIFPD is the local agency authorized to provide fire prevention, fire suppression, and emergency medical services in an approximately 1,250 square mile area, including the HHSEGS site. SIFPD operates on a very limited budget, and has one station in Tecopa and one temporary location in Charleston View. SIFPD does not receive a share of the one percent property tax levied on the project site, so there would need to be provisions for financing fire and emergency services (SIFPD 2012b).

The Tecopa fire station would be the first responder for medical emergencies at the project site (CH2 2011e, pg. 14). A response from the Tecopa Station, 27 miles from the project site, would take about 30 to 40 minutes (HHSG 2011a, pg. 5.16-21, and CEC 2012h, CH2 2012z, pg. 7-2). As of February 2012, SIFPD staff at the Tecopa station consisted of two personnel with Emergency Medical Technician-Basic (EMT-B) certification, one Firefighter II (FFII), two Firefighter I (FFI) in training, and four Entry Level Firefighter/First Responders. With the exception of the Fire Chief and the Administrative Officer, which are paid, SIFPD personnel are volunteers that respond on a 24-hour, 7-day per week basis. The SFPD equipment consists of two Light Rescue Units, two Type 2 Engines, one Basic Life Support Ambulance, and one Ambulance (CH2 2012z, pg. 7-1). All firefighters in SIFPD have first response medical training called Basic Life Support (BLS) training. The Tecopa station has one ambulance staffed with three personnel and a fire truck staffed by two personnel, which would likely respond to emergencies at the project site. (CH2 2011e, pg. 14, and CEC 2012h)

At staff's request, the applicant provided a draft Fire and Emergency Services Risk and Needs Analyses (FESNA) on May 9, 2012 (CH2 2012z). The analyses suggest that by complying with LORS, the project would not create significant impacts on the local SIFPD or local emergency response resources, because any responses needed for fire, medical, or technical rescue needs would be sourced from either the Pahrump Valley Fire-Rescue Services (PVFRS) or Nye County Emergency Services (NCES) in Pahrump, Nevada. The mechanism of how these services would be sourced and paid for from another jurisdiction in the state of Nevada rather than from the local Authority Having Jurisdiction (AHJ), in this case SIFPD, has not been clearly established. Correspondence from Larry Levy, Acting Chief of the SIFPD (CEC 2012h), and William D. Ross, who provides legal representation for the SIFPD (SIFPD 2012a), states that the HHSEGS project would have an impact on SIFPD's ability to maintain its level of service for fire, hazmat, and EMS emergencies to its service district.

PVFRS has a long-standing practice of providing SIFPD mutual aid and response, but does not currently have a signed agreement. PVFRS has four stations, all located in Nevada and staffed with full-time and volunteer firefighters. All PVFRS staff has basic medical training. PVFRS has five ambulances and two medical squads distributed among their four stations. PVFRS' main station has two EMTs and one paramedic, as well as two advanced life support- (ALS) certified ambulances and one ALS-equipped medical squad vehicle (CEC 2011j). The estimated response time from Pahrump Valley Fire Station No. 3 (12 mile distance) is approximately 15-20 minutes, and from Station No.1 (18 mile distance), it is estimated to be approximately 18-25 minutes (CH2 2012z, Table 7-1). PVFRS is the closest responder to the project site with ALS capabilities and are staffed 24 hours a day.

Nye County Emergency Services (NCES) has a HazMat team that operates through the Nye County Fire Department's Station 51 in Pahrump, which is 28 road miles from the project site, and has an approximate response time of 45 minutes. Station 51 is staffed with 15 to 20 volunteers who are trained as HazMat technicians. The team has the following equipment, as of April 2011: one HazMat truck with 25-foot trailer, one biohazard unit, one fire engine, and one ambulance (HHSG 2011a, Sect 5.5.4.3).

PVFRS would respond to trauma or industrial accidents with an ALS ambulance, Heavy Rescue, and can request a helicopter for air rescue, if necessary, and based on availability (weather, other calls, etc.). Additional assistance is available from Round Mountain/Smoky Valley Fire Services in Nye County and Las Vegas as well, but it is at least a 1-hour response time from Las Vegas, and can take up to 2 hours (HHSG 2011a, pg. 5.16-21).

If a patient's condition is serious (e.g. serious cardiac arrest, stroke, large laceration, etc.), PVFRS can transport these patients via Mercy Air to University Hospital Medical Center (UMC) in Las Vegas in 20 minutes. The UMC is designated as a Level I adult and Level II pediatric trauma center, has Nevada's only burn center, has a heart center and a transplant center, and is equipped with 11 resuscitation and 18 intensive care unit beds (UMC 2011). The UMC trauma center serves an area over 10,000 square miles including southern Nevada, parts of California, Utah, and Arizona.

If the patient's condition is not serious then a PVFRS paramedic ambulance transports the patient to Desert View Regional Medical Center in Pahrump, the closest hospital to the project site with an emergency room. Drive time between the project site and Desert View Regional Medical Center is approximately 45 to 50 minutes (HHSG 2011a, pg. 5.16-23). Desert View Regional Medical Center is a 24-bed hospital with a 24-hour/7 day a week physician-staffed emergency room (DVRMC 2011). Minor injuries could also be treated at the Saint Rose Dominican Hospital in Henderson, Nevada (either the Rose de Lima or Siena campuses) or the UMC in Las Vegas. Both facilities have emergency departments, a full range of surgical and rehabilitative services, respiratory therapy, and radiology services (St Rose 2011).

Construction Impacts

Energy Commission staff contacted SIFPD and PVFRS staff to discuss the proposed project, ascertain their ability to provide emergency medical services to the project, and solicit comments or concerns they might have about the project. Staff has received comments from PVFRS and SIFPD and incorporated them in this analysis.

In response to staff's Emergency Medical Response Needs Assessment Form, SIFPD Acting Fire Chief, Larry Levy, stated that SIFPD would like to enhance their emergency medical services (EMS) in the Charleston View area to provide response times to the project site in the 5-10 minute range. This would require the acquisition of both facilities and equipment as well as the training of additional responders. SIFPD estimates that to achieve their desired response times they would need a three-bay station to house a new ambulance and existing fire apparatus in the project area and a minimum of two trained EMTs and four firefighters in the project area.

SIFPD expects that increased traffic would result in increased motor vehicle accident responses. The applicant estimated at least five (5) additional off-site vehicle accidents in the vicinity of the project site related to construction and workforce traffic (CH2 2012z, Table 6-4, pg. 6-10). For more information about traffic-related impacts, please see the **Traffic and Transportation** section of this **FSA**.

The applicant is actively engaged in discussions with SIFPD to ensure adequate fire and emergency service for the project. Discussions are ongoing. With the inclusion of Staff's proposed conditions of certification, **Worker Safety-6 and 7,** funding for increased emergency services would be provided, and impacts mitigated.

Operation Impacts

Facility operators would be trained as first responders and in safe operation, maintenance, and emergency response procedures to minimize the risk of personal injury (HHSG 2011a, pg. 2-20). HHSEGS would operate in compliance with federal and state occupational safety and health program requirements. Compliance with these programs would minimize project effects on employee safety (HHSG 2011a, pg. 2-21). The applicant states that the HHSEGS operation would not create significant adverse impacts on medical resources in the area due to the safety record of power plants and few operations staff. To protect the safety and health of workers during the construction and operation of HHSEGS, Worker Safety and Fire Protection staff is proposing two conditions of certification (**WorkerSafety-1** and **-2**) that would require the project owner to submit to the Compliance Project Manager (CPM) a copy of the Project Construction Safety and Health Program, and a copy of the Project Operations and Maintenance Safety and Health Program. Cal-OSHA's requirements are prescribed by, and contained within, the requested programs and plans. The project owner's compliance with proposed conditions of certification **WorkerSafety-1** and **-2** would help to mitigate impacts to emergency medical services.

Conclusion

SIFPD submitted an initial review of the draft FESNA on June 4, 2012 and the applicant and SIFPD stated they had entered into an agreement to negotiate at the June 27, 2012 PSA Workshop in Bishop, CA. At this time, Energy Commission staff has not been notified by the applicant or SIFPD that they have reached an agreement on how fire and emergency medical services will be provided and funded for the project site. Therefore, the **Worker Safety and Fire Protection** section of this document includes proposed Conditions of Certification **WORKER SAFETY-6** and **WORKER SAFETY-7** to ensure SIFPD has adequate funding. Staff concludes the HHSEGS would not significantly impact fire and emergency medical services if staff's proposed mitigations are implemented. For more information and proposed mitigation for fire protection and emergency medical services response, please see the **Worker Safety and Fire Protection** section of this document.

Law Enforcement

Affected Environment

The HHSEGS proposed project site is located within the jurisdiction of the Inyo County Sheriff's Department. There is a sheriff substation in Shoshone, approximately 34 miles from the project site. There are two resident deputies stationed in Shoshone who reside in County-owned housing. The patrol area for the deputies patrolling the HHSEGS site encompasses 3,200 square miles, consisting of both paved and unpaved roads (INYO 2012j, p. 19). This area includes the towns of Furnace Creek Ranch and Stovepipe Wells (both in Death Valley), which are located 60 and 90 miles from the Shoshone substation. The deputy on duty would likely respond from the patrol location, as they are

usually on patrol and on call in the service area and not present at the substation. As such, response time to an emergency on the project site ranges between 30 minutes to 4 hours (INYO 2012i, pp. 50-58). Depending on the type of assistance needed, and the geographic location of the other deputies, response time for any additional or specialized assistance could be an added 3 to 4 hours on top of the 30 minutes to 4 hours initial response time (INYO 2012b).

The California Highway Patrol (CHP) is the primary law enforcement agency for state highways and roads. The agency is predominately concerned with traffic safety, service to the motoring public, and protection of state property. The CHP does not have the legal authority to be the lead agency for general law enforcement and does not contract for general law enforcement duties. When appropriate, CHP officers can provide law enforcement assistance if the Inyo County Sheriff's Department requests such aid. CHP services include law enforcement, traffic control, accident investigation, and the management of hazardous materials spill incidents (HHSG 2011a, pg. 5.16-22). CHP has one resident patrol officer in Furnace Creek and one in Pahrump (CEC 2011y). Both officers are full time staff. The officers patrol the Death Valley area and if called can respond from the patrol area, or if off duty and needed, the officers can respond from their resident posts. The main area office is in Bishop (Inyo County). The Death Valley National Park Rangers can also respond to law enforcement calls when requested (HHSG 2011a, pg. 5.16-22).

Because the HHSEGS site is on the western border of the Nevada state line, the roads and highway in the vicinity (to the east of the project) are under the jurisdiction of the Nevada Highway Patrol (NHP). The closest NHP station to the project site is the Pahrump Substation on East Postal Drive in Pahrump (HHSG 2011a, pg. 5.16-22). CHP has a mutual agreement with the Nevada Highway Patrol (NHP) giving authority for up to 50 miles into each other's state when requested to provide assistance to one another (CEC 2011y).

The letter from the Inyo County Sheriff that was included in the February 16, 2012 Inyo County correspondence on county services and anticipated costs associated with HHSEGS (INYO 2012b, pg. 8), indicated that the Sheriff would need additional resources to serve the area during both the construction and operation of HHSEGS. The Sheriff's office provided estimates categorized as one-time initial costs totaling $2,130,966.00, and annual on-going costs totaling $1,269,120.00 for the first year, with an annual 4 percent increase each year for increased expenses. The one-time initial costs include hiring, training, and equipping seven new officers, constructing a new substation, and providing officer housing. On-going costs include salaries for the seven officers and one office manager, training, utilities, and other maintenance and administrative costs (INYO 2012b). After reviewing the applicant's UWA, the Sheriff's staff determined that during the construction phase an additional $9,600 per month (in overtime costs) would be needed due to the estimated increase in peak workforce numbers and related traffic and general law enforcement. The total additional cost of overtime during the construction phase would be $278,400 (INYO 2012l).

Following receipt of the February 16, 2012 letter from the Inyo County Sheriff, staff contacted the applicant to see if they had a contact at the San Bernardino County

Sheriff's office that could share their experiences in dealing with similar existing facilities in San Bernardino County. The San Bernardino County Sheriff's office in Barstow would respond to any law enforcement incidents at the Ivanpah construction site. In terms of fire protection, for example, the Ivanpah construction has only resulted in five calls to San Bernardino County since construction commenced in October 2010, and its construction activities and workforce are similar to that of the HHSEGS. (CH2 2012z, pg. 8-2)

The existing Solar Energy Generating Systems (SEGS) solar power plants in Daggett, Kramer Junction, and Harper Lake are all within about a 40-minute drive of the Sheriff's office in Barstow with close proximity to small neighboring communities and access from highways. The SEGS projects went online in the mid-1980s through the early 1990s. Staff contacted the Barstow office to get a sense of how often they have had to respond to the SEGS plants throughout their many years of operations. Sheriff Custody Assistant, Analeah Leon Guerrero, researched Sheriff's call log records through 2006 and found no records of incidents requiring Sheriff's staff response to the SEGS facilities or the Ivanpah construction site (CEC 2012o).

Staff also contacted the Las Vegas Metropolitan Police Department for calls for service and felony crime statistics in the Primm, Nevada area, where much of the Ivanpah labor force has resided in available lodging during construction. The groundbreaking ceremony marking the start of construction at Ivanpah was on October 27, 2010, and as of August 2012, construction is halfway complete. In the Primm area[8] calls for service increased about 6 percent from 2010 to 2011; however, felony crimes decreased about 43 percent (CEC 2012ee). As most of the HHSEGS construction labor force is likely to reside in the much larger community of Pahrump, or in Las Vegas, it is not likely that Inyo County would experience changes in service calls similar to Primm.

At the March 13, 2012, Inyo County Board of Supervisors meeting, Sheriff William Lutze provided additional insights regarding the project site location based on his experience working in the vicinity (INYO 2012i, pp 50-58). He stated that comparing the HHSEGS site to the Ivanpah site is not reasonable and is likely to result in misinformation where impacts to response times and services are concerned. Sheriff Lutze grew up in the area and was the resident deputy in the area for eight years. He explained that there has been an increase in vandalism and theft in the area in recent years, such as bullet holes in signs and theft of metal items that can be sold as scrap. He expressed concern that because the project site is in such an isolated, yet accessible area, that it would be an attractive target for those who might want to steal construction equipment and materials. He also noted that the proposed project would need to be considered as part of the county's homeland security assessment because it would be a significant power plant (INYO 2012i, p. 56). For these reasons, the Sheriff advised the applicant to provide a comprehensive site security plan describing all proposed security measures for the project.

A Draft Construction Site Security Plan was filed under Confidential Cover with the Energy Commission on April 16, 2012, and later provided to the Inyo County Sherriff's Department. The Sherriff and his staff reviewed the Draft Construction Site Security

[8] Statistics include Primm, Sandy Valley, Jean, and Good Springs, within Clark County, Nevada.

Plan and determined that as presented the plan did not lessen the need for additional resources as originally presented in the County's February 16, 2012 letter.

At the May 9, 2012 Staff Workshop, Sheriff Lutze explained that he determined the need for seven additional officers based on his knowledge that a 24-hour station needs 6.4 persons per day for staffing. Additionally, he stated that the current staffing situation in the southeast County requires five patrol officers, but only two are currently on staff. (CEC 2012t)

Conclusion

Staff's analysis in the *Socioeconomic and Fiscal Impacts of the Hidden Hills Solar Electric Generation System on Inyo County* (**Appendix Socio-1**), including staff's review of other power plant projects and comments made in the May 9, 2012 Staff Workshop, shows that two additional resident deputies would be sufficient to provide adequate police protection and response times. With this increase in staffing at the Tecopa/Shoshone substation, it appears that patrol coverage would be sufficient such that an additional substation building would not be required.

As shown in **Appendix Socio-1,** the sales tax revenue that would be generated for the County during the construction period of HHSEGS would be far greater than the potential county expenditures estimated by Inyo County staff and by Energy Commission staff. Therefore, if Inyo County chooses to implement the full increases in Sheriff's Department resources as originally proposed in their February 16, 2012 letter, they would have the tax revenue to do so. Impacts to law enforcement from HHSEGS would be less than significant because the County would have adequate financial resources to provide appropriate Sheriff's protection to the project site and southern Inyo County.

Education

Affected Environment

The HHSEGS site is located within the Death Valley Unified School District (DVUSD). There are five schools in the DVUSD with a current enrollment of 64 students for the 2011/2012 school year. Staff contacted the DVUSD to obtain current enrollment counts and assess capacity of the school district. DVUSD staff reported that there would be no need to add any facilities if new students were to enroll in the District as the classrooms can physically accommodate approximately 20 students per classroom and the district has approximately 17 classrooms (CEC 2011x). DVUSD staff also explained that additional teachers may need to be hired if new students were to enroll in the district. **Socioeconomics Table 11** shows the current district enrollment and calculated capacity available for each school.

SOCIOECONOMICS Table 11
Death Valley Unified School District

Death Valley Unified School District	2011-2012 Enrollment (students)	Capacity (seats)*	Teachers
Death Valley Elementary	4	160	1
Shoshone Elementary (5th and 6th grades)	14	20	1
Tecopa-Francis Elementary (K to 4th grade)	13	40	1
Death Valley High Academy (7th to 12th grades)	32	100	5
Shoshone High (Continuation)	1	20	1
Total District	**64**	**340**	**9**
Notes: *Approximate capacity based on the number of classrooms with a capacity of 20 students per classroom. Source: CEC 2011x, CA DOE 2011, US CENSUS 2010i.			

There are 357 schools in the Clark County School District with a current enrollment of 309,480 students for the 2011/2012 school year and a capacity of 317,056 students (CEC 2011cc). The 357 total schools in the district are comprised of 217 elementary schools, 59 middle schools, 49 high schools, and 32 special/alternative schools. As **Socioeconomics Table 12** shows, the district is within capacity, but the elementary and special/alternative education schools are above capacity.

SOCIOECONOMICS Table 12
Clark County School District

Clark County School District	2011-2012 Enrollment (students)	Capacity (seats)
Elementary	147,492	139,211
Middle	72,331	83,435
High	86,788	92,744
Special/Alt. Ed.	2,869	1,637
Total District	**309,480**	**317,056**
Source: CEC 2011cc.		

Schools within the Nye County School District range widely in size from a single classroom school to a school with 40 to 50 classrooms, so staff focused on schools within the Pahrump Valley. There are six schools in Pahrump Valley, four elementary, one middle school, and one high school. **Socioeconomics Table 13** shows the enrollment and available capacity for each of the Pahrump Valley schools.

SOCIOECONOMICS Table 13
Nye County School District (Pahrump Valley)

Nye County School District (Pahrump Valley area only)	2011-2012 Enrollment (students)	Excess Capacity (seats)
Elementary	1,870	+500
Middle	1,042	+200
High	1,300	+200 to 400
Total Pahrump Valley	**4,212**	**+900 to 1,100**
Source: CEC 2011n.		

A new addition to the high school was completed in January, 2012. At that time, all students moved into the addition as a part of Phase I. Under Phase II, the existing high school will be remodeled and once completed in late 2012, the 9th graders will be moved back into the newly remodeled school. With the completion of Phase II, Pahrump Valley High will have a total capacity for 1,600 students.

Construction Impacts

During construction, staff expects the majority of the labor force would commute daily from the region. Based on the Updated Workforce Analysis (UWA), work would be scheduled on a five day-per-week, 10 hour-per-day basis, comprised of a day shift and swing shift. This would allow construction workers who have temporarily relocated during the construction period to commute to the site either Sunday evening (day shift) or Monday morning (swing shift), and then head home either Friday afternoon (day shift) or early Saturday morning (swing shift). Based on communication with the various BTCs, and examples from other solar projects, staff does not expect construction workers to relocate their families to the project area; therefore, staff does not expect a significant adverse impact to the schools from construction of the proposed project.

Operation Impacts

An estimated 100 permanent workers would be needed to operate the HHSEGS, once constructed. The AFC states that five percent of the 100 operational employees (five workers) would come from Inyo County (HHSG 2011a, pg. 5.10-30). Based on the average family size in Inyo County of 2.88 persons per household, there would be an estimated addition of five students to the Death Valley Unified School District. As shown in **Socioeconomics Table 11**, there would be ample capacity available within the school district to accommodate the additional children. The HHSEGS operation would not create any significant adverse impacts to the local school system.

As noted in **Socioeconomics Table 1**, Section 17620 of the Education Code states "The governing board of any school district is authorized to levy a fee, charge, dedication, or other requirement for the purpose of funding the construction or reconstruction of school facilities." State and local agencies are precluded from imposing additional fees or required payments on development projects for mitigating possible enrollment impacts to schools. The current statutory school fees for the 2011-2012 fiscal year for commercial or industrial development within the Death Valley Unified School District is $0.47 per square foot of covered and enclosed space (CEC

2011x). The applicable fees are calculated prior to the issuance of building permits during plan review. Based on the preliminary project design, approximately 23,673 square feet would be considered occupied structures (HHSG 2011a, pg. 5.10-30). Based on this preliminary estimate, approximately $11,126.31 in school fees would be assessed for the Death Valley Unified School District.

Conclusion

Staff is proposing Condition of Certification **SOCIO-1** to ensure the payment of fees to the Death Valley Unified School District and compliance with Section 17620 of the Education Code through the one-time payment of statutory school impact fees. Staff concludes the project would not adversely impact service levels for schools and would have a less than significant impact on schools.

Parks

Inyo County Parks and Recreation offers outdoor recreation by providing fifteen parks and campgrounds within the county for residents and visitors. The closest facility is the Tecopa Hot Springs Park & Campground located approximately 26 miles southwest of the project site (INYO 2010b). Staff's analysis shows that the construction and operation of the HHSEGS would not induce population growth in the project area. Given the shortage of residential, commercial, and service-oriented development in the immediate project area, staff does not expect construction or operations workers to permanently relocate to the project area. Therefore, staff concludes that the construction or operation workforce would not have a significant adverse impact on parks or necessitate construction of new parks in the area.

Conclusion

Staff concludes the project would have a less than significant impact on parks.

Other Services

In addition to the comments from the Sheriff's office, the February 16, 2012 letter from Inyo County included preliminary estimates of the fiscal impacts of construction and operation of the HHSEGS project on several other county departments (INYO 2012b). The County provides non-law enforcement services to the Charleston View community near the proposed HHSEGS site with limited local staff, based in Tecopa, and supplements those services with staff from other County offices located in Lone Pine, Independence and Bishop (INYO 2012j, p.19). The County's total estimated costs associated with construction of HHSEGS amount to $11.4 million in expenditures, with $1.7 million in additional annual expenditures expected during the operation period of the project.

Each department head who contributed to the February 16, 2012 letter made a public presentation of their HHSEGS impact estimations (for construction and operation) during a special Inyo County Board of Supervisors meeting held on March 13, 2012 in Independence. Departmental management and representatives from the County also attended the May 9, 2012 Issues Resolution Workshop in Sacramento to present and discuss their estimates with staff and other parties to the HHSEGS proceeding, including the applicant. County staff have consistently stated that the remote location of

the project site raises legitimate logistical concerns for county administrators because the majority of their existing available offices and resources are concentrated within the communities of Independence and Bishop, more than 200 miles northwest of the project site, in the northern part of Inyo County. In addition to the Sheriff's Department, the identified fiscal impacts were to the following county departments: Agricultural Department, Assessor's Office, Health and Human Services, Information Services, the Inyo County Motor Pool Program, the Department of Public Works, Waste Management and the Inyo County Water Department.

As discussed above, Inyo County is the second largest county in California in land area and has the sixth smallest population of counties in California, with much of the land publicly owned. Because the tax base is smaller than many other counties in California and the land area so large, the county has not yet been able to invest in the level of infrastructure and public services that would be needed to service large-scale industrial developments in the remote, southeastern portion of the county, such as HHSEGS.

Conclusion

The applicant was available at the March 13, 2012, Inyo County Board of Supervisors meeting and was encouraged to work closely with Inyo County planning staff and department heads to understand the costs identified by the County, and to ensure that Inyo County Staff had the requisite information they need to understand the potential impacts (and benefits) from the project. At the April 26, 2012 workshop at the Energy Commission, staff and Inyo County again addressed the applicant on the potential economic and fiscal impacts of the projects on the county.

To help quantify the economic and fiscal impacts to the county noted in its February 16, 2012 letter, staff prepared a report to determine the benefits and the costs of the HHSEGS to Inyo County, which is included as **Appendix Socio-1** of this document. Staff concluded that over the life of the project, the County would gain about $33.2 million net present value. The sales tax revenue alone generated for the County during the construction period would be far greater than the potential county expenditures estimated by Inyo County staff and by Energy Commission staff.

Preliminary cost estimates from the Inyo County departments of Public Works, Agriculture, Waste Management, and Water received in the February 16, 2012 letter are addressed in the **Traffic and Transportation**, **Biological Resources**, **Waste Management**, **Soils and Surface Water** and **Water Supply** sections of this **FSA**.

CUMULATIVE IMPACTS AND MITIGATION

A project may result in significant adverse cumulative impacts when its effects are cumulatively considerable; that is, when the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, other current projects, and probable future projects [Public Resources Code Section 21083; California Code of Regulations, Title 14, Sections 15064(h); 15065 (c); 15130; and 15355]. Mitigation requires taking feasible measures to avoid or substantially reduce the impacts.

In a socioeconomic analysis, cumulative impacts could occur when more than one project in the same area has an overlapping construction schedule, thus creating a demand for workers that cannot be met locally, or a demand for public services that does not match a local jurisdiction's ability to provide such services. An influx of non-local workers and their dependents can strain housing, schools, parks and recreation, law enforcement, and medical services.

The project site is in Inyo County, along the California and Nevada border. Adjacent on the Nevada side of the state border is Nye County, with Clark County in close proximity. HHSEGS construction is anticipated to begin in the second quarter of 2013 and continue through the fourth quarter of 2015. The AFC evaluated projects within a 20-mile distance from the project site for the potential of creating cumulative impacts. Although there are a number of projects that are currently under development in the vicinity of the HHSEGS that could potentially have an adverse cumulative socioeconomic effect, most of these projects have not advanced to the point where enough is known about them in terms of construction workforce requirements or construction schedule (HHSG 2011a, pg. 5.10-31).

The HHSEGS construction labor is expected to primarily come from unions in the counties of Kern, Inyo, and Mono, which the BTC serves. As shown in **Socioeconomics Tables 5 and 6,** the project would require workers of various specialized trades, which is common for construction of similar renewable energy plants. Although there are non-renewable energy projects in the vicinity of HHSEGS that are in various stages of development, they are not expected to conflict with the construction of HHSEGS because of the requirements of the construction workforce.

The nearby St. Therese Mission project is currently under construction, and would not likely employ the same types of specialized trade workers as HHSEGS. Agreements for the Pahrump Valley Airport are being coordinated between the Town of Pahrump, BLM, and the Federal Aviation Administration (FAA); once completed, the EIS process is expected to take several years. Therefore, staff considered a geographic area for cumulative impacts of Clark, Nye, Kern, Inyo, and Mono counties and sought out reasonably foreseeable renewable energy projects that may have overlapping construction schedules with HHSEGS. Staff also included projects in San Bernardino County due to its proximity to the south of the project site and the multitude of renewable energy projects proposed there in recent years.

Socioeconomics Table 14 lists the projects considered part of the HHSEGS cumulative scenario, from a socioeconomic resources perspective. **Socioeconomics Figure 3** displays the cumulative project locations on a map. Staff reviewed project tracking information and available environmental reports and notices on the websites of local jurisdictions and the BLM, and spoke with project managers from various agencies to compile the list.

SOCIOECONOMICS Table 14
Cumulative Socioeconomic Projects

ID #	Project Name	Peak Construction Workers	Operation Workers	Construction Begin	Construction End
	HHSEGS	**2,293**	**100**	**2nd Qtr 2013**	**4th Qtr 2015**
F	Silver State South Solar	230-400	70-100	3rd Qtr 2012	4th Qtr 2014
G	Stateline Solar	500	7-10	4th Qtr 2013	4th Qtr 2015
I	Searchlight Wind Energy	250-300		2012	2013
J	Southern Owens Valley Solar Ranch	300	10	3rd Qtr 2012	3rd Qtr 2015
N	Hidden Hills Valley Electric Transmission	66		4th Qtr 2012	1st Qtr 2015
O	Calnev Pipeline Expansion	550-650		2012	2013/1014
	Total	**4,189-4,509**	**187-220**		
Source: US BLM 2012a, US BLM 2012b, US BLM 2012c, LADWP 2010, CH2 2012jj.					

The applicant estimates a peak construction workforce of 2,293 workers during HHSEGS construction. An operations workforce of 100 workers would be needed for the project. As mentioned above, the operations workforce is, by and large, not anticipated to relocate to the immediate project area. **Socioeconomics Table 5** presents the total labor force for the crafts specifically needed for the construction of HHSEGS. As shown in the table, the labor force within the Eastern Sierra Region, Bakersfield MSA, and Las Vegas-Paradise MSA are more than sufficient to accommodate the labor needs for construction and operation of the HHSEGS and other probable future projects. Staff knows of no other projects currently under construction that could overlap with the construction schedule and workforce requirements of HHSEGS.

The HHSEGS does not directly or indirectly impact parks and housing and would not contribute to a cumulative impact to law enforcement, parks and housing; the HHSEGS would not directly or indirectly induce population growth, displace substantial numbers of people and/or existing housing or contribute to a cumulative impact in these areas. Assuming six operational employees reside in Inyo County, the estimated addition of five to six children as a result of the operational employees families would be an addition the DVUSD could readily accommodate. Staff's proposed Condition of Certification **SOCIO-1** would ensure applicable school fees are paid by the project. The increased usage of neighborhood or regional parks or other recreational facilities as a result of the project would be minimal. At this time, staff cannot conclude whether the HHSEGS would significantly impact emergency services and would contribute to a cumulative impact in this area.

POTENTIAL FOR PROJECT'S GAS PIPELINE AND ELECTRIC TRANSMISSION LINE TO INDUCE GROWTH IN THE PROJECT AREA

The CEQA Guidelines (Section 15126.2(d)) address whether projects which would remove obstacles to population growth could be growth-inducing, such as a major expansion of a waste water treatment plant that allows more construction in a public service area. This section analyzes the project's natural gas pipeline and electric

transmission line and the potential for this new infrastructure to induce growth in the project area.

Overview of Development in the Area

In the 2001 Inyo County General Plan, the Charleston View area was designated Open Space and Recreation (OSR) and Resort/Recreational (REC) and the zoning was Open Space 40-acre minimum (OS-40). In 2011, Charleston View was one of 14 areas within the county identified for potential renewable energy development by the Inyo County Board of Supervisors. The most recent General Plan Progress Report notes that two conditional use permits were granted in 2010 in the Charleston View area: one for the St. Therese Mission environmental park development and another for placing a temporary weather monitoring station to see if the area is viable for solar energy production (Inyo County 2011a).

Beginning in the late 1950's, the Charleston View area, including the HHSEGS site, was subdivided into small- and medium-size parcels. An unpaved road grid system remains from that past activity, which would have been used had the residential developments occurred. However, given the low level of infrastructure development, and public services in the area combined with the scarcity of groundwater resources (see discussion below), no significant development occurred, no improvements were implemented, and no infrastructure was brought to the site. The proposed project site is currently undeveloped, vacant private land.

Project Infrastructure/Service Capacity Increase

In a letter to the U.S. Bureau of Land Management (BLM), dated December 6, 2011, the Chair of the Inyo County Board of Supervisors identified the project's electric transmission line and natural gas pipeline as potential triggers for growth-inducing impacts (INYO 2011b).

The electric transmission line and natural gas pipeline would be located on BLM managed lands and an environmental analysis pursuant to NEPA will be prepared by BLM as the lead agency (HHSG 2011a, pg. 1-3). In early February 2012, BLM released a Scoping Report for the Hidden Hills Transmission Project which identified various comments on cumulative and growth-inducing impacts related to the HHSEGS electric transmission line and natural gas pipelines, and additional renewable resource generation facilities in Nevada. These comments were submitted by various local government agencies including Inyo County (INYO 2011b), environmental groups (Basin and Range Watch), and members of the public. Response to these comments would be part of the Draft Environmental Impact Statement (DEIS) which is scheduled to be published in late December, 2012 or early January, 2013.

Natural Gas Pipeline

A 12-inch-diameter natural gas pipeline would be required for the project. The gas pipeline would enter the HHSEGS site in the common area where it would connect with an onsite gas metering station. It would exit the HHSEGS site at the California-Nevada border, extending 32.4 miles to the Kern River Gas Transmission (KRGT) existing

mainline system just north of Goodsprings in Clark County, Nevada. Because of the gas line's exclusive use by HHSEGS, staff concludes the gas pipeline would not induce any additional growth in the project area.

Electric Transmission Line

HHSEGS will interconnect to the Valley Electric Association (VEA) system.[9] The interconnection would require an approximately 10-mile-long generation tie-line (gen-tie line) from the HHSEGS to the proposed Crazy Eyes Tap Station,[10] where the project would interconnect to the VEA electric grid. The gen-tie line would originate at the HHSEGS' onsite switchyard, cross the Nevada state line, and continue east for approximately 1.5 miles until reaching Tecopa Road. At Tecopa Road, the route would head northeast paralleling Tecopa Road until it reaches the Crazy Eyes Tap Substation, which would be located immediately east of the Tecopa Road/SR 160 intersection**.**

Staff has reviewed the **Transmission System Engineering** section of this **FSA,** which notes that the generator tie-line is rated to carry the full output of the project. The applicant has stated that power generated at HHSEGS would go to Pacific Gas & Electric (PG&E) under two power-purchase agreements approved by the California Public Utilities Commission in 2010, and this power would serve electricity needs in PG&E's service territory (HHSG 2011b). A small amount of electric power would be used onsite to power auxiliaries such as pumps and fans, control systems, and general facility loads including lighting, heating, and air conditioning. Additionally, some power would also be converted from alternating current (AC) to direct current (DC) and stored in batteries on site, which would be used as backup power for the plant control systems and essential uses. No other electrical power would be made available, either onsite, or offsite.

For these reasons, staff concludes the project's transmission infrastructure would not induce any additional growth in the project area. Staff has not assigned significance to impacts or required mitigation for the project's electrical and gas infrastructure in Nevada since that is the responsibility of the BLM.

Limitations to Development

As discussed in the **Water Supply** section of this **FSA**, the Pahrump Valley groundwater basin (PVGB), which includes the Charleston View area, has experienced significant declines in groundwater levels during the last 100 years. The PVGB has experienced average water level declines of approximately one foot per year since the 1950s. Staff believes the scarcity of local groundwater resources is a serious constraint to any significant development. New commercial/residential development is also constrained in the local area by the Open Space Recreation and Resort/Recreation land use designations, which are more fully discussed in the **Land Use** section of this **FSA.**

[9] In January, 2013, VEA will become a participating transmission owner (PTO) and will turn operational control of its facilities over to the California Independent System Operator (CAISO).

[10] In the HHSEGS AFC, and in the Preliminary Staff Assessment published on 5/24/2012, this substation was referred to as the "Tap Substation."

RESPONSE TO COMMENTS

Several comments were received on the Preliminary Staff Assessment during the public review period. Staff has reviewed these comments and has incorporated applicable edits and discussion into this **FSA**. For a listing of all of the staff's responses, please refer to **Appendix 2**, PSA Response to Comments, Growth-Inducing Impacts.

CONCLUSIONS AND PROPOSED FINDINGS OF FACT

Natural gas used to augment the solar operation at HHSEGS would be provided by a 12-inch gas pipeline and would not be available for any additional development; therefore, the project's gas pipeline would not induce any additional growth in the project area. The bulk of electricity generated by HHSEGS would provide power to the proposed VEA Crazy Eyes Substation, which would go to PG&E pursuant to two power-purchase agreements, and a small amount would be used on site for auxillary power plant operational purposes; therefore, the project's 230-kV transmission line to the VEA Crazy Eyes Substation would not induce any additional growth in the project area. The scarcity of local groundwater resources and the existing land use designations are serious constraints to any significant economic development in the project area.

In terms of impacts on BLM land in Nevada, the HHSEGS is one of several renewable energy projects that are being reviewed by BLM. As the lead federal agency under the National Environmental Policy Act, BLM has the responsibility to analyze the various issues related to the proposed energy projects, including growth-inducing impacts. Growth-inducing and cumulative impacts were identified in several comments in the BLM Scoping Report for the VEA Hidden Hills Transmission Project, and would be discussed more fully in the forthcoming BLM DEIS. Staff has not assigned significance to impacts or required mitigation for the project's electrical and gas infrastructure in Nevada since that is the responsibility of the BLM.

PROPOSED FINDINGS OF FACT

Based on the analysis above, staff makes the following proposed findings:

1. The HHSEGS would involve the construction and operation of a 230-kV electric transmission line.

2. HHSEGS would require a 12-inch-diameter natural gas pipeline.

3. Both linears would be located on BLM managed lands and would be analyzed in a DEIS scheduled to be released in December, 2012 or January, 2013.

4. The project's natural gas pipeline and electric transmission line would not induce any additional growth in the project area.

5. The Pahrump Valley groundwater basin, which includes the Charleston View area, has experienced significant declines in groundwater levels during the last 100 years and staff believes this is a serious constraint on any significant development. Current land use designations are an additional constraint on new commercial/residential development in the local area.

NOTEWORTHY PUBLIC BENEFITS

The AFC provided an estimate of the direct, indirect, and induced impacts resulting from the construction and operation of the HHSEGS project based on an IMPLAN model analysis. IMPLAN is an input-output model that relies on a series of multipliers to provide estimates of the number of times each dollar of input or direct spending cycles through the economy in terms of indirect and induced output, or additional spending, personal income, and employment. The IMPLAN model is widely used by governmental agencies, trade associations, and public interest research groups.

According to the AFC, indirect and induced economic impacts from construction typically lag behind direct effects by 6 to 12 months, beginning approximately between the fourth quarter of 2013 and the second quarter of 2014. Indirect and induced economic impacts from the operation would lag behind direct effects by 6 to 12 months, beginning approximately between the second quarter of 2014 and fourth quarter of 2014. **Socioeconomics Tables 15 and 16** present the IMPLAN results presented in the UWA. These IMPLAN results are based on the applicant's assumption that 70 percent of the construction workforce would be drawn from California and 30 percent from Nevada.

At the March 13, 2012, Inyo County Board of Supervisors meeting, the supervisors encouraged the applicant to work with their EPC contractor to develop programs to entice young people within the county to join the project workforce (INYO 2012i, pp 141-142).

SOCIOECONOMICS Table 15
HHSEGS Economic Benefits from Construction (2011) dollars

Fiscal Benefits	5-County[1] Region, CA	Clark & Nye counties, NV	Total
State and local sales taxes:			
Construction (annual)	$3,875,000[2]	$1,721,480	$5,571,590
Non-Fiscal Benefits			
Total capital costs	$2.2 billion	$ 0	$ 2.2 billion
Construction payroll	$185.3 million	$120 million	$213.7 million
Construction materials and supplies	$50 million	$21.4 million	$71.4 million
Direct, Indirect, and Induced Benefits			
Estimated Direct Benefits			
Jobs (average)	769	329	1,098
Estimated Indirect Benefits			
Jobs	89	41	130
Income	$3,594,400	$1,687,620	$5,282,020
Estimated Induced Benefits			
Jobs	409	257	666
Income	$15,189,370	$11,131,100	$26,320,470

[1]The 5-county region is: Inyo, Mono, Kern, Riverside, and San Bernardino counties. [2] Estimate applies to Inyo County only.
Source: CH2 2012jj

SOCIOECONOMICS Table 16
HHSEGS Economic Benefits from Operation (2011) dollars

Fiscal Benefits	Inyo County, CA	Clark & Nye counties, NV	Total
Estimated annual property taxes	$3.9 million	$0	$3.9 million
State and local sales taxes:			
Operation (annual)	$2,090	$41,010	$43,100
School Impact Fees (estimated)	$11,126.31	$ 0	$ 11,126.31
Non-Fiscal Benefits			
Operations payroll (annual)	$652,180	$12,391,330	$13,043,500
Operations and maintenance supplies (annual)	$27,000	$513,000	$540,000
Direct, Indirect, and Induced Benefits			
Estimated Direct Benefits			
Jobs	5	95	100
Estimated Indirect Benefits			
Jobs	0	2	2
Income	-	$97,630	$97,630
Estimated Induced Benefits			
Jobs	2	62	64
Income	$60,150	$2,697,310	$2,757,460
Source: CH2 2012jj			

In Data Response SE-3, the applicant stated that they are willing to work with Inyo County to maximize the allocation of sales and use tax to the county given the supply chain that will be established for construction of the project. A similar arrangement has worked well with San Bernardino County at Ivanpah SEGS, and it is anticipated that a similar arrangement would work equally well with the HHSEGS Project (CH2 2012u).

Staff prepared a report on the socioeconomic and fiscal impacts of the project on Inyo County, which is included as **Appendix Socio-1** of this document. **SOCIOECONOMICS Table 17** shows that based on staff's analysis of the information available, county agencies would receive about $33.2 million more than it expends over the life of the project. Staff is proposing Condition of Certification **SOCIO-3**, to ensure economic benefits to the County by obtaining the receipt of sales and use tax revenues.

SOCIOECONOMICS Table 17
Net Fiscal Impacts on Inyo County: 28 Years

	Construction (29 Month Total)	Operation (Years 1-3)	Operation (Years 4 on)	Net Present Value
Revenues	$30,043,00	$801,000	$801,000	$37,289,000
Expenditures	$2,791,000	$388,000	$58,000	$4,054,000
Net Impact	$27,252,000	$413,000	$743,000	$33,200,000
	Source: Appendix Socio-1 *Socioeconomic and Fiscal Impacts of the Hidden Hills Solar Electric Generation System on Inyo County*			

PROPERTY TAX

The AFC states the proposed HHSEGS would generate property tax revenue to Inyo County, California. As the legislation currently stands, HHSEGS, if under construction

by January 1, 2017, qualifies for the exclusion of certain parts from valuation per the Revenue and Taxation Code, Section 73. The applicable property tax rate for the project site is one percent. Assuming the property tax exemptions apply, Inyo County would receive about $3.9 million annually. This additional property tax revenue would constitute an almost 23 percent increase in the total county taxes over fiscal year 2010 amounts. (HHSG 2011a, pg. 5.10-29)

Staff's report *Socioeconomic and Fiscal Impacts of the Hidden Hills Solar Electric Generation System on Inyo County* (**Appendix Socio-1**) estimates that after the project becomes operational, Inyo County government would receive $0.75 million more in property taxes annually from the parcels within the project's boundaries than is currently being received for those parcels.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Please see **Appendix 1** – PSA Response to Comments, Socioeconomics

PROPOSED FINDINGS OF FACT

Staff concludes the HHSEGS would not cause a significant adverse direct, indirect, or cumulative socioeconomic impact as a result of the construction or operation of the proposed project in the areas of population, fire and emergency medical services, law enforcement, housing, schools, parks and recreation, based on the following proposed Findings of Fact:

1. The project's construction and operation workforces would not directly or indirectly induce a substantial population growth in the project area.

2. The project's construction and operation workforce would not have a significant adverse impact on housing within the project area and would not displace any people or housing, or necessitate construction of replacement housing elsewhere.

3. The project would not result in substantial adverse physical impacts to schools.

4. The project would not increase the use of existing neighborhood and regional parks or recreational facilities to the extent that substantial physical deterioration of the facility would occur or be accelerated, and new parks are not proposed by or needed as a result of the project.

5. The sales tax revenue generated for Inyo County during the construction period would be greater than the estimated potential County expenditures. Therefore, the County would have adequate financial resources to provide appropriate Sheriff's protection to the project site and southern Inyo County.

6. The construction and operation of the project would not significantly impact the local fire district if proposed Conditions of Certification **WORKER SAFETY-6** and **WORKER SAFETY-7** are implemented.

PROPOSED CONDITIONS OF CERTIFICATION

SOCIO-1 The project owner shall pay the one-time statutory school facility development fees to the Death Valley Unified School District as required by Education Code Section 17620.

Verification: At least 30 days prior to the start of project construction, the project owner shall provide to the Compliance Project Manager (CPM) proof of payment to the Death Valley Unified School District of the statutory development fee.

SOCIO-2 Information regarding illegal and unauthorized camping shall be provided to all onsite personnel at the time of their Worker Environmental Awareness (WEAP) training.

Verification: At least 60 days prior to the start of any project-related pre-construction site mobilization, the project owner shall provide to the CPM (for review and approval, and to Inyo County for review and comment), electronic copies of the information regarding illegal and unauthorized camping that will be provided to all onsite personnel at the time of their WEAP training. At least 30 days prior to the start of any project-related pre-construction site mobilization, the project owner will provide two copies of the final information regarding illegal camping to the CPM and implement the training for all workers at the time of their WEAP training.

SOCIO-3 In order to ensure economic benefits to the County and to the State of California as intended by the enactment of the Renewables Portfolio Standard[11] by obtaining the receipt of sales and use tax revenues, the project owner will work with the County and the contractors that will be responsible for the acquisition of materials and the construction of the Project so sales and use tax shall be accepted in the unincorporated area of the County of Inyo. A signed and notarized statement from someone authorized to sign on behalf of the project owner shall include terms mutually acceptable to the County and the project owner indicating a good faith effort will be made to ensure the receipt of sales and use tax revenue in the unincorporated area of the County of Inyo. Terms that would ensure the receipt of sales and use tax could include, but not be limited to, the following:

1. Make a good-faith effort to have all transactions that will generate sales and use taxes, including transactions of project owner's contractors, occur in the unincorporated area of the County;
2. Encourage the contractors to establish a business location and tax resale account, and take other reasonable steps, to maximize receipt of sales and use tax revenues for the County;
3. Include in a master contract and any other contract for construction, language ensuring that the County will receive the benefit of any sales

[11] The State of California's Renewables Portfolio Standard is established and amended in CA Public Utilities Code § 399.11 et seq., CA Public Resources Code § 25740 et seq., and SBX1-2.

and use tax generated by the Project to the fullest extent permitted by law;

4. Include the following provision from California Board of Equalization, Regulation 1806(b), in all construction contracts:

   The jobsite is regarded as a place of business of a construction contractor or subcontractor and is the place of sale of "fixtures" furnished and installed by contractors or subcontractors. The place of use of "materials" is the jobsite. Accordingly, if the jobsite is in a county having a state administrated local tax, the sales tax applies to the sale of the fixtures, and the use tax applies to the use of the materials unless purchased in a county having a state-administrated local tax and not purchased under a resale certificate.

5. In all agreements related to the Project, identify the jobsite as the project address, which is located within the unincorporated area of the County of Inyo;

6. If the project owner enters into a joint venture or other relationship with a contractor, supplier, or designer, the project owner shall either establish a buying company within Inyo County under the terms and conditions of Board of Equalization Regulation 1699(h), to take possession of any goods on which sales and use taxes are applicable but are not defined by Regulation 1806 and shall include in it their requests for bids, procurement contracts, bid documents, and any other agreement whereby California Sales and Use Taxes may be incurred, that the sale occurs at that place of business in the unincorporated area of Inyo County; or, alternatively, any entity that may sell goods on which sales taxes are applicable may establish its own place of business within the unincorporated area of Inyo County where delivery is ultimately made to the project owner; principle negotiations for all such sales shall be carried on in Inyo County;

7. Provide notice to all out-of-state suppliers of goods and equipment, no matter where originating, that Inyo County is the jurisdiction where the first functional use of the property is made.

Verification: At least 30 days prior to the start of any project-related pre-construction site mobilization, the project owner shall provide to the CPM (for review and approval, and to Inyo County for review and comment),a signed and notarized statement from someone authorized to sign on behalf of the company, with language acceptable to the company and the CPM specifying the terms related to sales and use taxes

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APPENDIX SOCIO-1: SOCIOECONOMIC AND FISCAL IMPACTS OF THE HIDDEN HILLS SOLAR ELECTRIC GENERATING SYSTEM ON INYO COUNTY

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EXECUTIVE SUMMARY

This fiscal impact report estimates a range of potential economic impacts in jobs and spending under reasonably foreseeable scenarios for a solar project proposed on privately owned land in Inyo County (County). It also assesses changes in the County government's fiscal situation if the proposed project is built, using the best available data and constructing reasonably foreseeable scenarios.

The study evaluates of the following project under review by the County. The Hidden Hills Solar Electric Generating System (HHSEGS) project is proposed by BrightSource Energy. BrightSource proposes to construct and operate two solar fields, each consisting of 250 MW, for a total of 500 MW.

The two scenarios examined differ in their assumptions of county expenditures resulting from the proposed project and sales and use tax revenue to Inyo County agencies.

Scenario 1: County estimates of mitigation costs associated with the project are used. This amounts to $11.4 million in expenditures during the construction period and $1.7 million in annual expenditures during the operation period. Mirror costs are not included in sales and use tax base under the case that the vendor applies for and receives a state manufacturing exemption, and sales tax generated from employee spending are not included in revenues to the County. This amounts to revenues of $24.1 million during the construction period and annual revenues of $0.77 million during the operation period.

Scenario 2: Revised estimates of $2.7 million in construction period expenditures and $0.39 million annual operation period expenditures in the first three years and $0.06 million thereafter generated by our staff based on new information and analysis are used. Mirror costs are included in the sales and use tax base, and sales and use tax generated from employee spending is included in revenues. This amounts $30 million in revenues during the construction period and $0.80 million in annual revenue during the operation period.

The proposed project is expected to cost in the range of $2.2 billion in total to construct with direct material costs of roughly $1.05 billion, based on estimates for the solar power tower technology provided by the applicant. Using conservative assumptions about where plant components are assembled, a reasonably foreseeable scenario is that about $50 million of the total value of materials and supplies would be purchased locally over three years. However, staff assumes only $0.23 million (0.46 percent) would be spent within Inyo County, and the remaining $49.7 million (99.54 percent) would be

spent in neighboring counties in California. This level of spending could be expected to directly produce two jobs within Inyo County and 1,096 jobs in the neighboring counties, indirectly create seven jobs within the County, and induce another 41 positions within the County. Such spending would increase County economic output by $41.6 million and earnings by $2.8 million over the 29-month construction period.

Annual operational payroll and spending on operating costs of the project are projected by the applicant to be about $13.04 million and $0.54 million, respectively, with 5 percent going to the County. This could directly produce five jobs, indirectly generate approximately three jobs and induce 11 jobs in the County. County economic output could rise by $2.2 million and earnings by $1 million.

The proposed project would generate between $82.9 to $100.4 million in total sales and use tax revenues over three years based on the cost estimates presented here of which $24.1 to $29.2 million would go to the County based on the representations by the project proponents and state tax allocation formulas. This amount represents the maximum available assuming the County and state take the actions necessary to ensure compliance with tax collection. Of this amount, $8 to $9.7 million would go directly to the County General Fund for city and county operations, and $5.3 to $6.5 million would go to Special Districts in the County as part of the Rural Counties Transaction Tax. $10.7 to $13 million would be provided to the County indirectly through the Local Public Safety and Local Revenue Funds allocated from state revenues. The proposed project is unlikely to qualify for a sales tax exemption that sets the lower bound on this estimate for several reasons discussed in this report. After the project becomes operational, the County government would receive a levelized annual amount of $0.75 million more in property taxes annually from the parcels encompassed in the project's boundaries than is currently being received for those parcels. The proposed project would avoid $16.25 million annually in property taxes based on this cost estimate with the state exemption. However, if the project is sold, the new owners would be liable for this amount.

Construction and operation of the project would require the County to pay additional costs for public safety and other services in the local area. As noted above, staff generated scenarios in which the cost of these services would be between $2.7 and $11.4 million during construction and approximately $0.39 million for the first three years and $58,000 annually thereafter to $1.7 million per year during plant operations.

Other County costs outside of Charleston View are not expected to change substantially. While most of the labor force will be coming from outside the County, the applicant projects that most will reside in Nevada for the duration, so the County population and workforce are expected to remain stable. Thus general County government expenditures should remain stable. Although social welfare and public health expenditures may decrease as unemployment decreases and socioeconomic conditions improve, no reliable estimation method is available to calculate those impacts. Such a study would require an in-depth analysis of affected departmental budgets that is beyond the scope of this analysis.

Appendix Socio-1 Table 1 and **Table 2** summarize the net fiscal impacts during the construction and operational periods for both scenarios. During the 29-month construction period, County agencies would receive about $12.6 to $27.3 million more than it expends. Once operational, the County would annually expend between $0.94 million more than it receives and up to $0.75 million less than it receives after the first three years of operation.

APPENDIX SOCIO-1 Table 1
Net Fiscal Impacts on Inyo County: 28 Years, Scenario 1

	Construction (29 Month Total)	Operation (Annual)	Net Present Value
Revenues	$24,069,000	$773,000	$31,471,000
Expenditures	$11,408,000	$1,714,000	$31,337,000
Net Impact	$12,661,000	($941,000)	$100,000

APPENDIX SOCIO-1 Table 2
Net Fiscal Impacts on Inyo County: 28 Years, Scenario 2

	Construction (29 Month Total)	Operation (Years 1-3)	Operation (Years 4 on)	Net Present Value
Revenues	$30,043,000	$801,000	$801,000	$37,289,000
Expenditures	$2,791,000	$388,000	$58,000	$4,054,000
Net Impact	$27,252,000	$413,000	$743,000	$33,200,000

This analysis has several key caveats which could alter the results and conclusion significantly if the situation changes. The first is that the overall project cost estimates are based on published sources and only partially reflect the actual costs that will be revealed once the project is constructed and assessed by the County Assessor. The proportion of the project costs subject to taxation also could vary as (1) the amount of material sales subject to local sales tax could vary, and (2) the County Assessor may determine that differing proportions of the plants qualify for the property tax exemption. Perhaps the largest caveat for Scenario 2 is that the manufacturing plants for the projects mirrors will not qualify for a sales tax exemption as well. However, the project still shows a positive fiscal impact on the County so long as an agreement on the point of sale is concluded to direct sales and use tax into California. And finally, the calculations of the local shares of property and sales tax are complex and uncertain due to changing fiscal conditions at the state level.

This report that follows contains further discussion of the rationale and supporting documentation for this summary.

INTRODUCTION

The HHSEGS project is proposed by BrightSource Energy, Inc. BrightSource proposes to construct and operate two 250 MW solar power plants (500 MW combined) on privately owned land in the Charleston View area of Inyo County, adjacent to the California/Nevada border. BrightSource has two purchase agreements (PPA) with Pacific Gas and Electric Company (PG&E) to deliver power that have been approved by the California Public Utilities Commission (BrightSource Energy, Inc., 2011a).

This report estimates potential economic impacts in jobs and spending, under a reasonably foreseeable scenario, from the construction and operation of the Hidden Hills project. It also assesses changes in Inyo County (County) government's fiscal situation if the proposed project is built. The economic impacts are derived from direct costs based on publicly available estimates for each of the technologies, and these costs are used in a regional economic input-output model. The economic impacts show jobs creation and increased earned income in the County.

The fiscal impacts reflect both increased net revenues and changes in County costs. This report addresses the direct fiscal impacts on the County's government agencies of the construction and operation of the plants, and not from any other induced economic activity. This report does not address the larger question of how overall changes in economic activity might affect the County's fiscal situation due to the complexity and uncertainty of the required analysis. In other words, it does not fully account for either the changes induced by increased local employment on County expenditures or revenues. The revenue changes reflect property and sales taxes generated by the project directly. The costs reflect those created directly either by the project itself, or the change in employment at the project locations.

COUNTY OF INYO SOCIOECONOMIC PROFILE

The Hidden Hills Solar Electric Generating System would be located on private property in the Charleston View area in eastern Inyo County, adjacent to the California/Nevada border. The County's 2010 population was estimated to be 18,546, and the State Department of Transportation forecasts an increase to 20,279 by 2020 and 21,592 by 2030. Most of the population resides in the County's unincorporated areas, with the three largest cities and Census-designated places being Bishop, with a population of 3,879, Dixon Lane-Meadow Creek, with 2,645 residents, and West Bishop, with 2,607 residents (United States Census, 2012a; California Department of Transportation, 2011).

Inyo County's 2010 annual average unemployment rate reached a 15-year high of 10 percent, which was still below the State's average jobless rate of 11.7 percent (U.S. Bureau of Labor Statistics, 2012). At $29,966 per capita (in 2008), personal income is 2.7 percent above the statewide average of $29,188, with the lower proportion of very-low-income people than the statewide average — 11.9 percent of the population have

incomes below the poverty level in the County, compared to 13.7 percent across the state (U.S. Census Bureau, 2012b).

APPENDIX SOCIO-1 Table 3
Employment Profile of the Study Area, 2011

Industry	Inyo County Labor Force
Total Farm	50
Construction and Mining	200
Education and Health Services	450
Financial Activities	150
Government	3,220
Information	70
Leisure and Hospitality	1,520
Manufacturing	250
Professional & Business Services	250
Trade, Transportation, Utilities	200
Other Services	180
Total Employed	***8,480***
Unemployment Rate	***9.2%***
Source: CAEDD, 2012	

Appendix Socio-1 Table 3 displays the employment in the County by sector for 2011, the most current year available (CAEDD, 2012). As indicated in the table, government agencies are the number one employer in Inyo County. In 2008, the annual average County unemployment rate was 6.5 percent. The recession increased this rate to 9.2 percent in 2009, and the most recent reported rate for December 2011 also is 9.2 percent. This is a slight decrease from the annual average of 10 percent in 2010 but still one of the higher unemployment rates for the country in recent years (U.S. Department of Transportation, 2011).

ECONOMIC INFLUENCE OF THE HIDDEN HILLS SOLAR ELECTRIC GENERATION SYSTEM

The project has two distinct phases that have different economic consequences for the County. Construction is the first short-term phase, which will take place over a specified period, planned as 29 months in this case. This entails a fairly intensive amount of activity with substantial expenditures and material components. Operation and maintenance is the second, longer-term phase. The majority of the costs during the second phase will be for operation staff of the power plants. These expenditures, uses of resources and changes in the labor force will result in changes in the local economy and associated governmental activities.

BrightSource provided much of the required cost estimates for construction and operation of the proposed project (BrightSource Energy, Inc., 2011a; BrightSource Energy, Inc., 2011b; BrightSource Energy, Inc., 2012a; BrightSource Energy, Inc., 2012b). The cost assumptions presented here are consistent and within the range of publicly available published reports and models, and represent a reasonably

foreseeable outcome. Unless explicitly stated, this report assumed manufacturing and non-labor operating expenditures would occur out of the County. The project proponents have their corporate offices or headquarters located outside of Inyo County, and no significant solar panel manufacturing plant is located locally. While a certain proportion of these expenditures are likely to occur locally, there is insufficient detail from any source to quantify this amount accurately. This report uses the applicant's estimates of local expenditures as a reasonably foreseeable scenario. Construction and operating labor costs are allocated between Inyo and outside of the County (Mono, Kern, Riverside, and San Bernardino counties in California and Clark and Nye counties in Nevada) based on the employee locations provided by the applicant and U.S. Bureau of Economic Analysis personal income data. The applicant failed to provide construction cost and employment estimates for Inyo County, opting instead to provide this data for the five-county region that includes Inyo, Mono, Kern, Riverside, and San Bernardino Counties. Staff used Inyo's share of total personal income in the 5-county region (0.46 percent) to allocate the reported construction costs between Inyo and the remaining four counties in the region. Similarly, staff used Inyo's share of personal income in the construction and wholesale trade industries (0.22 percent) to allocate construction payroll expenditures and employment between Inyo County and the rest of the five-county region.

BRIGHTSOURCE'S PROPOSED HIDDEN HILLS SOLAR GENERATING SYSTEM

The HHSEGS is a proposed 500 MW AC PV power plant. The proposed project would be developed within an approximate 3,277-acre area, with approximately 6,000 additional acres assumed to be used for mitigation measures. The plant would be composed of two solar fields and associated solar facilities. The two solar plants will use heliostats—elevated mirrors guided by a tracking system mounted on a pylon—to focus the sun's rays on a solar receiver steam generator (SRSG) atop a tower near the center of each solar field (BrightSource Energy, Inc., 2011a). **Appendix Socio-1 Table 4** details the assumptions and costs for construction and operation of the HHSEGS plant. Data on the construction period and labor force size were provided by the applicant, BrightSource, as was data on per worker labor costs. Certain cost elements were then allocated based on the U.S. Department of Energy's National Renewable Energy Laboratory's (NREL) Jobs and Economic Development Impact II, or JEDI II input-output model (NREL, 2011). The land purchase costs, which are the basis for the assessed values of the land portion of the secured property, are based on the average per acre price derived from data on 2011-2012 land sales in the Charleston View Area (Deputy County Counsel, 2012a).

APPENDIX SOCIO-1 Table 4
HHSEGS Economic Parameters and Costs

Plant Size	
Production (AC Net MW)	500
Acreage	9,277
Land cost per acre	$3,312
Total land cost if purchased – Inyo County	$30.7 million
Months of construction period	29
Construction Costs[1]	
Cost of construction	$2,176 million
Supplies & materials costs	$1,050 million
Local construction expenditures – Inyo County	$0.2 million
Local construction expenditures – outside county	$71.2 million
Annual Average Local construction payroll – Inyo County	$0.5 million
Annual Average Local construction payroll – outside county	$62.9 million
Average monthly number of construction workers – Inyo County	2
Average monthly number of construction workers – outside county	1,096
Average salary & wages – Inyo County	$0.12 million
Average salary & wages – outside county	$88.4 million
Average benefits & other overhead costs – Inyo County	$0.05 million
Average benefits & other overhead costs – outside county	$37.9 million
Operation Impacts[2]	
Annual operation and maintenance cost	$13.6 million
Local operation expenditures – Inyo County	$0.7 million
Local operation expenditures – outside county	$12.9 million
Labor portion of annual operation cost – Inyo County*	$0.7 million
Labor portion of annual operation cost – outside county	$12.4 million
Annual Number of FTE permanent positions – Inyo County	5
Annual Number of FTE permanent positions – outside county	95
Labor wage portion of annual operation cost	$9.1 million
Average salary & wages – Inyo County	$0.5 million
Average salary & wages – outside county	$8.6 million
Average benefits & other overhead costs – Inyo County	$0.2 million
Average benefits & other overhead costs – outside county	$3.8 million

Source: BrightSource, 2011; BrightSource, 2012b.

* Includes wages, benefits, and other employer costs.

1 Outside County includes Mono, Kern, Riverside, and San Bernardino counties in California and Clark and Nye counties in Nevada

2 Outside County includes Clark and Nye counties in Nevada

REGIONAL ECONOMIC IMPACT FORECAST METHODOLOGY AND RESULTS

The economic significance of the proposed solar project to the Inyo County economy can be assessed using an input-output model of the County's economy based on the NREL JEDI input-output model system of regional economic accounts (Lantz and Mosey, 2009). The "region" here is defined as the County. These County multipliers for employment, wage, and salary income and output (economic activity), and personal expenditure patterns included in JEDI are adapted from the IMPLAN Professional model (MIG, 2011). In turn, the IMPLAN data set is derived from U.S. Bureau of Economic Analysis data. These regional model assesses impacts to such variables as industry output (or gross sales), labor income (employee compensation and self-employed proprietors' earnings), other property ownership–related income (corporate profits, dividends, rents and other returns on capital assets), indirect business taxes (mainly sales and property taxes), and employment (full- and part-time jobs). These models are commonly used to evaluate economic activity in which changes in the total demand for output of the industries being studied results in changes in inputs and outputs by the local economic sectors. For example, these models have been used to estimate the impacts of such projects as construction and operation of new factories, development of tourism facilities, and military base closures. A recent study by the University of California found that IMPLAN produced an accurate estimate of actual job losses in the Central Valley related to the 2009 drought (Howitt, et al, 2011).

Economic activity is measured with two important concepts. The first is "total output," which is the total expenditures and receipts associated with all transactions in the economy. However, it includes both activity which may only be a simple transfer with little associated economic production as well as the actual economic activity that is facilitated by or facilitates the transfer.

The second concept of "value added" measures the actual economic activity associated with a transfer, and is a component of total output. It is the component that adds actual wealth to the economy. Value added is the economic value added to a product by an industry beyond the costs of purchasing the necessary inputs from other industries, as measured by labor and property income and indirect taxes. Each step of the production, delivery, and service process adds incremental value. The cumulative value added across these industries, plus any out of state imports, will equal the total cost to provide the final product to the end consumer. The sum of all of this value added for California is known as the "Gross State Product" or GSP. The GSP excludes out of state imports, and does not include the multiplier effect. The GSP is directly analogous to the U.S. Gross Domestic Product or GDP, whose growth rate is followed closely in the business and economic press.

The JEDI model uses multiplier analysis to estimate the total change in County economic activity due to an initial change in construction and plant operational activity. The total change in economic activity consists of three parts: (1) the direct impact, (2) the indirect impact, and (3) the induced impact. The direct impact is simply the initial change in activity. For example, if farm sales fall by $1 million, the direct impact is the change to farm sales, farm income, farm employment, and tax receipts caused by the

fall in farm output. The indirect impact is the change in output, earnings, and employment to all businesses that are linked to the affected downstream sector and impacted by reduced demand for its inputs. The induced impact is the change in regional output, earnings, and employment caused by changes in household income and spending associated with the direct and indirect impacts. Together, direct, indirect, and induced impacts capture the full range of changes in County economic activity stemming from an initial direct change in demand for a good or service. The assumptions about the economic relationships that induce spending and job creation are embedded in the JEDI model and are complex and extensive. The reader is referred to the JEDI and IMPLAN documentation to understand these assumptions and data sources in greater depth.

ISSUES IN MODELING REGIONAL ECONOMIC IMPACTS TO THE COUNTY FROM THE PROPOSED SOLAR PROJECT

Regional economic models such as RIMS, IMPLAN and JEDI can give useful insights into how policy choices might affect the economy. However, they have several limitations on their results. The most important is that they do not account for changes in the economy over time. They rarely capture such technological changes such as the introduction of personal computers. Another shortcoming of input-output models such as IMPLAN or RIMS is that they do not account for relative price changes. For example, if beef becomes cheaper than chicken, the model does not reflect how beef consumption would increase and chicken would fall. Because of these limitations, regional models tend to overstate the economic impacts from large projects or policy changes, especially as the analysis extends further out into the future.

Three particular issues are of note for this regional economic analysis. First, some of the economic activity and flows associated with the proposed project occur outside of, or “leak” from, Inyo County economy into other counties. “Leakage” occurs in a regional economy when goods and services are bought outside of the local economy. Such leakage is common in every regional modeling exercise; however, there are some additional considerations in this case. First, most of the solar panel manufacturing would occur outside of the County. And second, a large segment of the labor force for both construction and operation would commute from outside the County due to the remote location of the proposed project. Often there is a counterbalancing inflow, as will occur with this proposed solar project.

Finally, the standard configuration for the JEDI model assumes that all construction for the project takes place in one year and that the plant begins operating in that same year once construction is complete. This is problematic because most large scale projects are not completed within one year. Construction of the Hidden Hills plant will span 29 months, not including month 0 (BrightSource Energy, Inc., 2011a). In order to calculate the construction costs by year, staff generated a separate version of the JEDI model for each year in which construction occurs and another version of the model to determine the O&M costs and impacts. To do so, staff assigned a share of the total project construction costs to each year based on the proportion of construction employees over the life of the project working that year using detailed data on the project timeline and construction personnel provided in the HHSEGS AFC and revised in a Data Response (BrightSource Energy, Inc., 2011b)

The project is expected to begin construction in the third quarter of 2012, with a three month delay between the start of plant 1 and plant 2, and end in Q2 2015.[1] This allows for an on-line date of Q1 2015 for plant 1 and Q2 2015 for Plant 2. Given this information, we determined that construction would occur for three months in 2012, 12 months in both 2013 and 2014, and three months in 2015.

Table 5.10-16R1 of the HHSEGS AFC provides number of construction personnel by month for the duration of the construction period. Using the construction timeframe noted above, each month was assigned to one of the four construction years. Staff summed the total monthly construction workforce to determine the annual construction workforce for each of the four years in which construction takes place. Staff found that of the 32,620 construction personnel employed throughout the total construction period, 1.5 percent are employed in year 1 of construction, and 32.4 percent, 61.4 percent, and 4.7 percent are employed in the following years.

Staff multiplied the annual employment percentage values by the $2.176 billion in total construction costs to calculate the construction costs for each year of the project, which were then entered into the JEDI model for the respective years. To ensure that no O&M impacts were reported in the construction year models, staff set all O&M costs to zero and set the local share of property taxes, debt and equity financing/repayment, insurance and land purchase/lease parameters to zero. These items are all used to compute the O&M impacts but have no effect on the construction impacts.

For the O&M version of the JEDI model, staff used the estimated O&M costs provided in the AFC and set the local share of the items listed in the previous paragraph to the appropriate values. The local share of construction-related sales tax was set to zero as sales tax generates impacts from plant construction in the model. To ensure that the proper property tax value was computed and used in the model, staff entered the total construction period costs; however, the local share of all construction-related costs were set to zero to ensure that the model would compute only O&M impacts.

Impacts were measured in terms of County output, earnings, and employment. Economic output accounts for the total value of forgone goods and services produced or sold in Inyo County, including the value of imports into the County. These parameters consider only the economic value generated within Inyo County. Earnings represent the portion of value-added that accrues to wage earners and business proprietors. Employment counts the number of full- and part-time positions created by the construction and operation of the proposed project.

SUMMARY OF MODELING RESULTS FOR COUNTY ECONOMIC IMPACTS

The economic impacts from the project will occur in two phases. The first will last about 29 months as the project is constructed. **Appendix Socio-1 Table 5** shows a rea-

[1] The schedule was changed from that in the AFC and reflected in the numerous data submissions by Bright Source. The project now is expected to begin construction in the second quarter of 2013, with a three month delay between the start of plant 1 and plant 2, and end in Q4 2015. This allows for an on-line date of Q3 2015 for plant 1 and Q4 2015 for Plant 2.

sonably foreseeable scenario for increased employment, earnings and output, or product and services sold, within Inyo County for the 2012-2015 period, based on the assumptions specified here and included in the JEDI model algorithms and data. The modeling results show that two jobs would be created in the County directly from construction activity and another 48 would be induced through increased activity in the County.[2] Total County earnings would rise by $2.8 million, and total output by $41.6 million for the full 29 month period, or about $1.2 million annually for earnings and $17 per year for output.

The second phase is the long-term operation of the proposed plants, which is expected to extend at least 25 years based on financing projections used in the industry and the terms of the respective PPAs. **Appendix Socio-1 Table 6** shows a reasonably foreseeable scenario for the period beginning as early as 2015, depending on the operational date for the plant. BrightSource estimates five jobs out of 100 total jobs will be created for and filled by local residents. Another 13 jobs would be induced through local activity and purchases, for a total of about 18 jobs created County-wide. Total annual earnings would increase by $0.9 million and output by $2.2 million.

APPENDIX SOCIO-1 Table 5
Proposed Project Economic Impacts during Construction 2012-2015

Impact	Jobs	Earnings $million (2012)	Output $million (2012)
Project development and onsite labor impacts	2	$0.4	$0.4
Module and supply chain impacts	7	$0.4	$31.5
Induced impacts	41	$2	$9.7
Totals	50	$2.8	$41.6

APPENDIX SOCIO-1 Table 6
Proposed Project Annual Economic Impacts during Operation – 25 Years

Impact	Jobs	Earnings $million (2012)	Output $million (2012)
Onsite labor impacts	5	$0.7	$0.7
Local revenue and supply chain impacts	2	$0.1	$0.4
Induced impacts	11	$0.3	$1.2
Totals	18	$1.1	$2.3

No economic losses from reduced agricultural activity are projected as the reasonably foreseeable impact is negligible. As discussed in AFC Section 5.6 Land Use, there are currently no agricultural uses within the HHSEGS site.

[2] Note that the JEDI model results will differ from the project specific inputs to the model, as it segments job creation pathways.

FISCAL IMPACTS ON INYO COUNTY

The proposed solar project, located within the County, would use services provided by various local government agencies, such as public safety and health inspection, and would generate additional revenues for those agencies, such as property and sales and use taxes. Construction and operation of the solar project will also generate additional tax revenues from increased economic activity at other local businesses through indirect and induced economic effects from both project expenditures and increased employment. On the other hand, the solar project would include active solar systems under AB 1451 (Revenue and Taxation Code Section 73), which states that that fully qualifying active solar systems are 100 percent exempt and dual-use equipment is 75 percent exempt, and would not be considered new construction. Therefore, a significant portion of the total assessed value of each project would be exempt from property taxes.

The project applicant is not aware of sales and use tax exemption that applies to the project (CEC, 2012c). Sales and use tax generated by the project depends on the designation of the "point of sale" and the ownership structure of the facility. The County would receive none of the sales tax if the "point of sale" is designated outside of Inyo County. However, several factors make such a designation highly unlikely, as discussed below. For this reason, we presume that the sales and use taxes will accrue to Inyo County.

Public service expenditures — such as expenditures on public health and safety — are induced by changes in the population, workforce,[3] socioeconomic conditions such as unemployment, or facilities in an area. In some cases, such as for water and other utility charges, these costs are paid for directly through property tax increments or usage bills. In other cases, new services are paid for from general fund revenues, and growth may or may not contribute sufficient new sources of revenue to pay for itself.

From an economic perspective, it is the "marginal costs" that are created by economic or population growth that must be examined to determine whether or not a new project produces additional public sector costs. That is, a large portion of public service expenditures are fixed — they cannot be changed quickly. In many cases capital-related costs are sized with extra, or flexible, capacity. Other costs, such as staffing, may vary with demand and funding, but also can be "lumpy", that is, an employee is hired after a threshold level of demand or funding is added.

Fixed costs such as school classrooms, fire stations, and roads will generally not be affected by a small increase in demand. For example, a dozen or more students can typically be added to a school with 500 students without creating a need to enlarge the facility. Similarly, two to three additional calls a year to the fire and police departments will not create the need for a new fire station, or even another officer. However, an additional student, or extra police visit, will result in additional costs associated with supplies, transportation, and other operating expenses. A series of such small

[3] Population and employment may differ as a community may have significant net inflow or outflow of commuters. For example, San Francisco has a population of about 800,000, but its daytime "population" including workforce is about 1.4 million.

incremental increases or a single large project can reach a cumulative threshold where a new school or fire station would be required.

The public costs engendered by the proposed solar project can be illustrated by examining the average cost associated with the provision of various public services. Average costs are different from marginal costs in that they simply reflect a per capita expenditure associated with a particular population, but say little about how those expenditures change given changes in the population served. Likewise, average costs do not account for revenues generated by activities (e.g., reimbursement for building code enforcement), and as a result can overstate per capita expenses. On the other hand, marginal costs estimate the specific cost of adding one additional unit of service, for example, teaching one more student.

For some activities, the private provision of quasi-public services may act to offset any additional demand that the facility may otherwise have caused. For example, the primary burden the solar project places on police services is the need for additional patrols to prevent and investigate crimes against property. In this case the use of security devices and appropriate facility design may minimize the need for professional police services.

DIRECT GOVERNMENTO SERVICE COSTS FOR THE PROPOSED PROJECT

The proposed solar project would cause the County to incur direct costs to serve the public safety, health protection, and roadways requirements in the immediate vicinity of the project.

This section presents the county's estimates of direct government service costs and our own, more conservative, estimates, which form the basis of the two expenditure scenarios used in this analysis.

Scenario 1 – Estimates Based on County Projections

Scenario 1 relies on County expenditure projections developed by nine Inyo County Departments. The County recommended the following, as well as many additional, service upgrades to meet the increased demands in the Charleston View area:

- Resurfacing of Old Spanish Trail Road to the state border.
- The Inyo County Office of the Sheriff will require seven new positions. Training is required for each of the new officers, and new officer will be provided with equipment (patrol car, uniforms, etc.) and housing.
- The Department of Public Works will need one additional road department position for the life of the plant and one 30-month limited term position.

Appendix Socio-1 Table 7 shows the recommended annual mitigation costs proposed by the County for its service agencies or departments. The total costs estimated by the managing County departments during the construction period would be $11.4 million and $1.7 million annually during the operating period for serving a solar project in Inyo County.

APPENDIX SOCIO-1 Table 7
Annual Mitigation Costs Associated with HHSEGS Construction and Operation: Scenario 1 (Inyo County Estimates)

County Service	Construction Period	Operation Period (Annual)
Inyo County Health and Human Services Department	-	$188,115*
Inyo County Assessor Department	$120,000	$120,000
Inyo County Sheriff Department	$2,409,366	$1,269,120
Inyo County Public Works Department	$8,157,000	$78,500
Inyo County Information Services	$237,600	
Inyo County Agricultural Department	$150,000	$50,000
Inyo County Waste Management Department	$156,000	-
Inyo County Motor Pool Department	$33,200	-
Inyo County Water Department	$145,000	$8,000
Total	**$11,408,166**	**$1,713,735**

Source: CEC, 2012
* Annual costs shown are for the first year. They are estimated to increase 5% per year.

APPENDIX SOCIO-1 Table 8
Annual Mitigation Costs Associated with HHSEGS Construction and Operation: Scenario 2 (Staff Estimates)

County Service	Construction Period	Operation Period (Annual)
Inyo County Health and Human Services Department	$470,000	-
Inyo County Assessor Department	-	$50,000
Inyo County Sheriff Department	$871,000	$330,000*
Inyo County Public Works Department	$1,213,000	-
Inyo County Information Services	$237,600	-
Inyo County Agricultural Department	-	-
Inyo County Waste Management Department	-	-
Inyo County Motor Pool Department	-	-
Inyo County Water Department	-	$8,000
Total	**$2,791,600**	**$388,000**

Note: * - Additional annual cost to the Sheriff is for first three years of operation.
Totals may differ due to rounding.

Scenario 2 – Estimates Revised for Updated Information

Scenario 2 consists of Staff estimates of county expenditures. **Appendix Socio-1 Table 8** shows the Staff's estimates of direct government service costs for various county agencies as a result of the proposed project. Mitigation costs in this scenario are

significantly lower than in Scenario 1, with estimates of $2.8 million for the construction period and $0.4 million annually during the O&M period. A detailed discussion of how we arrived at these estimates is presented below.

Construction Housing

BSE and Bechtel considered the project area for the similarly-configured Ivanpah Solar Energy Generating Station to have a two-hour commute radius for construction. The population within this radius included large numbers of construction workers, so it was assumed that they would commute to the construction site.

"All workers would reside within commuting distance of the proposed ISEGS site, and therefore would not need to move into the area. Therefore, no construction or operation-related impacts are expected on the local housing supply availability or demand."

Similarly, the Hidden Hills site is located within one hour of the suburbs of Las Vegas, Nevada, and Pahrump, Nevada with a population of 36,441 in the 2010 U.S. Census is less than 15 minutes away (BrightSource Energy, Inc., 2011a). Given that Valley Electric Association, the electric cooperative headquartered in Pahrump, is promoting the siting of large-scale renewable power projects in its service territory, Pahrump can expect an influx of power plant construction employees for other projects as well.

Health and Human Services

In a review of Staff Assessments and environmental documents for 18 remote solar and natural gas-fired power plant projects, none have indicated additional costs to county health services (County of San Luis Obispo Department of Planning and Building, 2011a; County of San Luis Obispo Department of Planning and Building, 2011b; California Energy Commission, 2010a; California Energy Commission, 2010b; California Energy Commission, 2010c; California Energy Commission, 2010d; California Energy Commission, 2010e; California Energy Commission, 2010f; California Energy Commission, 2010g; California Energy Commission, 2010h; California Energy Commission, 2010i; California Energy Commission, 2009a; California Energy Commission, 2009b; California Energy Commission, 2008; California Energy Commission, 2006a; California Energy Commission, 2006b; California Energy Commission, 2000; California Energy Commission, 1999). While Inyo Health and Human Services indicated in their December 12, 2011 letter that additional funding would be required on an ongoing annual basis, the need for this additional funding seems to be based on costs incurred during construction, not necessarily during operation (County of Inyo, 2012). With a peak construction workforce of 2,293 personnel during Month 19 of construction, assuming that construction workers have been drawn from outside the study area, Health and Human Services costs for additional services appears reasonable for the duration of construction (BrightSource Energy, Inc., 2012b). It is likely that the operational workforce of 120 would be largely drawn from the local population, much of it in Nevada, and if not, this increase would not represent a substantial increase in demand on services. In addition, this population is likely to be employed and of working age so demands on social services should be substantially less than the average experienced in the region. Consequently, the ongoing annual cost projected by Health and Human Services has been extrapolated for the 29-month duration of construction instead of as an ongoing cost. However,

these costs would not create a significant environmental impact and are beyond the regulatory purview of the Commission.

Assessor

The County projected that the average annual cost for the Assessor's Office would be approximately $120,000. Additionally, according to recent correspondence with Gruen Gruen + Associates, the assessment of the Coso Geothermal project cost the Assessor's Office approximately $200,000 per year (Gruen Gruen + Associates, 2012). These costs largely represent legal costs that would occur on an ongoing basis following the completion of construction. For the HHSEGS, staff estimates that ongoing annual legal costs to the Assessor's Office could be $50,000 (CEC, 2012d). However, given that the majority of these costs are for adversarial legal proceedings, it would be presumptive to require BSE to pay the County's legal fees prior to the determination of the outcome of proceedings that may not even occur. The Staff also believes that Inyo County can generate substantial savings by sharing information and resources with neighboring San Bernardino County, which will be assessing the largely identical Ivanpah Solar Energy Generating Station.

Sheriff

Reviewing the Energy Commission Staff Assessments for 16 remote solar and natural-gas fired power plants, project-related increases in property damage and theft were not identified as issues that would substantially increase demands on police protection services. For the projects reviewed, law enforcement response times ranged from three minutes to one hour. Each project included security fencing and nighttime lighting, with most projects specifying the inclusion of razor wire or barbed wire on the fencing. None of the projects indicated an increased demand on police protection that would require additional staffing or law enforcement facilities. For the solar and natural-gas fired power projects that did not specifically include security measures in their project descriptions, Energy Commission staff required Conditions of Certification for the power plants to implement a minimum level of security consistent with the 2002 North American Electric Reliability Corporation Security Guidelines for the Electricity Sector and the 2002 U.S. Department of Energy draft Vulnerability Assessment Methodology for Electric Power Infrastructure. These Conditions of Certification included perimeter fencing and breach detectors, guards, alarms, site access procedures for employees and vendors, site personnel background checks, and law enforcement contact in the event of a security breach (California Energy Commission, 2010a; California Energy Commission, 2010b; California Energy Commission, 2010c; California Energy Commission, 2010d; California Energy Commission, 2010e; California Energy Commission, 2010f; California Energy Commission, 2010g; California Energy Commission, 2010h; California Energy Commission, 2010i; California Energy Commission, 2009a; California Energy Commission, 2009b; California Energy Commission, 2008; California Energy Commission, 2006a; California Energy Commission, 2006b; California Energy Commission, 2000; California Energy Commission, 1999). Additionally, discussions with San Bernardino County Sheriff's Department have indicated that the Ivanpah, Kramer Junction, Daggett, and Harper Dry Lake Solar Energy Generating Systems have not increased the number of incidents

requiring response by the Sheriff's Department (California Energy Commission, 2012a; California Energy Commission, 2012b).

Based on a review of other power plant projects and comments made in the May 9, 2012 Staff Workshop, Staff estimates that two additional resident deputies would be sufficient to provide adequate police protection and response times. The County Sheriff stated at the workshop that the current situation requires five patrol officers in eastern Inyo County but only two are currently on staff. Thus, the County already requires three additional deputies plus administrative staff to meet current needs, so these positions are netted from the County's estimated requirements specific to the project. With this increase in staffing at the Tecopa/Shoshone Substation, it seems that patrol coverage would be sufficient such that an additional substation building at the plant site would be unnecessary. Assuming an average tenure for officers of 12 years based on U.S. Bureau of Justice Statistics national data, and an expected average remaining tenure of officers currently employed by the County of six years, the officers hired in response to HHSEGS construction would replace other officers through attrition or retirement in six years.[4] Consequently, the cost projection for salary and annual training for these new officers is estimated for the 29 months of construction and the remaining three years and seven months following completion of HHSEGS construction.

For this cost projection, the monthly resident deputy allowance of $400 is used to estimate housing costs to the County, for a total of $24,000 for HHSEGS construction at an annual cost of $9,600.

Revising the County Sheriff's Hiring and Recruitment, Academy Training, and Initial Startup costs for two additional employees instead of seven (including the officers' salaries and housing for the duration of construction), initial and construction costs would be reduced from $2,130,966 to $871,295.

Eliminating the cost of the proposed Substation would eliminate the ongoing annual projected utilities and maintenance costs and personnel costs would be reduced proportionately for two instead of seven additional personnel. This would reduce ongoing costs from $1,269,120 to $329,998.

Public Works

Inyo County Public Works had projected that severe truck traffic loads from Hwy 127 along Old Spanish Trail Road to the HHSEGS site would require reconstruction of the entire 30.1-mile length of Old Spanish Trail Road. The projected cost estimates provided by the Department of Public Works for repair and maintenance of Old Spanish Trail Road ($8,157,000 during construction and $78,500 annually during operation) appear consistent with other road maintenance costs determined for other projects on a cost per mile basis (County of Inyo, 2012). However, BSE has stated that 100 percent of truck trips and 90 percent of all construction workforce traffic would come and go from the SR 160 along Old Spanish Trail Road. 10 percent of construction workforce traffic would use Old Spanish Trail Road west of the project site to Hwy 127 (BrightSource Energy, Inc., 2012b). Consequently, the 3.4-mile segment of Old Spanish Trail Road in Inyo County from the western boundary of the HHSEGS east to the

[4] If the average tenure within the Inyo County Sheriff's Department were less, then the projected incremental costs would decrease because the excess force could be reduced more quickly.

Nevada state line would receive 95 percent of all construction traffic including all truck trips and would be subject to the most severe damage from construction. Doug Wilson, Interim Director of Inyo County Public Works acknowledged at the May 9 Workshop that the County was unlikely to incur large costs on Old Spanish Trail west of the plant site (CEC, 2012d).

The County projection of $8,000,000 for the replacement of the 30.1-mile length of Old Spanish Trail Road translates to a per mile replacement cost of $265,781 per mile. This projection assumes that the entire length of Old Spanish Trail Road will be equally impacted by construction. As described above, however, the 3.4-mile segment of Old Spanish Trail Road from the HHSEGS to the Nevada state line will receive 90 percent of the traffic impacts and the 26.7-mile segment from the HHSEGS to Hwy 127 will receive at most 10 percent of the traffic impacts. The proportional replacement cost per mile can be determined by using the County's cost per mile and multiplying it by the percentage of impacts that segment of road will receive.

However, this calculation assumes that car and truck trips damage the road equally, which is empirically untrue (General Accounting Office, 1979). If truck trips were weighted more heavily in the calculation, then because trucks only travel on the 3.4-mile segment to the Nevada state line, the proportion of traffic impacts to the 3.4-mile segment would increase, approaching 1.0, while the proportion of traffic impacts to the 26.7-mile segment would decrease, approaching zero. If the proportion of traffic impacts to the 3.4-mile segment comes close to 1.0, the proportional replacement cost increases near $265,781/mile, giving a total replacement cost for the segment from HHSEGS to the Nevada state line of $903,655 while the replacement cost for the segment from HHSEGS to Hwy 127 nears $0.

To balance these two different estimation methods, the staff has used the average of the two, which implies 95 percent of the damages come from traffic to Nevada and the remainder for traffic to California. On this basis, for the 3.4-mile segment from HHSEGS to the Nevada state line, $265,781/mile is multiplied by 0.95 to give a proportional replacement cost per mile of $252,492. For the 26.7-mile segment from the HHSEGS to Hwy 127, $265,781/mile is multiplied by 0.05 to give a proportional replacement cost per mile of $13,289. Multiplying each by the mileage of each segment we find a total proportional replacement cost for the 3.4-mile segment to be $858,473 and a total proportional replacement cost for the 26.7-mile segment to be $354,816, for a grand total of $1,213,289.

Inyo County Public Works department anticipated that the maintenance required for the 30.1-mile length of Old Spanish Trail Road during construction and afterward during operation would require an additional staffing position, a medium sized front end loader and a pick-up truck. As replacement and maintenance activities would disproportionately occur on the 3.4-mile segment from HHSEGS to the Nevada state line, little more than 10 percent of the 30.1-mile length of Old Spanish Trail Road, it is expected that current Road Department staff and equipment would be able to accommodate the additional maintenance burden. With 95 percent of traffic coming and going from SR 160 along Old Spanish Trail Road, no additional Public Works staffing or equipment would be necessary.

Information Services

Construction activities at the HHSEGS will draw a maximum of 2,293 workers to the project area for the duration of construction, requiring the temporary installation and maintenance of information infrastructure in the Tecopa/Shoshone area for the duration of construction (County of Inyo, 2012; BrightSource Energy, Inc., 2012b). While it is expected that the communications tower proposed as part of the project would be sufficient for communication needs directly related to the HHSEGS project, additional infrastructure will be required to accommodate additional County Services. Based on ongoing AT&T monthly charges for County workstations, the County's Information Services projected cost for the duration of construction appears reasonable (County of Inyo, 2012).

Agricultural

While the costs projected by the Agricultural Commissioner appear consistent with weed management costs for other projects, it should be noted that all the power plant projects reviewed included Conditions of Certification requiring the applicants to develop and implement weed management plans (County of San Luis Obispo Department of Planning and Building, 2011a; County of San Luis Obispo Department of Planning and Building, 2011b; California Energy Commission, 2010a; California Energy Commission, 2010b; California Energy Commission, 2010c; California Energy Commission, 2010d; California Energy Commission, 2010e; California Energy Commission, 2010f; California Energy Commission, 2010g; California Energy Commission, 2010h; California Energy Commission, 2010i; California Energy Commission, 2009a; California Energy Commission, 2009b; California Energy Commission, 2008; California Energy Commission, 2006a; California Energy Commission, 2006b; California Energy Commission, 2000; California Energy Commission, 1999). With the inclusion of Conditions of Certification as described in Biological Resources section requiring HHSEGS to develop and implement a weed management plan, it is expected that additional weed management by the County will not be necessary.

Waste Management

At this point in the planning process, it is unclear how construction worker housing may be accommodated in the area, but as discussed above, it appears sufficient housing is available within commuting distance to accommodate the workforce. No such camp has been constructed at Ivanpah SEGS which is similarly remote. While a 300-space RV park to provide housing for project employees could require waste disposal services during the 30-month construction period, these plans are speculative, but sufficient for inclusion in this cost estimate (County of Inyo, 2012). Other similar projects have developed Temporary Construction Worker Accommodations Areas in which the applicant was responsible for waste management (County of San Luis Obispo Department of Planning and Building, 2011a; County of San Luis Obispo Department of Planning and Building, 2011b). Without better knowledge of the construction labor force, these costs are uncertain and could be lower or higher. The **Waste Management** section addresses issues of waste disposal services. At this time, the Staff believes that no additional costs will be incurred by the County for this project.

Motor Pool

The projected cost estimates provided for the Inyo County Motor Pool ($66,000 during construction) appear consistent with costs determined for other projects (BrightSource Energy, Inc., 2011a). However, the Commission is fully responsible for all compliance and inspection, so the County need not incur any costs to visit the work site or the operating facility.

Water Department

While Water Department costs for oversight and monitoring appear consistent with costs determined for other projects, the costs for plan and model development would be borne by the HHSEGS project. Additionally, it seems presumptive to assume that the County would lose grant funding as a result of the project based on increasing the risk of being deemed ineligible. This would eliminate the Water Department costs of $145,000 during construction, while keeping the $8,000 annual cost. The **Water Supply** section addresses issues of groundwater monitoring.

CHANGES IN INDIRECT COUNTY EXPENDITURES

Beyond the direct public safety and health protection services discussed above, the solar project could result in changes to local governmental expenses, primarily in two ways. The first is increased spending induced by increased population. The second is decreased spending caused by improved socio-economic conditions.

The first set is associated with an increase in the number of employees located in Inyo County who could be new residents. These indirect increases include both the public facility development costs identified for impact fees and other general governmental service costs such as health and social services, recreation, judiciary and detention, and permitting and licensing. These costs generally increase with the population, or with a related metric such as daytime workforce population. The usual underlying economic assumption in the studies that develop these costs is that the local economy is in a stable equilibrium represented by long-term averages that relate county expenditure growth to population growth. In turn, this assumption implies that increased employment leads to both increased jobs for current residents and attraction of immigrants from other jurisdictions, which implies a growing population, and increased County government spending.

Given the extraordinarily high unemployment rate now being experienced which is expected to continue for several years, few employees at this project can be expected to be new residents. Combined with other communities in neighboring counties, there will be an available labor supply in proximity to the proposed solar project. The applicant plans to employ up to 2,293 workers during the peak construction period should have a negligible impact on the County's current population of 18,546 and labor force of 9,550 as the majority of them will reside in neighboring counties and the California Employment Development Department employment figures indicate that approximately 1,000 members of the County's labor force are unemployed. The existing County labor force will likely fill these new jobs where needed and project developers will not need to offer higher compensation to attract outside labor. The current situation is in contrast to

recent history when construction labor costs escalated through the 2000s to attract an increase labor supply across geographic regions.

While the daytime population will be shifting from neighboring areas to the Charleston View area, so that demand on services will also shift to a currently underserved portion of the County, those services will still be rendered within the County boundaries. Building and operating the proposed solar project could increase County governmental expenditures on direct services, but the County's indirect costs in total are unlikely to increase as a result. For this reason, the County should not expect to experience higher costs for the public services beyond the direct service costs identified in Section 5.1 specifically for the proposed project.

The second set of potentially affected services is associated with decreased social welfare and public health services due to reduced unemployment and improved socioeconomic conditions, including higher income. While the relationships for the expenditures on the first set of services described above are well understood, the relationships for the expenditures on the second set of services are not. For example, the quantitative relationship between the number of unemployed and County health service expenditures has not been estimated and would require substantial analysis of the affected departments' budgets. For this reason, while the County should expect lower costs for social welfare and health services as a result of reduced unemployment, those savings cannot be estimated at this time.

CHANGES IN LOCAL GOVERNMENT REVENUE

Local government revenue sources can be categorized into seven general types:

- property tax and property-related taxes and fees,
- local sales and use tax,
- vehicle license fees,
- fines and forfeitures,
- fees for services,
- other local taxes (e.g., transient occupancy tax, utility users tax, business license tax), and
- intergovernmental transfers.

California's cities and counties vary in the extent to which they rely on the above taxes and fees to support their functions due to the differing nature of their relationship with the state government, their responsibilities, and their authority.

Further, developing the proposed solar project will impact the various taxes and fees in different ways. Due to the specificity of the taxes, changes in property and sales taxes can be estimated on an incremental basis with information about changes in property values, projected sales, and the appropriate tax rates. Certain special taxes, such as the transient occupancy tax, also can be estimated using an incremental approach focused on the added economic activity. Changes in other taxes are more readily estimated using the average revenue per County resident due to their less direct relationship to changes in population and business activity. Due to the complexity of the relationships between changes in economic activity and fiscal revenues, those changes have been estimated only where a direct relationship can be identified. For property and

transfer taxes, and impact fees, these are derived solely from proposed project activities. For sales taxes, both the project construction costs and the indirect supply chain expenditures have been included in the calculation. Left out are the fines, licenses and special taxes such as transient occupancy, as well as the sales and property taxes from induced economic activity because those require a wider and detailed modeling of County economic activity.

Property Tax Impact

Although the active solar energy system portions of the proposed solar project would be excluded from the assessment of property taxes, pipes and ducts that are used to carry energy derived from solar are active solar energy system property only to the extent of 75 percent of their full cash value, and non-generating facilities would be assessed at their full value. For HHSEGS, the annual property tax avoided due to exemptions is roughly $13.6 million based on the cost estimates presented here. This translates to a total of $4 million that would have gone to the County services including the General Fund, libraries and roads. The land on which the project is located would be taxed at their newly assessed values, as well as the transmission interconnection facilities. The assumption is that the current "highest and best use" used for value assessment is agricultural, and that will change to an industrial activity definition with a new higher assessment upon transfer.

Changes in property taxes were estimated from the Deputy County Council's data on tax allocation, property assessments and sales; exemption details from BrightSource; and the appropriate tax rates for each area, as reported by the County. Property tax is assessed on project land and equipment. Current property tax on project land was estimated using the assessed value of BrightSource project area parcels (Deputy County Council, 2012b). The parcels are assessed 1.0 percent, resulting in the pre-project parcels generating approximately $62,000 in property taxes annually, $18,000 of which goes to county services. With the construction under the proposed solar project, the value of the parcels will be reassessed and property taxes will be assessed accordingly. In addition, the assessed value of the plant facilities would be $2.176 billion for the project. After the first year, staff applied the BOE's percent good factor to discount the assessed value of plant facilities over the life of the project (BOE, 2012a), resulting in a levelized assessed value over the life of the project of $1.63 billion per year. Approximately 45 percent of the project property will be taxable non-solar property, of which 38 percent will be dual-use and, thus, taxable at 25 percent of full value and 7 percent will be fully taxable (BrightSource Energy, Inc., 2012). Based on these values, the proposed solar project is estimated to generate approximately $2.63 million in property taxes annually, a net increase of about $2.56 million over the total fiscal year 2010 amounts. **Appendix Socio-1 Table 9** shows the increases in property tax revenues to the various agencies under current allocation rules after the land is leased and reassessed at the new purchase price. The County's revenues would increase by about $0.75 million annually.

APPENDIX SOCIO-1 Table 9
Changes in Annual Property Tax Revenues with the Project Completed

Property Tax Revenues	County Allocation	Added Revenues
School districts	62.5%	$1,600,000
County Services	29.43%	$760,000
Incorporated cities	1.16%	$30,000
Special districts	6.91%	$180,000
Total	100%	$2,560,000
Source: Deputy County Council County of Inyo, 2012.		

BSE has provided cost information regarding the non-generating facilities to be constructed as part of the project (BrightSource Energy, Inc., 2011a). The addition of new construction would also generate property tax revenue, although without the capital costs of the non-energy production components of the project, the additional revenue cannot be estimated. The structures subject to additional property tax not included here are listed in **Appendix Socio-1 Table 10**. These components would be taxed at their assessed value.

APPENDIX SOCIO-1 Table 10
Structures Subject to Additional Property Taxes

Structures	Square Feet
HHSEGS	
Visitor Center	23,637
Source: BrightSource Energy, Inc., 2011a	

Sales and Transaction Taxes Impacts

In fiscal year 2009-10, Inyo County received over $1.2 million in revenues from its share of the sales and use tax (California State Controller, 2012). **Appendix Socio-1 Table 11** shows the distribution of sales taxes collected within the County borders. The components sent to the County are shown in italics. The County receives 0.75 percentage point directly to its General Fund. Two other components of 0.5 percentage points each are directed to criminal justice activities and human and health services under state law. Finally, the County imposes a tax 0.5 percentage points for a Special Districts. 0.5 percentage points go to County transportation funds, but these revenues are controlled by the Inyo County Local Transportation Commission (ICLTC), which consists of representatives from the Inyo County Board of Supervisors and Bishop City Council, as opposed to being directly controlled by the county, so these are not considered, conservatively, as part of the local share. The County thus receives 2.25 percentage points of the 7.75 percentage point sales tax revenue from the proposed project. A second component equal to 1.06 percentage points is deposited into the Local Revenue Fund 2011 in the State Treasury; this is then reallocated back to the counties based on formulas specified in Assembly Bill 118 (2011). The amount that

Inyo County receives is independent of the sales and use tax revenues generated in the County.

APPENDIX SOCIO-1 Table 11
Distribution of Sales Tax

Purpose	Rate
State (General Fund)	3.94%
County Transportation Funds (ICLTC)	0.25%
State (Fiscal Recovery Fund)	0.25%
State (Local Public Safety Fund)	0.5%
State (Local Human and Health Services Fund)	0.5%
State (Local Revenue Fund 2011)	1.06%
City and County Operations	0.75%
County Special Districts Tax	0.5%
Total	**7.75%**
Source: BOE, 2012b.	

The proposed project is subject to sales and use taxes upon construction and operation, and the tax would be payable within the County per Board of Equalization Regulation 1826(b) (BOE, 2002). Sales tax revenues for the County are largely dependent on the final purchase price and designated “point of sale” for the proposed project, both of which are currently unknown. However, the applicant has made clear its desire to and intention of working with Inyo County to ensure that it maximizes the allocation of sales and use tax to the County (BrightSource Energy, Inc., 2012). In the past, BrightSource worked with the County of San Bernardino to maximize sales and use tax allocated to the unincorporated San Bernardino County stemming from construction of the Ivanpah SEGS project (07-AFC-05C). This indicates that it is reasonably foreseeable that BrightSource will follow through with its intentions and do the same for Inyo County. Furthermore, BrightSource noted that even if it designated the “point of sale” as nearby Pahrump, NV, it would still be subject to use tax in Inyo County.

Based on these assumptions presented by the proponents, the County government could receive $24.1 to $29.2 million, depending on the scenario, in its local share of sales and use tax over the 29-month construction period based on the assumptions presented in this report. The difference in sales tax revenues between the two scenarios is derived from the fact that mirror costs are not included in the sales tax base in Scenario 1. These amounts represent the maximum available assuming the County and state take the actions necessary to ensure compliance with tax collection.

During operation, however, sales tax revenues from the project will be negligible because non-payroll O&M expenditures spent in the County amount to only $27,000 annually. Of the amount collected, only $2,900 would go to the county. The sales tax revenue generated for the County during the construction period is far greater than the

potential county expenditures estimated by the County and by Staff. Because of this, the net present value of the project net impact is positive in both cases.

Scenario 2 assumes that the project will generate additional sales tax revenues for the County because the newly employed local workers will be spending some of their additional disposable income locally on various goods, such as food, appliances and clothing. We generated a rough estimate of how much sales tax revenue employees of the direct and induced jobs created by the project will generate through local spending. Employees of the 50 direct and indirect jobs resulting from project construction will generate over $0.9 million during the 29-month construction period, and employees of the 18 direct and indirect jobs created by operations and maintenance spending will generate roughly $28,000 annually during the 25-year operation period. The County has expressed concern that increased employment during the O&M period could double the local population, which would place a financial burden on the County services that are population dependent. While a doubling of the local population would indicate roughly 100 additional employees in the O&M period, over five times the increase in jobs predicted by the model, we estimated the sales tax generated by employee spending if employment rose to 100 and found that this would generate nearly $156,000 annually for the County. This would offset most of the estimated County costs induced by increases in population.

In addition, an education impact fee would be assessed on the administration building at a rate of $0.47 per square foot. This would generate another $11,109. Staff did not include property transfer tax revenues in our analysis because there will likely be no transfer of property for the proposed project. Currently, the applicant has not acquired any property for the project but is under an option to lease and has obtained the right of land. If the lease is carried out, as anticipated, there will be no property transfer tax revenues.

One question is whether the project might be excluded from the sales and use tax by the California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA) under the authority granted by the recently enacted Senate Bill 71 (Public Resources Code Section 26003, et al). It appears questionable whether the project would qualify in any case given the criteria listed by the CAEATFA emphasizing the requirement that “the project develops manufacturing facilities, or purchases equipment for manufacturing facilities, located in California” (CAEATFA, 2010). Nevertheless, the project owners must (1) apply for the exclusion to the CAEATFA and (2) demonstrate that the project would not have been constructed without the exclusion. The County can object to that exclusion and present a case in opposition. It is doubtful that the project would qualify for an exclusion because (1) the project has a power purchase agreement with PG&E and (2) the project is prepared to begin construction as soon as the Energy Commission approves it (assuming it is approved). Currently, BrightSource has stated that it is not operating the facility, and the vendor has not applied for such an exemption for this project. The vendor is not expected to going forward because it has not done so at Ivanpah (CEC, 2012c)

The solar project will have two additional economic impacts on the County’s sales and use tax revenues that are not quantified in this study due to the complexity of the analysis. A balanced presentation of the added sales tax revenues requires a full

accounting of the added governmental costs as well. Such an analysis is beyond the scope of this study. These additional economic impacts to County sales tax revenue include:

- First, developing the solar project will have an indirect, but positive, effect on complementary services in the vicinity. Businesses en route to the project sites, such as convenience stores and gas stations, stand to benefit from increased traffic moving through the area. A higher sales volume for these entities will lead to higher tax revenues for the County's share of the sales tax as well as other taxes (e.g., gasoline taxes). The value of these additional revenues with the County is unknown, and would be substantially larger during the construction period than during the longer operational period. However, few businesses are located close to the site in Inyo County, so these added revenues are likely to be small.

- Second, the increased sales tax revenues from the additional "rounds" of spending by the businesses supplying the solar project, their employees, and the induced spending on the overall economy are excluded in this analysis. This would depend on the local share of expenditures on project supplies.

CONCLUSION

The proposed project is expected to cost in the range of $2.176 billion in total to construct with direct material costs of approximately $1.05 billion. Using conservative assumptions about where plant components are assembled, it was determined that about $71.4 million of the total $2.176 billion in construction costs would be spent locally over three years. However, only $0.23 million (0.3 percent) is projected by the applicant to be spent within Inyo County, and the remaining $71.2 million (99.7 percent) would be spent in neighboring counties. This spending is expected to directly produce about two jobs within Inyo County, and induce another 48 positions. Such spending would increase County economic output by $41.6 million and earnings by $2.8 million.

Local spending on annual operating costs would be about $27,000 based on the applicant's projections. This spending could directly produce 100 jobs, with about 5 of the 100 positions being filled by County residents and the remainder commuting from neighboring counties. It could indirectly generate another 13 jobs. Annual County economic output could rise by $2.2 million and earnings by $0.9 million.

Based on County Agency estimates, the County could incur gross costs of $11.4 million during construction and $1.7 per year during operation on public safety and other services in the local area (Scenario 1). Staff estimates are more conservative and predict that the county could incur costs of $2.8 million during construction and $0.39 per year during operation (Scenario 2).

Appendix Socio-1 Table 12 and **Table 13** summarize the net fiscal impacts during the construction and operational periods, and over the 28-year period of expected construction and operation for the two expenditures scenarios. These estimates represent the maximum available revenues presuming that the County and state take

the actions necessary to ensure that taxes are appropriately collected at the project site. (San Bernardino County has taken such actions at Ivanpah SEGS which is also owned by BrightSource.) The net present value represents the discounted sum of the cash flow of revenues and expenditures. A 5.2 percent "real" discount rate was used based on the current yield on Inyo long-term debt and the inflation rate projected by prices on U.S. Treasury bonds (Big Pine Unified School District., 2010; FMS Bonds, Inc., 2012; Yahoo Finance, 2012; U.S. Department of the Treasury, 2012a; U.S. Department of the Treasury, 2012b).[5] During the three-year construction period, County agencies could receive between $12.6 and $27.3 million more than it expends. Once operational, the County could expend $940,000 annually more than it receives in Scenario 1 and receive $413,000 more than it expends in the first three years and $743,000 more thereafter in Scenario 2. Over the entire period, the County would effectively break even in Scenario 1 and gain $33.2 million net present value in Scenario 2. County gains would be positive even if the amount of materials subject to sales tax is cut in half in Scenario 2.

APPENDIX SOCIO-1 Table 12
Net Fiscal Impacts on Inyo County:
28 Years, Scenario 1

	Construction (3 Year Total)	Operation (Annual)	Net Present Value
Revenues	$24,069,000	$773,000	$31,471,000
Expenditures	$11,408,000	$1,714,000	$31,337,000
Net Impact	$12,661,000	($941,000)	$100,000

APPENDIX SOCIO-1 Table 13
Net Fiscal Impacts on Inyo County:
28 Years, Scenario 2

	Construction (29 Month Total)	Operation (Years 1-3)	Operation (Years 4 on)	Net Present Value
Revenues	$30,043,000	$801,000	$801,000	$37,289,000
Expenditures	$2,791,000	$388,000	$58,000	$4,054,000
Net Impact	$27,252,000	$413,000	$743,000	$33,200,000

Other County costs are not expected to change substantially. Population should remain unchanged as the local labor force, particularly for construction, is experiencing high unemployment and should be able to easily absorb the increased projected demand over the forecast period. Social welfare and public health expenditures may fall as unemployment decreases and socioeconomic conditions improve, but those have not been quantified. This report did not estimate induced changes in County revenues from the increased economic activity, which could be significant given the reported economic changes under a reasonably expected to occur scenario.

[5] The "real" discount rate is used for cashflows that are not adjusted for future inflation, as is the case here. The discount rate has the inflation rate subtracted out.

This analysis has several key caveats which could alter the results and conclusion significantly if the situation changes. The first is that the overall cost estimates are based on published sources and only partially reflect the actual costs that will be revealed once the project is constructed and assessed by the County Assessor and Board of Equalization. The proportion of the project costs subject to taxation also could vary as (1) the amount of material sales subject to local sales tax could vary, and (2) the County Assessor may determine that differing proportions of the plants qualify for the property tax exemption. Perhaps the largest caveat is that the manufacturing plant for the mirrors will not qualify for a sales tax exemption as well. If that portion did qualify, the project could have a net negative direct fiscal impact on the County departments. And finally, the calculations of the local shares of property and sales tax are complex and uncertain due to changing fiscal conditions at the state level.

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SOCIOECONOMICS

List of Comment Letters

		Socioeconomics Comments?
1	Inyo County	**X**
2	Bureau of Land Management	
3	National Park Service	
4	The Nature Conservancy	
5	Amargosa Conservancy	
6	Basin & Range Watch	**X**
7	Pahrump Paiute Tribe	
8	Richard Arnold, Pahrump Piahute Tribe	
9	Big Pine Tribe of Owens Valley	
10	Intervenor Cindy MacDonald	**X**
11	Intervenor Center for Biological Diversity	
12	Intervenor, Old Spanish Trail Association	
13	Applicant, BrightSource Energy, Inc.	**X**

Comment #	DATE	COMMENT TOPIC	RESPONSE
1	**July 17, 2012**	**Inyo County**	
1.8		County objects to use of private lands for mitigation purposes.	Objection noted. Appropriate mitigation lands within Inyo County are unlikely to have other useful economic purposes unless they have specific mineral rights.
1.9		Economic impacts of retired private lands not included in economic analysis.	The economic impacts of the lands used for mitigation are included in the analysis. Because such lands are currently of low valuation and any alternative valuation would be highly speculative given the extremely limited water supplies in the region and a lack of identified mineral rights, the county will experience a net positive impact from the inclusion of mitigation lands in proximity of the power plant site. This has been clarified in the revised report. This analysis complies with County Title 21, Section 21.20.010.
1.10		The Consultant's report has a false premise that 1,000 construction workers will commute to site from their homes.	Appendix Socio-1 assumes that the construction workforce will either be hired directly from the Las Vegas / Pahrump labor pool, or under a PLA California workers will find temporary housing in the Las Vegas or Pahrump area, similar to the practice at the Ivanpah SEGS site. Further rationale is discussed in the Consultant's report at p.4-12.6. This has been clarified in the revised report.

1.11a		Service demands for a commuting workforce will impose higher county costs.	The analysis includes most of the estimated county service costs. Specific changes are addressed to specific comments. This analysis complies with Inyo County Title 21, Section 21.20.010.
1.11b		Not unreasonable to anticipate a number of construction employees to dry camp or to reside in Tecopa or Shoshone.	The analysis currently assumes that 5% of the construction labor force will reside in Inyo County. Anyone dry camping will require an independent water supply which is problematic in the area. The number residing in Tecopa or Shoshone will be limited by available residential dwellings. The analysis does not include the positive fiscal impacts from increased employee populations and commensurate local spending.
1.12a		Clark County reports an increase of 30% in service calls in Primm during construction of Ivanpah.	According to Inyo County Sheriff William Lutze, the 30% increase in service calls is a comparison of stats from October 2009 to October 2010. The groundbreaking ceremony marking the start of construction at Ivanpah was on October 27th, 2010, therefore a 30% increase in calls to Las Vegas Municipal Police Department (LVMPD) in October 2009 to October 2010 would not be attributable to the construction at Ivanpah, which as of August 2012 is at the half-way point of completion. Staff requested more recent data from LVMPD which showed an increase in service calls in the Primm area of 6% from 2010 to 2011 and a decrease in felony crimes of 43% for the same period. Furthermore, as most of the HHSEGS construction labor force is likely to reside in the much larger community of Pahrump, or in Las Vegas, it is not likely that Inyo County would experience changes in service calls similar to Primm. This analysis complies with County Title 21, Section 21.20.010.
1.12b		The consultant did not visit the HHSEGS proposed project site to discover that camping on private land has been a problem.	See proposed Condition of Certification SOCIO-2.
1.13		Consultant did not question the applicant's estimate that 5% of construction costs would be spent in the county, and the Consultant substituted his judgement for that of the Sheriff.	At the July 27 workshop, the county pointed out that the 5% estimate probably was too high, not too low as implied by this comment. That 5% is too high implies that demand on the Sheriff's services will be lower than estimated in the report. Staff's report uses the Sheriff's estimates for needed staffing.
1.14		The absence of a CEC condition requiring a letter of credit or other financial assurance is nothing short of cavalier.	See proposed Condition of Certification SOCIO-3.

1.15		The Consultant expresses uncertainty whether the project owner might seek a sales and use tax exclusion under CAEFTA.	Only the mirror manufacturing plant is eligible to request such an exemption, not the entire plant. This has been clarified in the revised report. Staff's report states that it is not reasonable to expect that such an exemption will be requested or granted for the reasons expressed in the report. However, Scenario 1 assumes that the vendor receives a sales and use tax exclusion.
1.16		It is not inconceivable that BSE might apply for a CAEFTA sale and use tax exemption.	BSE does not own the mirror manufacturing plant, which is owned by a vendor. The vendor has not applied for an exemption at the Ivanpah SEGS. Without this precedent, such an application would not meet the criteria for the CAEFTA. Staff ran Scenario 1 excluding the sales tax revenue on the $446 million portion of the plant value could be eligible for such an exclusion.
Resolution 2012-29			
1.17a		Res. 2012-29 requires that the project be designated as a point of sale to the BOE.	See proposed Condition of Certification **SOCIO-3**.
1.17b		Res. 2012-29 requires project owner to establish financial assurances of $84.5 million.	County Title 21 Section 21.20.010 only requires that "the County and its citizens do not bear an undue financial burden from the project." This implies that any assurance be tied to the costs, not the revenues, projected for the project.
1.32		Res. 2012-29 requests a change in finding of fact that the socio economic impacts would be significant.	The report finds that it is reasonable to expect that the revenues generated for the county will exceed the reasonable expected costs by several fold, and thus there will not be significant socioeconomic impacts. This analysis complies with inyo County Title 21, Section 21.20.010.
1.33		Size and location of the project.	Noted. See page 4.12-24 of the FSA, Other Services.
1.34		Res. 2012-29 requests a change in finding of fact that less than 2% of county land is in private ownership, and every acre restricted for the purpose of compensatory mitigation results in a significant impact.	Mitigation lands are part and parcel of the overall project, and the net benefits that accrue to the county include the costs of providing mitigation lands. In addition, it is speculative to assume that the mitigation lands would have a higher economic value given the resource constraints on candidate lands.
1.35		Description of Charleston View.	Noted. See page 4.12-5 of the FSA, Socioeconomics Table 2.
1.36		Closest communities to site.	Noted
1.37		Size of closest communities.	Noted. See page 4.12-5 of the FSA, Socioeconomics Table 2.
1.38		Staffing of local services.	Noted. See revised page 4.12-24 of the FSA, Other Services.
1.39		Sheriff's staffing and patrol area.	Noted. See revised page 4.12-19 of the FSA, Affected Environment.
1.40		Additional services will be required during the construction period.	Noted and included in the assumptions in the report.

1.41		HHSEGS is anticipated to be constructed under the terms of a PLA with California Trade Councils. Majority of workers will commute from California to the project site.	A PLA has not yet been signed. The analysis assumes that regardless of whether a PLA is signed, the vast majority of construction workers will commute to the project site from temporary housing in Nevada. See page 4.12-3 of the FSA, Setting.
1.42		5% of the construction workforce will reside in Inyo, resulting in a 30% increase in the local population. The site is surrounded by vacant land on which "squatting" has occurred.	Noted. See page 4.12-15 of the FSA, Conclusion.
1.43		The temporary increase will lead to increased demand for County services.	See response 1.12a.
1.44		The County estimates that costs wll increase $11.1 million during construction and $1.7 million per year during operation.	Those cost estimates are included as Scenario 1 in the report.
1.45		Table of costs	See response 1.44
1.46		Increased costs will not be offset by increased property tax, nor will the County gain economic benefits due to the remote location.	As noted in the report, property taxes are only one component of the increased tax revenues reasonably expected to occur. Whether the property taxes are sufficient to cover ongoing costs depends on the cost scenario. This analysis complies with County Title 21, Section 21.20.010.
1.47		County Title 21 governs the siting, licensing and construction of the proposed project. The definition of "environment" exceeds that of CEQA, and requires mitigation of "undue financial burden."	The Commission must consider LORS, but has final authority over siting, licensing and construction of the proposed project under state law. The Commission will give due consideration to the County's concerns. This analysis complies with County Title 21, Section 21.20.010.
1.48		Designation of the HHSEGS jobsite for purposes of the sales and use tax would result in the County receiving revenues to offset economic impacts.	Consistent with the report.
1.49		A consultant with expertise in the area of sales & use tax should be funded by the project owner.	Comment Noted
1.50		The Consultant's report stated unequivocally that the County will receive $84.5 million in sales and use tax.	The report stated that it was reasonable to expect that the project will generate that amount of sales tax. However, the report notes that any forecast is uncertain within a potential range. In addition the sales and use tax forecast is revised as noted in response to specific comments, and an updated estimate provided by the applicant.
1.51		Requests COC SOCIO 2 that HHSEGS jobsite be designated as point of sale, and that the method be approved by the County.	Noted. Staff has proposed Condition of Certification SOCIO-3 to address this.
1.52		Requests that a consultant with expertise in the area of sales & use tax should be funded by the project owner.	Comment Noted

1.53		Requests that if BSE receives a sales tax exemption under CAEFTA, that BSE be required to pay the County $84.5 million.	Noted. Under County Title 21, the applicant is only required to mitigate "undue financial burden." The projected sales tax revenue is well in excess of the forecast of costs to the County.
1.54		Requests that BSE deliver a letter of credit for $84.5 million.	See response 1.53.
1.55		Request that the letter of credit be reduce annually by the amount of sales & use tax attributable to the project.	Comment Noted
1.56		Requests that 30 days after completing construction that BOE records be reviewed to audit sale & tax revenues.	Sales and use tax revenues attributable to the project will accrue to the county over a several year period, including after project completion because some of the increase comes from changes in relative statewide tax allocations. The report has been revised to clarify this.
1.57		Requests that the letter of credit will be returned upon full payment of the sales & tax revenues.	Comment Noted
1.58		Requests that the letter of credit be required as a mitigation under County Title 21.	Comment Noted
1.59		Requests COC SOCIO 3 that the CEC in coordination with the County investigate means to enhance degraded public lands rather than use private lands for compensatory mitigation.	Comment Noted
1.60		Requests that if private lands are used for mitigation that an economic study of lost opportunity costs be conducted.	See response 1.34.
1.72		Mitigation would result in net loss of County land. Mitigation should be met based on the County's COC.	See response 1.34.
1.73		It is unresolved how the project proposes to subsidize facilities…a large and temporary increase in population will require.	The report shows it is reasonable to expect that tax revenues will exceed expected costs by a substantial amount during the construction period. This analysis complies with County Title 21, Section 21.20.010.
1.74		The project will result in population increases that create a need for increases in services and infrastructure. Compliance should be met based on the County's COC.	See response 1.73.
1.75		The project will result in population increases that create a need for increases services and infrastructure. Compliance should be met based on the County's COC.	See response 1.73.
Gruen Gruen + Associates			

1.95		$2.9 billion total cost for construction ($2.5 billion in materials) vs. $2.18 billion assessed value confused Gruen Gruen + Assoc. consultants	The total construction costs are derived from the AFC Section 5-10, the assessed land value provided the County Assessor, an incremental cost increase reported in Data Response Set 2F 191, and an updated workforce estimate by the applicant. Of this amount, $2.58 billion is materials and equipment. In Data Response Set 2F 191, the applicant responded that the capital value for assessment purposes is $2.18 billion. The property tax amount has been revised in the report to reflect the corrected capital value reported by BSE.
1.96a		San Bernardino County "conversations" indicated $7.2 million in sales and use taxes for Ivanpah construction accruing to County due to BSE cooperating w/ a tax attorney	Staff contacted San Bernardino County's special consultant on sales & use tax. He confirmed that the approach in the Consultant's report is consistent with the method used by San Bernardino County. Tangible property subject to taxation is likely to exceed $2 billion.
1.96b		Only a portion of the sales & use tax goes to the County's General Fund.	The report states its reasonable to expect that $19 million would go to the General Fund. (p. 2) While the 1.0% of the sales and use tax allocations listed in Table 5.5 of the report have state-mandated purposes, those purposes have been identified by the county as significant added expenses created by the proposed project. In addition, the amount generated by just the portion going into the General Fund greatly exceeds the reasonably expected costs under Scenario 1 using the county's cost estimates. Finally, the sales tax excludes the transportation tax portion that would largely be spent at the discretion of County Supervisors through the Council of Governments.
1.96c		Property tax assumes that the base value remains constant into the future.	The tax base should be depreciated using the BOE's Percent Good Factor. A revised estimate has been included in the revised report.
1.97a		Inyo County will receive 30% of annual property tax based on assessment; school districts 62.5% and special districts 7%	This is consistent with Table 5.3 in the report that is the basis of the fiscal impacts assessment.
1.97b		Ivanpah has an estimated cost of $500 million and a tax basis of $250 million.	As noted in a recorded conversation, Mr. Endler did not give Mr. Gruen an estimated construction cost. In addition, Ivanpah was only 18% complete as of July 2012. Based on the Commission's ongoing review of power plant costs, the cost estimate of approximately $3 billion used in the report is consistent with costs reported publicly for Ivanpah, and for costs estimate for CSP technology projects. The assessment value of $2.2 billion provided by the applicant is consistent with this estimate.

1.97c		Taxable spending and increases in property tax base from JEDI are unreliable.	While a University of California study recently confirmed the reliability of IMPLAN-based model estimates, the Consultant's report considered these additional fiscal benefits sufficiently uncertain and relatively trivial compared to the direct project fiscal contributions that these amounts are excluded from the reported total added fiscal revenues. Only additional sales tax revenues are included in Scenario 2.
1.98		"Opportunity costs" of project and mitigation lands	If the 170 residential lots were developed, based on the current average home sale price of $90,000, this total assessed value would increase to only $15 million, or less than 1% of the expected value of the proposed project. A large-scale residential development on this location would require 9,000 to 18,000 acre-feet of water, and no such water supply is available nearby in California. An interstate water project would be highly speculative. As such, no other economic activity appears viable in the locale. Mitigation lands are part of the project, and project and mitigation lands will pay property taxes, either on private or publlic lands (the latter as in-lieu.)
1.99		Attraction of tourists to project site	Creating a tourism attraction would be an additional benefit that accrues to the project and would further mitigate any potential socioeconomic impacts. This comment appears to contradict Comment 1.98 that the project will decrease opportunities for developing tourism in the region.
1.101		Contractors and Subcontractors obtain a Board of Equalization sub-permit and allocate eligible sales and use tax payments to Inyo County	See response 1.51.
1.102		Requests that a consultant with expertise in the area of sales & use tax should be funded by the project owner.	See response 1.52.
1.103		Interpretive Center (mitigation for Visual Resouces, Cultural Resources) be designed and operated to promote and take full advantage of potential for expanded tourism	Noted
1.105		Demand for human and health services shown in Table III.2	While Table III.2 shows trigger levels for added expenditures, it does not tie those triggers to increases in demand from the proposed project. Given that the entire population increase will be either project employees or their families, it appears unlikely that demand for all but a small portion of the listed services will increase. The report includes an estimate for added costs during the construction period in Scenario 2, and the county's original estimate in Scenario 1. Demand for these services is discussed at p. 4.12-15 of the report.

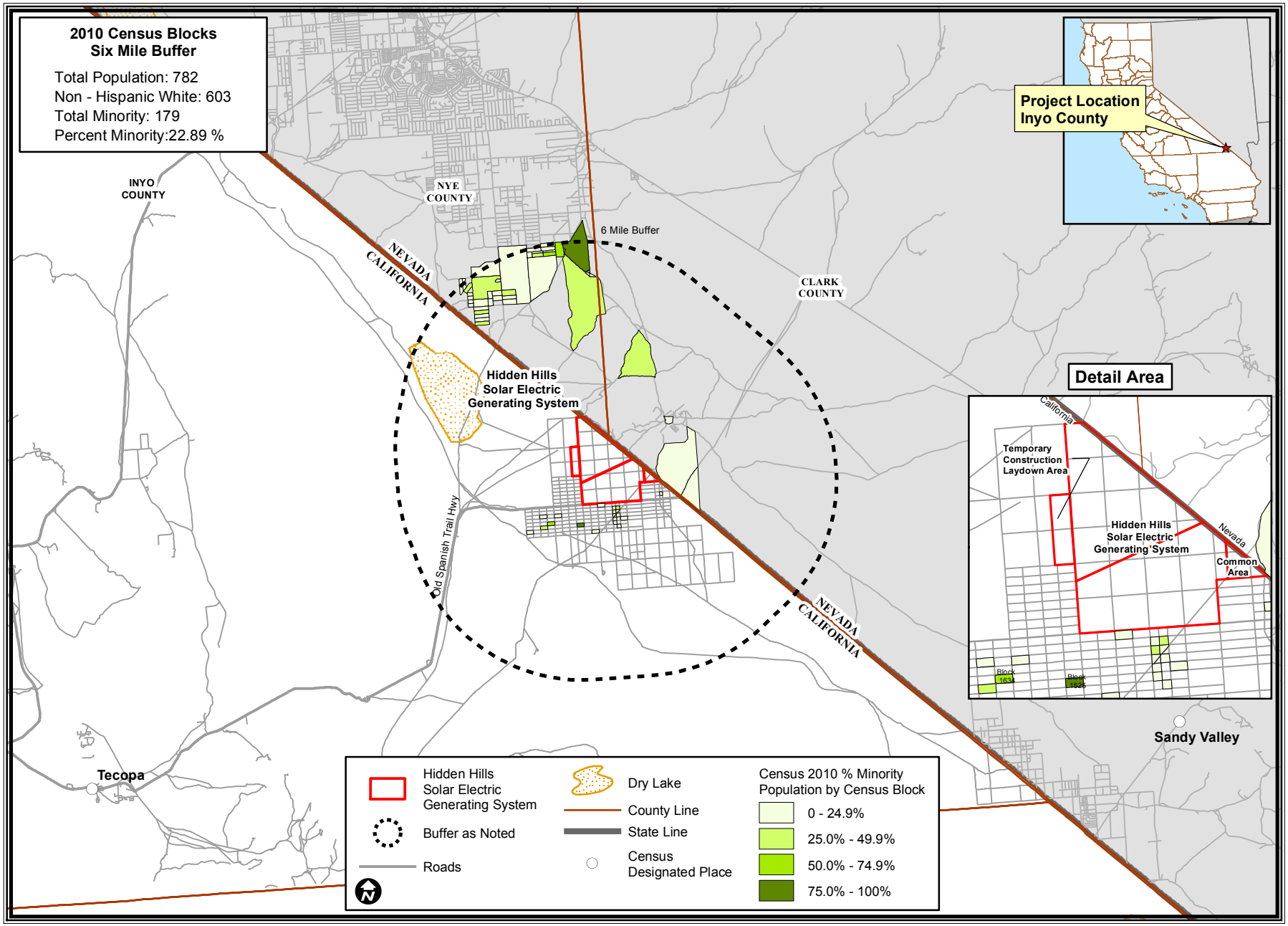
1.106		Cites conversation with San Bernardino Sheriff about increased incidents at solar power plants there.	See revised page 4.12-20, Affected Environment.
1.107		Cites conversations that law enforcement calls have increased 30% in Primm, NV due to Ivanpah project; concerns about "squatting" and illegal camping around HHSEGS site; concerns about increase in local population due to Project Labor Agreement	See responses 1.10, 1.12a, 1.12b, and 1.41. See proposed Condition of Certification SOCIO-2.
1.113		Motor Pool costs associated w/ County services increases due to project	Should additional trips to the project area outside of the Energy Comission's jurisdiction be deemed necessary by county staff, the projected sales tax revenue is in excess of the forecast of estimated costs to the County Motor Pool.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
6	**July 23, 2012**	**Basin and Range Watch**	
6.21		Nevada will get only a small portion of the economic benefits as only 10% of workers will come from Nevada.	Table 3-1 of the report shows that the applicant projects that 95% of the construction workforce will reside in Nevada, expending funds locally there. In addition, 95% of the ongoing workforce is expected to reside in Nevada, adding to ongoing employment opportunities.
6.22		Concerned that Nye County will be burdened with costs of potential emergencies.	Nye County's electricity cooperative, Valley Electric Association, has agreed to interconnect the power project. As a public corporation, the ratepayers of Nye County can weigh in on this decision.
6.44		Developers do not share benefits of large energy projects with local community.	The analysis finds that it is reasonable to expect that increased tax revenues will exceed expected additional costs for infrastructure and services as shown in Tables ES-1 and ES-2. Such a net increase in net revenues would constitute a net public benefit.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
10	**July 21, 2012**	**Intervenor Cindy MacDonald**	
10.1	**13-3 #1**	Where are complimentary services located in vicinty?	Such services are located in Tecopa and Shoshone.
10.2	**13-3 #2**	Where are businesses enroute to the project site?	5% of the construction workforce can be expected to reside in Tecopa or Shoshone. Such businesses are located in those communities.

10.3	**13-3 #3**	At what entities can Inyo County expect to receive higher sales volume?	Such businesses are located in Tecopa and Shoshone. However, those tax revenues were included in the estimated tax revenue increases reported in Tables ES-1 and ES-2, but have been excluded from the summary table, but are included as illustrative examples of reasonable to expect future conditions.
10.4	**13-3 #4**	How can Staff conclude that tax revenues will be substantially larger during construction than during the operational period?	The tax revenue increases in Tables ES-1 and ES-2 are dominated by the direct payments from proposed project and indirect and induced additional revenues from expenditures at local businesses are only a small portion of the total.
10.5	**13-5 #1**	Would Staff consider allocating the County money for tax assessment given stipulations about proceedings?	The report shows in Tables ES-1 and ES-2 that the county can reasonably expect to receive more than sufficient tax revenues to cover the expenses of recovering those revenues, as is typical and expected of all government agencies.
10.6	**13-5 #2**	In what sectors would the additional 77 jobs be created in?	The JEDI model used to estimate the job impacts does not provide a breakdown of the specific sectors in which those jobs have been created. Results are reported at p. 11 of the report. Note that input-output model upon which JEDI is based (IMPLAN) has been validated by a recent University of California study.
10.7	**13-5 #3**	How does Staff's recommended reductions, cuts and revised budgets serve the public interest of the County?	Other than the reference to discussion of the Assessor's expenses, the commentor has not provided other specific examples where the staff has recommended cuts and revised budgets, so a response is not possible.
10.8	**13-6 #1**	Why did Staff leave out analysis of potential adverse impacts to local residents?	The fines, licenses and special taxes left out would be paid by new construction and operational workers who come to the county, not by existing local residents. These would be added revenues to the county, and thus would be further benefits.
10.9	**13-6 #2**	Why did Staff report on the potential advantages but ignored potential disadvantages?	The fiscal impact reports both increased revenues and increased costs. Revenues are net of foregone revenues.
10.10	**13-6 #6**	If Staff recommends not funding infrastructure and services, where are the public benefits?	The analysis finds that it is reasonable to expect that increased tax revenues will exceed expected additional costs for infrastructure and services by several fold as shown in Tables ES-1 and ES-2. Such a net increase in net revenues would constitute a net public benefit.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
13	**July 23, 2012**	**Applicant, BrightSource Energy, Inc. -- p. 230**	
13.1		Environmental Justice	See revised page 4.12-5 of the FSA, Minority Populations
13.2		Environmental Justice	See revised page 4.12-5 of the FSA, Minority Populations
13.3		Federal LORS	Recommended federal LORS applies to agencies receiving federal funds, not applicable to list in this case.

13.4	Environmental Justice	See revised page 4.12-5 of the FSA, Minority Populations
13.5	Ommited word	See revised page 4.12-8 of the FSA, Induce Substanstial Population Growth
13.6	EPC Contractor	See revised page 4.12-3 of the FSA, Setting
13.7	Impacts to SIFPD	See revised page 4.12-18 of the FSA, Conclusion
13.8	Ommited word	See revised page 4.12-19 of the FSA, Affected Environment

SOCIOECONOMICS - FIGURE 1

Hidden Hills Solar Electric Generating System (HHSEGS) - Census 2010 Minority Population by Census Block - Six Mile Buffer



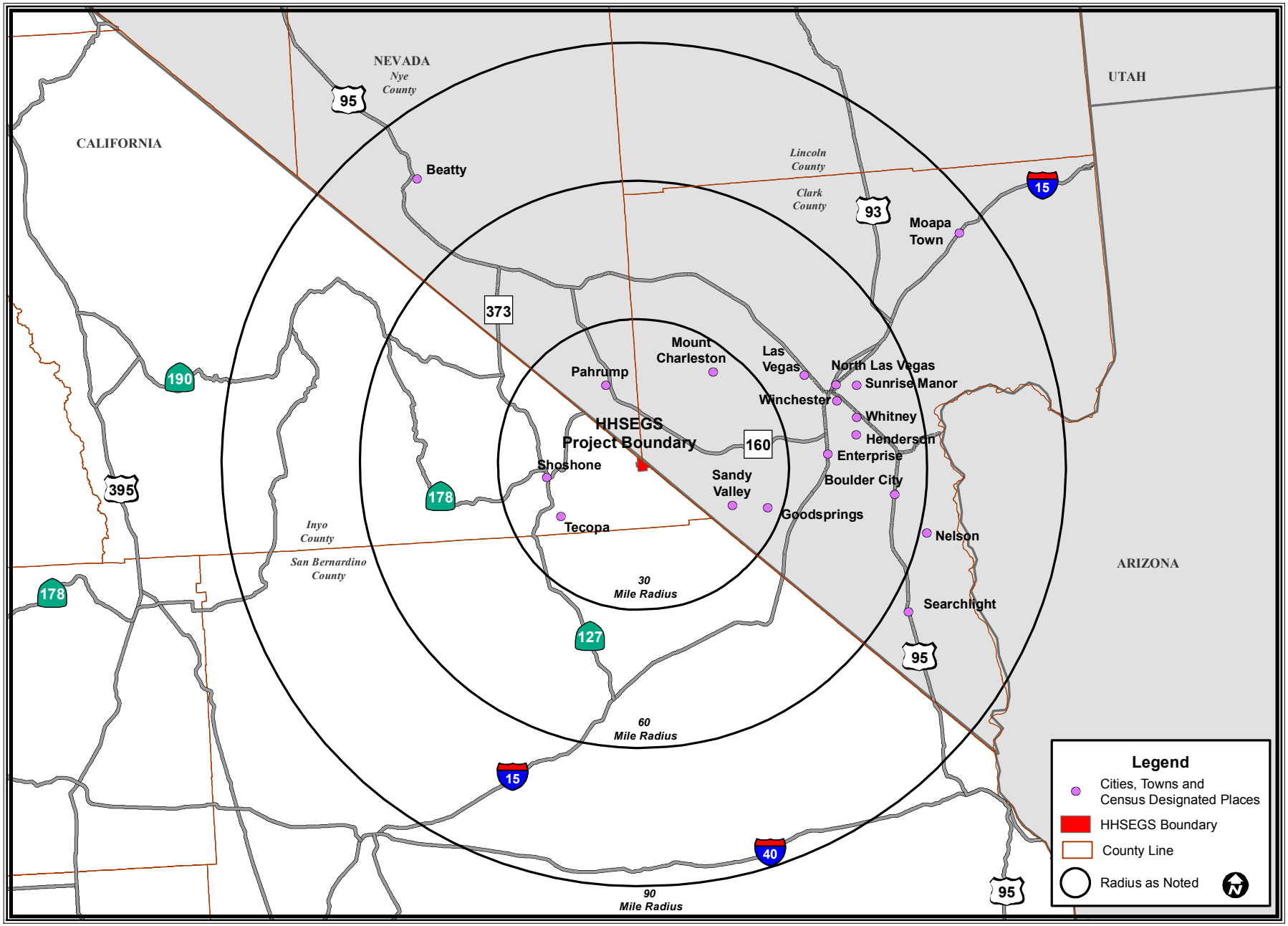
SOCIOECONOMICS

CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL- Census 2010 PL 94-171 Data

SOCIOECONOMICS - FIGURE 2

Hidden Hills Solar Electric Generating System (HHSEGS) - Cities, Towns and Census Designated Places within 2 hour Commute

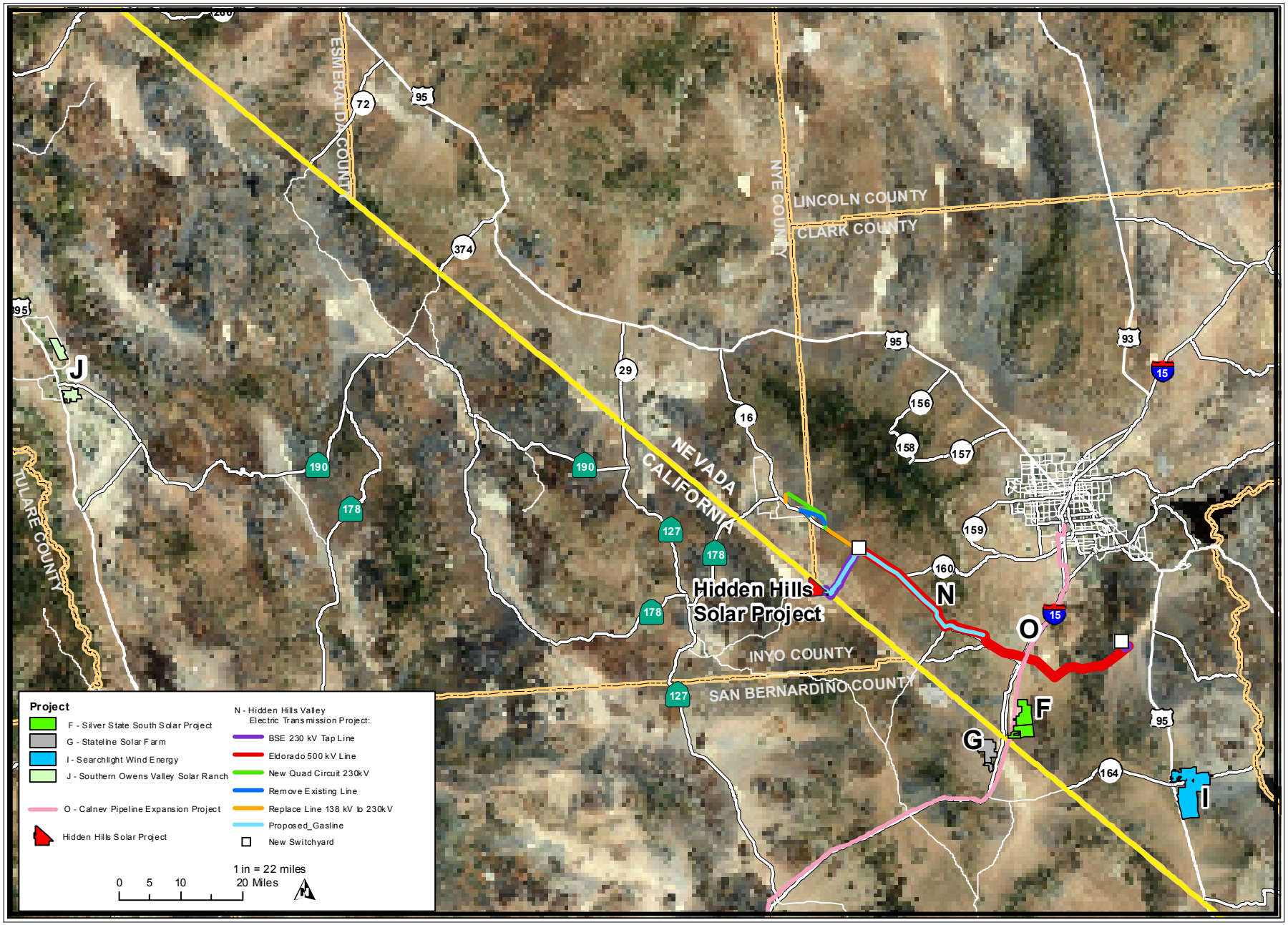


CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: ESRI

SOCIOECONOMICS - FIGURE 3

Hidden Hills Solar Electric Generating System (HHSEGS) - Cumulative Socioeconomic Projects



CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: BLM Southern Nevada District - Renewable Energy in Southern Nevada, BLM California - Renewable Energy Priority Projects, and Los Angeles Department of Water and Power.

SOILS & SURFACE WATER

Testimony of Marylou Taylor, P.E.

SUMMARY OF CONCLUSIONS

This assessment analyzes the potential impacts on soil and surface water resources by the proposed Hidden Hills Solar Electric Generating System (HHSEGS). Refer to the **WATER SUPPLY** section of this Final Staff Assessment for a detailed analysis of the potential impacts on groundwater supplies and groundwater quality.

California Energy Commission (Energy Commission) staff evaluated the potential impacts to: accelerated wind or water erosion and sedimentation; flood conditions in the vicinity of the project; surface water supplies; surface water quality; and compliance with all applicable laws, ordinances, regulations, standards (LORS) and state policies. Staff concludes that construction and operation of the proposed HHSEGS project would not result in any significant adverse impacts to soil and surface water resources, and would comply with applicable LORS and state policies, provided that the measures proposed in the Application for Certification (AFC) and staff's proposed conditions of certification are implemented.

The proposed HHSEGS project would not impede or significantly redirect flood flows of the designated 100-year floodplain. Compliance with staff proposed Conditions of Certification **SOILS-1** through **-9** would reduce or avoid impacts to less than significant of soil erosion, contact runoff, and discharge wastewater during construction and operations. Condition of Certification **SOILS-5** would reduce potential impacts from storm water damage. Condition of Certification **SOILS-6** would reduce potential offsite flooding impacts to Old Spanish Trail Highway/Tecopa Road.

Staff has not identified any significant impacts that would occur in Nevada regarding water quality and hydrology caused by the proposed HHSEGS project. The water quality and hydrology impacts from the linear facilities (transmission line and natural gas line portions) within the state of Nevada would be assessed by the Bureau of Land Management.

INTRODUCTION

This section of the Final Staff Assessment (**FSA**) analyzes the potential effects on soil and surface water resources by the proposed HHSEGS. This assessment specifically analyzes surface hydrology, surface water quality, and soil erosion by focusing on the potential for HHSEGS to:

- cause accelerated wind or water erosion and sedimentation;
- exacerbate flood conditions in the vicinity of the project;
- adversely affect surface water supplies;
- degrade surface water quality; and,

- comply with all applicable laws, ordinances, regulations and standards (LORS) and state policies.

Refer to the **WATER SUPPLY** section of this **FSA** for a detailed analysis of the potential effects on groundwater supplies and groundwater quality.

Where the potential for impacts is identified, staff proposes mitigation measures to reduce the significance of the impact and, as appropriate, recommends conditions of certification to ensure that any impacts are less than significant and the project complies with all applicable LORS.

LAWS, ORDINANCES, REGULATION, AND STANDARDS

Soils & Surface Water Table 1
Laws, Ordinances, Regulations, and Standards (LORS) and Policies

Federal LORS	
Clean Water Act (33 U.S.C. Section 1257 et seq.)	The Clean Water Act (CWA) (33 USC § 1257 et seq.) requires states to set standards to protect water quality, which includes regulation of storm water and wastewater discharges during construction and operation of a facility. California established its regulations to comply with the CWA under the Porter-Cologne Water Quality Control Act.
State LORS	
The Porter-Cologne Water Quality Control Act of 1967, California Water Code Section 13000 et seq.	Requires the State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (RWQCBs) to adopt water quality criteria to protect state waters. Those regulations require that the RWQCBs issue waste discharge requirements (WDRs) specifying conditions for protection of water quality as applicable. Section 13000 also requires the state to be prepared to exercise its full power and jurisdiction to protect the quality of the waters of the state from degradation. Although Water Code 13000 et seq. is applicable in its entirety, the following specific sections are included as examples of applicable sections.
California Water Code Section 13240, 13241, 13242, 13243, & Water Quality Control Plan for the Lahontan Region (Basin Plan)	The Basin Plan establishes water quality objectives that protect the beneficial uses of surface water and groundwater in the region. The Basin Plan describes implementation measures and other controls designed to ensure compliance with statewide plans and policies and provides comprehensive water quality planning.
California Water Code Section 13260	This section requires filing, with the appropriate RWQCB, a report of waste discharge that could affect the water quality of the state unless the requirement is waived pursuant to Water Code section 13269.
California Code of Regulations, Title 20, Division 2, Chapter 3, Article 1	The regulations under Quarterly Fuel and Energy Reports (QFER) require power plant owners to periodically submit specific data to the California Energy Commission, including water supply and water discharge information.
SWRCB Order 2009-0009-DWQ	The SWRCB regulates storm water discharges associated with construction affecting areas greater than or equal to 1 acre to protect state waters. Under Order 2009-0009-DWQ, the SWRCB has issued a National Pollutant Discharge Elimination System (NPDES) General Permit for storm water discharges associated with construction activity. Projects can qualify under this permit if specific criteria are met and an acceptable Storm Water Pollution Prevention Plan (SWPPP) is prepared and implemented after notifying the SWRCB with a Notice of Intent.

SWRCB Order 2003-0003-DWQ	The SWRCB regulates storm water discharges to land that has a low threat to water quality. Categories of low threat discharges include piping hydrostatic test water.
SWRCB Order 97-03-DWQ	The SWRCB regulates storm water discharges associated with several types of facilities, including steam electric generating facilities. Under Order 97-03-DWQ, the SWRCB has issued a NPDES General Permit for storm water discharges associated with industrial activity. Projects can qualify under this permit if specific criteria are met and an acceptable SWPPP is prepared and implemented after notifying the SWRCB with a Notice of Intent.
Local LORS	
Inyo County General Plan	The General Plan includes water resources related goals and implementation measures to protect water resources from overutilization, degradation, and export.
Inyo County Code Title 21, Ordinance No. 1158 (Renewable Energy Ordinance)	Requires developers of solar thermal, photovoltaic, or wind energy power plants to obtain a renewable energy permit before the project moves forward. Facilities exempt from a renewable energy permit are required to obtain a "renewable energy impact determination" from the county to ensure that mitigation measures are addressed and, to the extent possible, incorporated into any approval of the facility granted by the applicable state or federal agency.
State Policies and Guidance	
SWRCB Res. 68-16	The "Antidegradation Policy" mandates that: 1) existing high quality waters of the state are maintained until it is demonstrated that any change in quality will be consistent with maximum benefit to the people of the state, will not unreasonably affect present and anticipated beneficial uses, and will not result in waste quality less than adopted policies; and 2) requires that any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters, must meet WDRs which will result in the best practicable treatment or control of the discharge necessary to assure that: a) a pollution or nuisance will not occur and b) the highest water quality consistent with maximum benefit to the people of the state will be maintained.
SWRCB Res. 2008-0030	This SWRCB resolution requires sustainable water resources management, such as low impact development (LID) and climate change considerations, in all future policies, guidelines, and regulatory actions. It directs Regional Water Boards to "aggressively promote measures such as recycled water, conservation and LID Best Management Practices where appropriate and work with Dischargers to ensure proposed compliance documents include appropriate, sustainable water management strategies."

SETTING

REGIONAL SETTING – PAHRUMP VALLEY

The HHSEGS project would be located in the Pahrump Valley in the eastern Mojave Desert. Pahrump Valley, contained in both California and Nevada at an elevation of roughly 2,700 feet above mean sea level, is bordered by mountain ranges and adjoining valleys (see **Soils & Surface Water Figure 1**). The Nopah Range and Kingston Range border Pahrump Valley to the west and southwest, respectively. The Spring Mountains, which border Pahrump valley to the east in Nevada, reach 11,910 feet above mean sea level. Stewart Valley and Mesquite Valley border Pahrump Valley to the northwest and southeast, respectively.

The Pahrump Valley region is mostly very gently to moderately sloping alluvial fans, nearly level basin floor, and dry lakebeds with large playas. Major surface water features within the Pahrump Valley include Stewart (dry) Lake (approximately six square miles) located in California in the northwest portion of the valley, Pahrump (dry) Lake (approximately ten square miles) located in the central part of the valley in Nevada, and ephemeral washes located throughout the valley. The surrounding watershed has two main watercourses, Stump Springs and Lovell Wash. Both watercourses originate in Nevada and converge south of the site where they flow into Pahrump Valley. Average annual precipitation ranges from about four to six inches, and surface runoff within the Pahrump Valley drains towards Stewart (dry) Lake in California or towards Pahrump (dry) Lake in Nevada (DWR 2004).

Numerous small desert washes (ephemeral drainages) from the Spring Mountains cross the state border from Nevada and into California in the project area. The slope gradient diminishes from east to west. Surface waters that enter the proposed project site occur only during heavy rains and storm water runoff eventually drains into Stewart (dry) Lake located northwest of the proposed project.

The primary responsibility for the protection of water quality in California rests with the State Water Resources Control Board (SWRCB) and nine Regional Water Quality Control Boards. The portion of Pahrump Valley located within California falls under the jurisdiction of Lahontan Regional Water Quality Control Board (Lahontan RWQCB). Residents, visitors and nature rely on the region's water resources to provide beneficial uses, defined as "uses of water necessary for the survival or well being of people, plants and wildlife." The Water Quality Control Plan for the Lahontan Region (Basin Plan) designates beneficial uses for water bodies within the region, and establishes water quality objectives and implementation plans to protect those beneficial uses.

The Pahrump Valley watershed is contained in both California and Nevada. Lahontan RWQCB identifies the portion of Pahrump Valley watershed located within California as the Pahrump Hydrologic Unit, which does not contain any perennial surface water bodies. The Basin Plan does, however, recognize "all minor surface waters" in the Pahrump Hydrologic Unit as resources. The beneficial use designations for minor surface waters, both existing and potential, are listed in **Soils & Surface Water Table 2**. The Basin Plan does not identify receiving water for the Pahrump Hydrologic Unit.

Soils & Surface Water Table 2
Lahontan RWQCB Basin Plan Beneficial Use Designation for Minor Surface Waters in the Pahrump Valley

Existing or Potential Beneficial Uses	Description
Rare, Threatened, or Endangered Species	Supports habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened, or endangered
Wildlife Habitat	Supports terrestrial ecosystems or wildlife water and food sources
Warm Freshwater Habitat	Supports warm water ecosystems
Commercial and Sportfishing	For fish or other organisms including, but not limited to, those intended for human consumption
Water Contact Recreation[1]	Activities involving body contact with water where ingestion of water is reasonably possible (i.e. swimming, wading, fishing)
Non-contact Water Recreation[1]	Activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible (i.e. picnicking, hiking, camping, boating)
Ground Water Recharge	Natural or artificial recharge for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion
Agricultural Supply	Farming, horticulture, or ranching
Municipal and Domestic Supply[1]	Used for community, military, or individual water supply systems including, but not limited to, drinking water supply

(Source: RWQCB 2005)
Note 1: The Basin Plan designates this beneficial use for all surface waters of the Lahontan Region, including all surface waters located in the Pahrump hydrologic unit.

LOCAL SETTING – CHARLESTON VIEW AREA

Soil Features

The project site is located on private land, which has already been partially disturbed as part of a previously approved residential development. Although the residential development was never completed, unpaved roads were installed in a grid pattern, which remains to the present date. The remainder of the site is mostly bare soil with sparse natural vegetation, similar to the surrounding area (HHSG 2011a § 5.11.3). The rural residential subdivision community known as Charleston View, established in the 1960s with a current population of about 70 people, is located just south of the project site (J&S 2001).

The project site is situated on the downstream edge or margin of alluvial fans that emanate from the Spring Mountains, as shown on **Soils & Surface Water Figure 2**. Alluvial fans form at the base of topographic features where there is a marked break in slope. Water-transported material (alluvium) carried by a mountain stream enters a broad flat valley and deposits sediment as its velocity decreases on entering the flatter valley. This creates fan-shaped deposits. Consequently, alluvial fans tend to be coarse-grained, especially at their mouths. At their edges, however, they can be relatively fine-grained.

Detailed Natural Resources Conservation Service (NRCS) soil survey data is not available for the project site; therefore the applicant used U.S. General Soil Map information to estimate soils properties. The U.S. General Soil Map consists of general soil association units, created by generalizing more detailed soil survey maps. In situations such as the HHSEGS proposed site where more detailed soil survey maps are not available, data on geology, topography, vegetation, and climate were assembled, together with satellite images. Soils of like areas are studied, and the probable classification and extent of the soils were determined. The U.S. General Soil Map shows the entire HHSEGS site within a much larger area labeled with Soil Unit S5740, which is a particular grouping of several separate soil types that would likely be found together in a landscape. Subcomponents of Soil Unit S5740 are presented in **Soils & Surface Water Table 3**. Descriptions of the four Hydrologic Soil Groups, which classifies a soil's infiltration characteristics, are listed in **Soils & Surface Water Table 4**.

Soils & Surface Water Table 3
U.S. General Soil Map: Soil Unit S5740 Sub-Components

Sub-Components	Composition percent	Hydrologic Group	Texture
Beshem	25	C	Clay / Clay loam
Nopah	15	C	Loam
Glencarb	10	C	Silt loam
Haymont	10	B	Very fine sandy loam
Rumpah	10	D	Clay
Tencee	10	D	Gravelly loam
Bluepoint	5	A	Loamy fine sand
Pahrump	5	C	Fine sandy loam
Tanazza	5	B	Fine sandy loam
Wodavar	5	D	Fine sandy loam

(Source: HHSG 2011b, Attach 5.15ER)

Note: This percent composition generally applies to the entire generalized soil association, which is extremely large. The HHSEGS site may contain only a few of these series.

Soils & Surface Water Table 4
Hydrologic Soil Groups

Hydrologic Soil Group	Description
A	Low runoff potential. Soils having high infiltration rates (greater than 0.30 inches per hour) even when thoroughly wetted and consisting chiefly of deep, well-drained sands or gravels.
B	Soils having moderate infiltration rates (0.15 – 0.30 inches per hour) when thoroughly wetted and consisting chiefly of moderately deep to deep, moderately well- to well-drained sandy loam soils with moderately fine to moderately coarse textures.

Hydrologic Soil Group	Description
C	Soils having slow infiltration rates (0.05 – 0.15 inches per hour) when thoroughly wetted and consisting chiefly of silty-loam soils with a layer that impedes downward movement of water, or soils with moderately fine to fine texture.
D	High runoff potential. Soils having very slow infiltration rates (0 – 0.05 inches per hour) when thoroughly wetted and consisting chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material.

The applicant also completed onsite investigations to collect data on soil characteristics specific to the site. A Preliminary Geotechnical Evaluation was prepared following subsurface exploration performed in January 2011. Results from laboratory testing showed that the shallow surface deposits consist of a porous, sandy surface layer overlying a hardpan layer (HHSG 2011a, App 5.4A). An infiltration and drain time analysis was prepared following infiltration rate testing during July 2012 at onsite locations near the western border[1]. The composite infiltration rate was calculated at about 0.8 inches per hour (CH2 2012ii), which corresponds to Hydrologic Soil Group A. Although this value is based on soils located near the western project site border, it suggests that infiltration rates for the entire site could be higher than the infiltration characteristics suggested in **Soils & Surface Water Table 3**.

Surface Water Features

Numerous small desert washes (ephemeral drainages) from the Spring Mountains cross the state border from Nevada and into California in the project area. The slope gradient diminishes from east to west. Surface waters that enter the proposed project site occur only during heavy rains and dissipate quickly into the well-drained, sandy surface soils.

Features of the drainages include single, large channels with well-defined bed and banks, as well as broad, but sometimes weakly expressed, assemblages of shallow braided ephemeral channels. Many of the washes interconnect with other nearby washes either by natural forces or by following the grid of existing dirt roadways on the project area which interfere with the natural hydrology. Water runoff generally drains toward the west via sheet flow and these natural drainage channels, draining to the northwest and eventually into Stewart (dry) Lake located northwest of the project (HHSG 2011a, App 5.15C).

A total of 80 ephemeral washes were mapped in the project area by the applicant and identified as potential “Waters of the State” (CH2 2012k). The Lahontan RWQCB and California Department of Fish and Game (CDFG) are currently reviewing the project to determine whether any of the onsite washes are “Waters of the State”. The Lahontan

[1] The purpose of the analysis was to develop representative infiltration rates for soils in the planned storm water retention area located at the western border of the site. For further information about the proposed retention area, see “Onsite Area Flooding” discussion below under “Direct Impacts”.

RWQCB will verify the extent of jurisdictional Waters of the State on the site, and CDFG and the Energy Commission will verify which of these features will be subject to streambed alteration requirements under Section 1600 of the Fish and Game Code. Two of the ephemeral washes were determined to be "Waters of the U.S." by the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act (CH2 2012k), as shown on **Soils & Surface Water Figure 2**. For further discussion on the jurisdictional determination, please refer to the **BIOLOGICAL RESOURCES** section of this **FSA**.

Area Flooding

The Federal Emergency Management Agency (FEMA) prepares 100-year flood maps for flood insurance purposes and for floodplain management use by local agencies to reduce the impact of flooding. FEMA map panels 06027C-4625D and 06027C-4175D cover the entire project site and show that the project site crosses into the Zone A[2] boundary in two areas: one located at the north tip of the site and the other located at the southwest corner of the site (see **Soils & Surface Water Figure 3**). Because FEMA does not indicate a value for expected flood depth for this floodplain boundary, the relative risk of flood damage (i.e. one foot of water versus three feet of water) is less predictable than floodplains where base flood elevation is determined.

The applicant completed a more detailed analysis of the project site and surrounding area. A Preconstruction Hydrology Analysis was submitted with the AFC that modeled offsite peak flows, runoff volumes, maximum velocities and maximum depths of potential floods (HHSG 2011a, App 5.15C). As shown on **Soils & Surface Water Figure 3**, the FEMA Zone A boundary (depicted by a heavy black outline) similarly matches areas where flooding of up to three feet deep were modeled (depicted by purple-colored cells). The exception occurs southeast of the project, where depths up to three feet appear just outside the Zone A boundary. This is runoff that originates as far away as the Spring Mountains in Nevada and flows through the Stump Springs area before dissipating at the valley floor (depicted by the fan shape). A portion of this flow is shown to enter the project site at its southeast corner, as well as a section of the southern boundary.

The fact that Old Spanish Trail Highway (also called Tecopa Road) borders the project site's southern boundary implies that the roadway also experiences flooding caused by large storm events. Posted signs along the roadway caution motorists of potential flooding, and residents of Charleston View have indicated during workshops and PSA comments that flooding of the roadway occurs[3]. The extent, depths, or locations of the flooding is not well documented because Inyo County does not keep specific storm related data (CEC 2012ii). Inyo County's Road Department records the days a flood event occurred and whether road repairs were made to fix flood damage, but logs do not indicate what portion of Tecopa Road was impacted by the noted event.

[2] Zone A is defined by FEMA as special flood hazard area subject to inundation by the 1% annual chance flood also known as the 100-year flood (the flood that has a 1% chance of being equaled or exceeded in any given year). Because detailed analyses are not performed for Zone A, no depths or base flood elevations are shown within these zones. See www.fema.gov.

[3] Including but not limited to, PSA Workshop 1 (June 14, 2012 in Pahrump, Nevada) and Supplemental Comments & Analysis submitted by intervenor C.R. MacDonald (MAC 2012c).

Topographic maps show that the low point of Tecopa Road is located roughly 4,000 feet west of the HHSEGS site, which also falls within the published FEMA Zone A boundary.

The applicant's preconstruction hydrology study shows that the portion of Tecopa Road located directly adjacent to the project site is expected to flood from flows traveling northwest from the Stump Springs area and across the roadway. Floods of approximately one foot deep in spot locations are expected from rainfall equal to or larger than a 5-year, 24-hour storm, but no flooding is expected from a 2-year, 24-hour storm[4]. It is important to note that these rainfall recurrence intervals apply to rainfall that occurs in contributing sub-basins located upstream (primarily through the Stump Springs area), which eventually combine at Tecopa Road to cause flooding before they reach the southern and eastern site boundary. See **Soils & Surface Water Figure 4** for locations of the contributing sub-basins. Based on topographic maps, no storm water runoff from the proposed site location currently flows onto Tecopa Road.

Existing Project Site Flooding

The applicant's Preconstruction Hydrology Analysis (HHSG 2011a, App 5.15C) also modeled onsite peak flows, runoff volumes, maximum velocities, and maximum depths of potential floods. Results of the onsite flow modeling verify that storm water flows across the proposed site from the east toward the west. Estimated flows due to a 100-year storm show that the majority of runoff originating offsite would enter the site through the southern solar plant before leaving the site at its western boundary. **Soils & Surface Water Table 5** presents the estimated peak flows leaving the site calculated from cross-sections located along the west border (as shown in **Soils & Surface Water Figure 5**). Because cross sections are different widths, the table calculates the average flow per foot across each cross section.

Soils & Surface Water Table 5
Estimated Preconstruction Peak Discharge along Western Boundary

Floodplain Cross Section		Rain Event					
		100-year storm		25-year storm		10-year storm	
No.	Approx. Width	Peak Flow	Flow per foot	Peak Flow	Flow per foot	Peak Flow	Flow per foot
CS-4	2500 ft	778 cfs	0.31	516 cfs	0.21	314 cfs	0.13
CS-5	4700 ft	252 cfs	0.05	111 cfs	0.02	52 cfs	0.01
CS-6	4200 ft	5590 cfs	1.33	2578 cfs	0.61	1227 cfs	0.29
CS-7	3900 ft	5241 cfs	1.34	1977 cfs	0.51	941 cfs	0.24
Flows through the Stump Springs area (estimated, for comparison only):							
	900 ft	15900 cfs	17.67	7400 cfs	8.22	3800 cfs	4.22

(Source: HHSG 2011a, App 5.15C)
Notes: Refer to **Soils & Surface Water Figure 5** for locations of Floodplain Cross Sections.
cfs – cubic feet per second
Flow per foot units are cfs per foot.

[4] The "recurrence interval" is based on the probability that the given event will be equaled or exceeded in any given year. A 5-year storm has a 20 percent chance of occurring in any given year, and a 2-year storm has a 50 percent chance of occurring in any given year. Rainfall recurrence intervals are based on both the magnitude and the duration of a rainfall event. For example, a 5-year, 24-hour storm is the amount of rainfall with a 20 percent chance of occurring in a certain area in a 24-hour period during any given year. Generally speaking, a larger recurrence interval would result in a larger storm.

When comparing flows at different cross sections for the same rain event, rates across the bottom half of the site are much higher than the top half. Comparing cross sections for different rain events, the north end of the site experiences peak flows during the large 100-year storm at about the same rate (0.3 cfs per foot) as the southern portion of the site during a much smaller 10-year storm. Staff included rough flow estimates occurring through the Stump Springs area during each storm even to give perspective of scale. Estimates show the flow from the Stump Springs drainage area is about 3 times greater than any of the events for each of the flow segments on the site.

Groundwater Resources

For a detailed discussion of the regional and local groundwater resources, refer to the **WATER SUPPLY** section of this **FSA**.

PROJECT DESCRIPTION

Hidden Hills Solar I, LLC, and Hidden Hills Solar II, LLC (the applicant) proposes to construct the Hidden Hills Solar Electric Generating System (HHSEGS), located on approximately 3,097 acres in Inyo County, California, adjacent to the Nevada border. HHSEGS would comprise two solar fields with heliostat arrays and associated facilities: the northern solar plant (Solar Plant 1) and the southern solar plant (Solar Plant 2). Each solar plant would generate 270 megawatts (MW) gross (250 MW net), for a total net output of 500 MW.

Major items at each solar plant would include a steam turbine system, an air-cooled steam condenser system, and a 750-foot-tall solar power tower topped with a solar receiver steam generator (SRSG). A 103-acre common area located at the southeastern corner of the HHSEGS site would include an administration, warehouse, and maintenance complex; an onsite 138 kV substation; a natural gas metering station; and a parking area for visitors and employees. Temporary construction laydown and parking areas would be located in three locations, one on the west side of the site occupying approximately 180 acres and one within each solar field near the respective Solar Plant occupying approximately 8.5 acres each (HHSG 2011a, App 5.15A). The 180-acre temporary construction laydown area in addition to the entire HHSEGS site would total 3,277 acres. The perimeter of the site would be surrounded by desert tortoise fencing backed by a chain link security fence, There would also be landscaping such as trees and shrubs oriented parallel to and adjacent to the fencing.

Refer to the **PROJECT DESCRIPTION** section of this **FSA** for more information on HHSEGS major features including water use, wastewater discharge, and storm water handling. Additional information relevant to the soil and water resources analysis is summarized below. For a complete detailed description of the proposed project, refer to the HHSEGS Application for Certification ([AFC] HHSG 2011a) and the applicant's related supplemental material.

PROJECT CONSTRUCTION

Construction of HHSEGS is expected to take place from the second quarter of 2013 to the fourth quarter of 2015, for a total of 29 months.

Soil Erosion and Storm Water Control

During construction, portions of the project site would be graded, including portions along the ephemeral washes. Grading is not intended to level the site, but rather to prepare the site for installation of the heliostats and ease future maintenance activities. As such, the existing depressions for the drainages would remain, and natural drainage waters are expected to continue to flow in and through these ephemeral washes. Any grading required would be designed to promote sheet flow where possible (HHSG 2011a, App 5.15C).

Power Plant Sites

Major items at each solar plant would include a steam turbine system, an air-cooled steam condenser system, and a 750-foot-tall solar power tower topped with a SRSG. Other associated items include various raw water/wastewater treatment facilities with water storage tanks, auxiliary boilers, mirror washing related equipment, and a plant services building with parking. Heavy to medium grading would be performed within each plant's solar power tower and power block areas. The earthwork within the power blocks would be excavated and compacted to the recommendations of the final geotechnical report. The deepest excavations would occur for foundations and sumps (HHSG 2011a §§ 2.4.1.1, 5.11.4.6.2).

Prior to construction, the applicant would prepare a Storm Water Pollution Prevention Plan (SWPPP) to control storm water and soil erosion during the facility's construction using best management practices (BMPs)[5]. To redirect storm water flow around these facilities, diversion berms or drainage swales would be used. Stone filters and check dams would be placed strategically, as needed, throughout the project site to provide areas for sediment deposition and to promote the sheet flow of storm water prior to leaving the project site boundary. Native materials (rock and gravel) would be used where available for the construction of the stone filter and check dams. Stone filters and check dams are not intended to alter drainage patterns but to minimize soil erosion and promote sheet flow. To reduce erosion, storm drainage channels may be lined with a nonerodible material such as compacted riprap, geosynthetic matting, or engineered vegetation. The design would be developed for sheet flow for all storm events less than or equal to a 100-year, 24-hour storm event (HHSG 2011a, App 5.15A).

Permanent diversion channels would be built during the early stages of power plant construction to provide storm water management of the power block area during construction activities. Diversion channels placed around both Solar Plant 1 and Solar Plant 2 power blocks would comprise engineered earthen berms and adjacent swales with rock slope protection. These channels would be designed with a minimum ground surface slope of 0.5 percent to allow positive, puddle-free drainage (HHSG 2011a, App 5.15A).

[5] Storm water and soil erosion BMPs are methods that have been determined to be the most effective, practical means of preventing or reducing pollution from nonpoint sources. BMPs can be classified as "structural" (i.e., devices installed or constructed on a site) or "non-structural" (procedures, such as modified landscaping practices). There are a variety of BMPs available, depending on pollutant removal capabilities. (See California Stormwater BMP Handbook at www.casqa.org.)

Solar Fields – Heliostats

Each solar field would consist of approximately 85,000 heliostats - elevated mirrors with a total reflecting surface of 204.7 square feet. Each heliostat assembly would be mounted on a single support pylon and guided by a computer-programmed aiming control system to track the movement of the sun (HHSG 2011a § 2.2.1.2).

The siting of pylons will be guided by global positioning system (GPS) technology. Installation of the heliostat assemblies would use vibratory technology to insert the pylons into the ground and a rough terrain crane able to mount heliostat assemblies on several pylons before moving to the next location. Vegetation clearing, grubbing[6], and contour smoothing in the heliostat fields would occur where necessary to allow for equipment access and storm water management. In areas where these activities are not required for access or construction, the vegetation would not be removed but would be mowed (if needed) to a height of approximately 12 to 18 inches (HHSG 2011a, App 5.15C).

Solar field development would maintain unobstructed sheet flow, with storm water mostly traveling in existing natural contours and flowpaths. Relatively small rock filters and local diversion berms through the heliostat fields may be installed as required to discourage water from concentrating and to maintain sheet flow. Mowing vegetation, rather than removal, would allow for clearance for heliostat function while leaving soil surface and root structures intact (HHSG 2011a, App 5.15C).

Solar Fields – Roads

The HHSEGS project would contain three types of roads (HHSG 2011b, Attach 5.15ER, CH2 2012u) as shown on **Soils & Surface Water Figure 6**:

- 20-ft wide internal perimeter asphaltic paved access roads – located between the power plants and along portions of the site boundary
- 12 to 20-ft wide dirt (aggregate base) access roads located along portions of the site boundary, as well as internally to the power plants
- 10-ft wide dirt heliostat maintenance paths[7] located concentrically around the power plants, placed approximately 152 feet apart

Most of the natural drainage features would be maintained and any grading required would be designed to promote sheet flow where possible. At some washes, limited grading may be required. Paved access roads would be protected from floods with ditches, culverts, and local fords with reinforced concrete shoulders (HHSG 2011a, App 5.15A).

[6] Grubbing of vegetation includes the removal of any remaining roots or stumps after cutting vegetation to clear land.

[7] Multiple sections in the AFC describe these as “20-foot wide drive zones”. For purposes of this section’s analysis, staff assumes that the concentric maintenance paths/drive zones would be ten feet wide because the applicant’s post-construction calculations used this value. This analysis does not assess the proposed project using 20 foot wide concentric roads.

At the site's western boundary, the middle two-thirds of the western perimeter road would be elevated to prevent runoff flow from exiting the project site along existing natural contours and flowpaths (see **Soils & Surface Water Figure 8**). The berm created by the elevated roadway would result in an onsite retention area, designed to decrease post-construction peak flows by retaining runoff and allowing water to infiltrate and evaporate (HHSG 2011b, Attach 5.15ER). The applicant estimates that the maximum flooded area would be approximately 125 acres with a maximum depth of 3.8 feet at its deepest point (see **Soils & Surface Water Figure 9**). The retention area would be designed to drain within 24 hours using three drainage culverts, allowing water to flow under the roadway and into the adjacent area west of the project site. Runoff from large storms would fill the retention area then overtop the roadway, which would function as a broad-crested weir (CH2 2012ll, CH2 2012ii). Because construction of this road would occur early in the construction phase, it would provide storm water management of HHSEGS during construction activities.

Common Area

The common area located at the southeastern corner of the HHSEGS site would include an administration, warehouse, and maintenance complex; an onsite substation; and a parking area for visitors and employees. Construction of these common area facilities would require heavy to medium grading and would occur concurrently with the construction of Solar Plant 1 (HHSG 2011a, App 5.15A).

Similar to the power plant sites, storm water management for the administration complex would include a permanent diversion channel comprising an engineered earthen berm and adjacent swale with rock slope protection. The surface areas within the common area that are used for construction activities would be stabilized and dust suppression maximized with a layer of crushed stone in areas subject to heavy daily traffic (HHSG 2011a, App 5.15A).

Laydown Areas

Temporary construction laydown and parking areas would occupy approximately 180 acres on the west side of the site and approximately 8.5 acres on the solar fields at each power plant site. Temporary construction facilities at the large area to the west include office trailers, parking areas, material laydown areas, a concrete batch plant, and a heliostat assembly facility. The surface areas within the temporary construction areas used frequently would be stabilized and dust suppression maximized with a layer of crushed stone in areas subject to heavy daily traffic (HHSG 2011a, App 5.15A).

To redirect storm water flow around these facilities, diversion berms or drainage swales would be used. Stone filters and check dams would be placed strategically, as needed, throughout the project site to provide areas for sediment deposition and to promote the sheet flow of storm water prior to leaving the project site boundary. These areas would be restored to natural existing conditions[8] once all heliostats are installed onsite and the project is complete (HHSG 2011b, Attach 5.15ER).

[8] See "Restoration of Temporary Disturbance" in the Project Description section of the **FSA**.

Linear Facilities

Onsite

Onsite linear facilities would include underground natural gas pipelines (to supply the auxiliary boiler and nighttime preservation boiler) and underground gen-tie lines (electrical lines to connect generation facilities with the switchyard). These linear facilities as shown in **Soils & Surface Water Figure 7** are located along onsite 20-ft wide access roads (CH2 2012hh).

Offsite

The offsite transmission and natural gas pipeline alignments would be located in Nevada, primarily on federal land managed by the U.S. Bureau of Land Management (BLM), except for small segments of the transmission line in the vicinity of the Eldorado Substation, which is located within the city limits of Boulder City, Nevada.

This proposed "Hidden Hills Transmission Project" would be constructed and operated by Valley Electrical Association, a nonprofit electric utility based in Pahrump, Nevada that services more than 6,800 square miles of land located mainly along the California-Nevada border, but most of it in Nevada. The proposed Hidden Hills Transmission Project would consist of improvements on BLM land (CH2 2012ee) including:

- Approximately 10 miles of new generation tie-line from the HHSEGS project site to the proposed Crazy Eyes Tap Substation located immediately east of the Tecopa Road/SR 160 intersection. The Crazy Eyes Tap Substation would interconnect to the existing VEA Pahrump-Bob Tap 230-kV line.
- Construction and operation of new and existing access roads along each of the proposed transmission alignments

To supply natural gas to the proposed site, Kern River Gas Transmission Company (KRGT) proposes to construct a 12-inch pipeline from the HHSEGS meter station and extending 32.4 miles to KRGT's existing mainline system just north of Goodsprings in Clark County, Nevada (CH2 2012ee).

Although the Hidden Hills Transmission Project and the KRGT natural gas pipeline are located entirely in Nevada (and therefore outside Energy Commission jurisdiction), these proposed projects are considered in this **FSA** as connected actions to the proposed HHSEGS project. Because the proposed linear facilities would be on BLM land, they are considered federal actions requiring review and compliance with the National Environmental Policy Act of 1969 (NEPA). A detailed environmental impact analysis will be prepared by BLM (BLM 2011). A separate construction storm water management program would be prepared for project features located in the State of Nevada and are not addressed in the AFC.

Total Soil Disturbance

Construction of the HHSEGS would affect the areas listed in **Soils & Surface Water Table 6**. Soil disturbance would occur as a result of grubbing, grading, and/or excavation activities. After construction, some of these areas would be covered with

impervious material (i.e. concrete foundations, asphalt pavement, heliostat assemblies) and temporary construction areas would be restored to natural existing conditions.

Soils & Surface Water Table 6
Estimated Soil Disturbance and Impermeable Area of HHSEGS

Element	Total Area	Area of Land Grading and Excavation (construction activities)	Impervious Area (post-construction)
Solar Field – Heliostats	2,994 acres	negligible[1]	806 acres[2]
Solar Field – Roads Paved Roads Dirt Roads		16 acres 189.2 acres	16 acres 0
Solar Plant 1		19 acres[3]	10.5 acres[4]
Solar Plant 2		19 acres[3]	10.5 acres[4]
Common Area	103 acres	14.8 acres	8 acres
Laydown Area	180 acres	180 acres[5]	0
TOTAL	3,277 acres	438 acres	851 acres
Linear Facilities[6] (Nevada)		unknown	unknown

(Source: HHSG 2011b, Attach 5.15ER)

Note 1: No grading required. All-terrain vehicles would install pylons and mount heliostat assembles.

Note 2: Accounts for surface area of all mirrors in horizontal position. Assuming 170,000 heliostats total, each with a 206.4 square feet reflecting surface.

Note 3: Erosion control plans show each solar plant includes a temporary parking area (2.5 acres) and construction laydown area (6 acres).

Note 4: This area includes gravel surfacing, which helps permeability.

Note 5: The Post Construction Hydrologic & Hydraulic Analysis assumes the entire 180 acres would be graded.

Note 6: Onsite linear facilities would be located along paved or fully graded roads. Soil disturbance area of these linear facilities is considered concurrent with these roads.

Water Use

Six onsite groundwater supply wells would be drilled and developed to provide raw water for the HHSEGS project; two new wells per power block (primary and backup) and two wells at the administration complex (HHSG 2011a § 2.2.4). One temporary well would be installed for use at the large construction laydown area on the west, primarily for the onsite concrete batch plant. The estimated annual water requirement during construction is 288 acre-feet per year (CH2 2012p). During construction, water would be used daily for dust suppression and vehicle washing. Other uses include soil compaction, hydrostatic testing, and concrete mixing.

Wastewater Management

During construction, anticipated sources of wastewater would include sanitary wastes, wash water, concrete washout water, paint wash water, piping and vessel hydrostatic test water, and passivating[9] and chemical cleaning fluid waste. Sanitary waste would be contained in portable facilities and routinely disposed of at an offsite treatment/disposal facility by a sanitary service. Excess concrete and concrete washout slurries would be discharged to a temporary washout facility (HHSG 2011a, App 5.15A). Hydrostatic test water and passivating fluid waste, approximately 400,000 gallons and 300,000 gallons total for both solar plants, respectively, would be discharged to the surrounding area or used for dust control if test results meet regulatory standards. Otherwise, the hydrostatic test water would be trucked offsite for disposal at an approved facility (HHSG 2011a, Table 5.14-2).

PROJECT OPERATION

HHSEGS would be designed for an operating life of 25 to 30 years. It is anticipated that the facilities would normally operate at high average annual capacity factors during periods of sunlight (HHSG 2011a § 2.3.2.1). Commercial operation is estimated to begin in Third Quarter 2015 for Solar Plant 1 and Fourth Quarter 2015 for Solar Plant 2.

Soil Erosion

The applicant submitted a Preliminary Draft Construction Storm Water Pollution Prevention Plan/Drainage, Erosion, and Sediment Control Plan ([SWPPP/DESCP] HHSG 2011a, App 5.15A) that lists standard best management practices (BMPs). Disturbed areas would be stabilized with effective soil cover (such as aggregate, paving, or vegetation) as soon as feasible, but no later than 14 days after construction or disturbance is complete in that portion of the site. To reduce erosion potential, BMPs would be implemented in accordance with the approved SWPPP/DESCP. Vegetation would remain but would be cut (when necessary) to a height that would allow clearance for heliostat function while leaving the root structures intact. Occasional cutting of the vegetation would be performed as needed to permit unobstructed heliostat mirror movement.

Access roads to the heliostat arrays for bi-weekly washing of the mirrors would also be used for the occasional cutting of vegetation to reduce the risk of fire due to plant regrowth. To minimize soil erosion from maintenance operations, including travel of mirror washing vehicles on unpaved roads, a dust control plan would be prepared that includes fugitive dust control measures during operations such as use of soil stabilization techniques and limits on vehicle speed (HHSG 2011a, App 5.15A).

Storm Water Control

As discussed above, permanent diversion channels would be constructed around Solar Plant 1, Solar Plant 2, and the administration complex. In addition, an onsite retention area would be created at the site's west perimeter road. These would be maintained during the operational life of HHSEGS. Periodic maintenance would be conducted as

[9] Passivating fluid is used to treat or coat a metal pipe in order to reduce the chemical reactivity of its surface.

required after major storm events and when the volume of accumulated material behind the check dams exceeds 50 percent of the diversion channel's designed volume (HHSG 2011a, App 5.15A).

Areas compacted during construction activities would be restored, as appropriate, to approximate preconstruction compaction levels to minimize the opportunity for any increase in surface runoff (see "Restoration of Temporary Disturbance" in the **Project Description** section of the **FSA**). A majority of solar field development would maintain unobstructed sheet flow along existing natural contours and flowpaths. Relatively small rock filters and local diversion berms through the heliostat fields may be installed as required to discourage water from concentrating. Stone filters and check dams are not intended to alter drainage patterns but to minimize soil erosion and promote sheet flow (HHSG 2011a, App 5.15A).

Grading and mowing during construction could directly result in a permanent loss of a large portion of the ephemeral drainages that are present due to their shallow depths; however, affected drainages would be expected to reform naturally in this landscape where flow patterns are highly variable, both temporally and spatially (HHSG 2011a, App 5.15A).

Each HHSEGS Solar Plant would keep the potentially polluted contact[10] storm water from the power blocks and equipment areas, general facility drainage, process wastewater, and sanitary waste completely separated from non-contact storm water runoff, as described in the Wastewater Management discussion below.

Water Use

Six onsite groundwater supply wells would be drilled and developed to provide raw water for the HHSEGS project; two new wells per power block (primary and backup) and two wells at the administration complex. The water would be used for steam cycle make-up water, wet surface air cooler used in the auxiliary cooling system, condensate polishing to reduce contaminates in the steam/water cycle, power plant equipment wash down, mirror wash water, and domestic uses. The combined 500-MW net capacity of the solar plants would require an average of approximately 90 gpm. To provide adequate operating flexibility, the applicant's estimated annual water requirement is 140 acre-feet per year based on HHSEGS operating at full load (HHSG 2011a § 2.2.4.1).

Wastewater Management

Each HHSEGS Solar Plant would keep the potentially polluted waste water (contact runoff, general facility drainage, process wastewater, and sanitary waste) completely separated from non-contact storm water runoff (HHSG 2011a § 2.2.6.1).

General Facility Drainage

Each HHSEGS Solar Plant would collect contact runoff from the power block to prevent this potentially contaminated water from comingling with non-contact storm water runoff.

[10] Contact runoff refers to storm water in contact with exposed polluted or hazardous materials and/or surfaces that can potentially result in contaminated runoff (containing trace oil, chemicals, metals, toxic substances, or other materials).

The contact runoff would be collected along with wastewater from the plant's raw water use (such as sample drains, containment area washdown, and facility equipment wash water, if cleaning chemicals are not used) through a system of floor drains, hub drains, sumps, and piping and routed to the oil/water separator. From there, the water would flow to the waste collection tank then to a thermal evaporator system with the process wastewater (HHSG 2011a §§ 2.2.6.1, 5.14.4.3.2).

Process Wastewater

The primary wastewater collection system would collect process wastewater from all of the solar plant equipment, including blowdown[11] from the SRSG, natural-gas-fired boiler, demineralization, auxiliary cooling system, and water treatment equipment. Additional sources of wastewater include oil/water separator effluent from power block storm water runoff and general facility drainage. To the extent practical, process wastewater would be recycled and reused. A thermal evaporator system would process the wastewater for recycling back into the service water tank, returning approximately 90 percent of the wastewater for reuse. The reject from the thermal evaporator (approximately 1,360 gallons per day combined for both solar plants) would be trucked offsite for disposal at an approved facility. No reject streams from water treatment are planned to be generated onsite under the proposed treatment scheme (HHSG 2011a §§ 2.2.6.1, 5.14.4.1.2).

Sanitary Waste

The project would require a septic system and leach field at each of the two power blocks and the administration complex. Each of the systems would be designed to treat up to 700 gallons per day of wastewater discharged from toilets, sinks, and showers. Septic tanks would be pumped out as needed by a qualified sanitary service provider (HHSG 2011a, Table 5.14-3).

CONTAMINATED SOIL AND WATER

A Phase I Environmental Site Assessment for the project area concluded that no recognized environmental conditions were associated with the project site. Although the potential of encountering contaminated soil would be low, staff would require that an experienced and qualified Professional Engineer or Professional Geologist be available for consultation during site characterization, soil grading or soil excavation to determine appropriate actions to be taken in the event contaminated soil is encountered. (Refer to the **WASTE MANAGEMENT** section of this **FSA** for additional information related to contaminated soil).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

This section provides an evaluation of the expected direct, indirect, and cumulative impacts to soil and surface water resources that could be caused by construction, operation, and maintenance of the HHSEGS. Staff's analysis consists of a description of the potentially "significant" impact, gathering data related to construction and operation

[11] Blowdown is the portion of water drained from a process to remove mineral build-up from concentrated recirculating water. These minerals would cause scaling on equipment surfaces and can damage the system.

of the project, then reaching a conclusion to determine whether or not the project presents a potentially "significant" impact. If staff determines there is a significant impact, then staff evaluates the applicants' proposed mitigation for sufficiency and staff may or may not recommend additional or entirely different mitigation measures that are potentially more effective than those proposed by the applicant. Mitigation is designed to reduce the effects of potentially significant HHSEGS impacts to a level that is less than significant. The determination of significance for potential impacts to soil and surface water resources is discussed below.

Soil Resources

Staff evaluated the potential impacts to soil resources including the effects of construction and operation activities that could result in erosion and downstream transportation of soils and the potential for contamination to soils and surface water. There are extensive regulatory programs in effect that are designed to prevent or minimize these types of impacts. These programs are effective, and absent unusual circumstances, an applicant's ability to identify and implement BMPs to prevent erosion or contamination is sufficient to ensure that these impacts would be less than significant.

The LORS and policies presented in **Soils & Surface Water Table 1** were used to determine the significance of HHSEGS impacts with respect to CEQA.

Water Quality

Staff evaluated the potential of HHSEGS to cause a significant depletion or degradation of surface water resources. (For a detailed analysis of the potential effects on groundwater supplies and groundwater quality, refer to the **WATER SUPPLY** section of this **FSA**).

To evaluate if significant CEQA impacts to water resources would occur, the following questions from CEQA Guidelines, Appendix G were addressed:

- Would the project violate any water quality standards or waste discharge requirements?
- Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?
- Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?
- Would the project create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff?
- Would the project otherwise substantially degrade water quality?

- Would the project place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?
- Would the project place within a 100-year flood hazard area structures which would impede or redirect flood flows?
- Would the project expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?
- Would the project be inundated by seiche or tsunami?
- Would the project result in substantial soil erosion or the loss of topsoil?
- Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?
- Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?

Although the CEQA Guidelines provide a checklist of suggested issues that should be addressed in an environmental document, neither the CEQA statute nor the CEQA guidelines prescribe thresholds of significance or particular methodologies for performing an impact analysis. This is left to lead agency judgment and discretion, based on factual data and guidance from regulatory agencies and other sources where available and applicable. Staff considered compliance with the LORS and policies presented in **Soils & Surface Water Table 1** and whether there would be a significant impact under the CEQA. Where a potentially significant impact was identified, staff or the applicant proposed mitigation to ensure the impacts would be less than significant.

DIRECT IMPACTS

A discussion of the direct and indirect HHSEGS construction and operations impacts and mitigation is presented below. For each potential impact evaluation, staff describes the potential effect, summarizes the applicant's position, and then analyzes impacts for determining significance. If mitigation is warranted, staff provides a summary of the applicant's proposed mitigation and a discussion of the adequacy of the proposed mitigation. In the absence of applicant-proposed mitigation or if mitigation proposed by the applicant is inadequate, staff mitigation measures are recommended.

Soil Erosion Due to Water and Wind

Erosion during Construction

Construction of the project is scheduled to last 29 months. Soil losses would be created by construction and grading activities that would expose and disturb the soil and leave soil particles vulnerable to detachment by wind and water. Soil erosion results in the loss of topsoil and increases in sediment loading to nearby water resources. In the absence of proper BMPs, earthwork could cause significant fugitive dust and erosion.

The magnitude, extent, and duration of those impacts would depend on several factors, including weather patterns in the vicinity of the HHSEGS site, the types of soil that could be affected, and the method, duration, and time of year of construction activities. Prolonged periods of precipitation, or high intensity and short duration runoff events coupled with earth disturbance activities could result in accelerated onsite erosion. In addition, high winds during grading and excavation activities could cause wind borne erosion leading to increased particulate emissions that adversely impact air quality. The implementation of appropriate erosion control measures would help conserve soil resources, maintain water quality, prevent accelerated soil loss, and protect air quality.

Power Plant Sites, Common Area, and Laydown Area

The potential for erosion by water during construction is expected to increase as a result of loss of vegetative cover, removal of surface crust, and increased local sediment transport through creation of localized gullies and rills on newly graded areas. The applicant submitted a Preliminary Draft Construction DESCP/SWPPP (HHSG 2011a, Appendix 5.15A) that lists standard BMPs applicable to HHSEGS construction activities along with Water Pollution Control Drawings that show locations of specific BMPs at each power block, the common area, and the large temporary construction laydown area. In addition, the DESCP identifies specific measures to reduce water-related erosion including:

- Temporary erosion control measures would be implemented on active and non-active disturbed areas prior to and at regular intervals throughout the defined rainy season, and year-round prior to storm events.
- Erosion in concentrated flow paths would be controlled by lining channels with a non-erodible material such as compacted riprap, geosynthetic matting, or engineered vegetation.
- Diversion berms (for example, earth dikes) or drainage swales would be used, as needed, to redirect storm water run-on or onsite storm water flow around critical facilities or away from disturbed soil areas and stockpiles.
- Disturbed areas would be stabilized with effective soil cover (such as aggregate, paving, or vegetation) as soon as feasible after construction or disturbance is complete and no later than 14 days after construction or disturbance in that portion of the site has temporarily or permanently ceased.
- Sediment controls would be implemented at the draining perimeter of disturbed soil areas, at the toe of slopes, and at outfall areas.
- Stone filters and check dams would be strategically placed, as needed, throughout the project site to provide areas for sediment deposition and to promote the sheet flow of storm water prior to leaving the project site boundary. Where available, native materials (rock and gravel) would be used for the construction of the stone filter and check dams. Stone filters and check dams are not intended to alter drainage patterns but to minimize soil erosion and promote sheet flow.

The Preliminary Draft DESCP also includes a Monitoring and Reporting Program/Construction Site Monitoring Program to ensure performance standards and to monitor the effectiveness of BMPs.

Solar Fields – Heliostats and Roads

The Preliminary Draft DESCP states that each area of the HHSEGS project would be designed to provide the minimum requirements for access of installation equipment and materials. Most of the natural drainage features would be maintained and any grading required would be designed to promote sheet flow where possible. Areas disturbed by grading and other ground disturbance would be protected from erosion by implementation of appropriate BMPs. Some of the measures listed include:

- Existing vegetation would be preserved when feasible. Vegetation would be cut to a height that will not interfere with construction and operation of the heliostat fields, instead of clearing or grading the entire field.
- Clearing and grading activities would be restricted to areas where foundations, drainage facilities, and all-weather roads must be placed.
- Areas compacted during construction activities would be restored, as appropriate, to approximate preconstruction compaction levels to minimize the opportunity for any increase in surface runoff.
- Effective sediment perimeter controls would be established and maintained at locations where runoff discharges offsite.

Wind Erosion

The Preliminary Draft DESCP also includes standard BMPs for Wind Erosion Control. The following practices were listed to minimize the loss of wind-blown soil from the site:

- Disturbed soil areas of the project site would be watered regularly to control dust and to maintain optimum moisture levels for compaction as needed, but to avoid runoff, the areas would not be watered excessively. Sediment controls may be used at the edges of these areas as necessary to minimize sediment discharge.
- Areas of high erosion may require application of an approved palliative to reduce dust and prevent excess moisture on the road which may attract tortoises.
- At each structure site, the disturbed soil would be watered to form a crust following completion of construction in that location.
- The construction site would post visible speed limit signs to prevent vehicles from traveling at excessive speeds.

Linear Facilities

Although the amount of excavation required to install the onsite underground transmission lines and natural gas pipelines would be relatively minor, soil disturbance associated with buried linear facilities could total to a considerable amount of soil disturbance. Activities such as clearing vegetation, excavation, and vehicle travel would present the highest potential for erosion. However, for the HHSEGS project the onsite linear facilities would be located along proposed paved internal roads. The Preliminary Draft DESCP does not specifically mention measures to implement for onsite facilities.

The applicant does not include measures for the offsite linear facilities located in Nevada. A separate construction storm water management program would be prepared

for the Hidden Hills Valley Electrical Transmission Project and KRGT natural gas pipeline activities in Nevada.

Staff Evaluation of Erosion during Construction

Staff reviewed the Preliminary Draft DESCP and agrees that BMPs during construction would reduce or avoid impacts to soil from erosion. To protect surface waters, standardized storm water and soil erosion Best Management Practices (BMPs)[12] have been determined by the SWRCB and RWQCBs to be the most effective, practical means of preventing or reducing pollution from nonpoint sources. The conceptual plans for erosion control during construction appear reasonable, but there are additional elements that should be incorporated into the final DESCP that would be developed as required in Condition of Certification **SOILS-1**.

- The Preliminary Draft DESCP currently does not include BMPs that would be implemented for the onsite linear facilities. Although the proposed BMPs for the linear facilities may be similar to those already proposed for other construction activities, a discussion should be included in the BMP narrative section of the document.
- The DESCP should reflect the most recent design plans of the proposed HHSEGS project. Since the initial filing of the original AFC, some changes to the project have occurred such as removal of two boilers from each power block, relocation of various elements within the power blocks, undergrounding of onsite linear facilities, and modifications to the west perimeter retention area (CH2 2012p, CH2 2012ii). Any adjustments that would alter Water Pollution Control Drawings, change the BMP strategy, or result in revised hydrology or hydraulic calculations should be reflected and addressed in an updated DESCP.

Staff believes that compliance with an approved DESCP accordance with Condition of Certification **SOILS-1** would reduce the impacts of soil erosion during construction. In addition, the project activities require that it be covered under the federal General Construction Permit (SWRCB Order No. 2009-0009-DWQ). To ensure compliance with this order, staff proposes Condition of Certification **SOILS-2** which requires a construction SWPPP. Also, conditions of certification in the **AIR QUALITY** section of this **FSA** require a construction mitigation plan to prevent significant impacts from fugitive dust and wind erosion during construction. With implementation of BMPs and associated monitoring activities included in the approved DESCP and SWPPP, impacts on soil would be expected to be less than significant during construction of the proposed HHSEGS project.

Erosion During Operations

Soil losses would be ongoing after the construction of the HHSEGS project. Areas disturbed during the construction phase are subject to potential erosion during the operational life of the proposed project. HHSEGS would be designed for an operating life of 25 to 30 years.

[12] BMPs can be classified as "structural" (i.e., devices installed or constructed on a site) or "non-structural" (procedures, such as modified landscaping practices). There are a variety of BMPs available, depending on pollutant removal capabilities.

Onsite Erosion

The estimated total area of land grading and excavation during construction of the HHSEGS project would be about 438 acres, as shown in **Soils & Surface Water Table 6**. After project completion, the temporary parking and construction laydown areas would be restored to natural existing conditions and about 45 acres would become impervious due to the addition of concrete foundations and asphalt paving. The balance of the previously disturbed area, roughly 200 acres, would be susceptible to potential erosion during the operational life of the proposed project. Furthermore, the addition of impervious surfaces to an area previously undeveloped would increase velocities of storm water runoff (see "Flooding" discussion below), which would increase the erosion potential of open soil areas.

The applicant submitted a Preliminary Draft DESCP/SWPPP (HHSG 2011a, App 5.15A) that states permanent erosion control measures would reduce potential soil related impacts, including gravel, landscaping, and engineering drainage channels. These would be stabilized areas with very little or essentially no risk of erosion. In addition, relatively small rock filters and local diversion berms through the heliostat fields may be installed as required to discourage water from concentrating and to maintain sheet flow. These all would serve to prevent wind and water erosion and maintain some water infiltration capacity of the soil.

Staff agrees that implementation and maintenance of permanent BMPs during operations would reduce or avoid impacts to onsite soil from erosion. The Preliminary Draft DESCP is reasonable in concept, however it does not sufficiently discuss post construction measures for erosion and sediment control. The document should address exposed soil treatments proposed during operation of the project for both road and non-road surfaces. A maintenance schedule should include post construction maintenance of BMPs applied to disturbed areas following construction. Staff believes that compliance with Condition of Certification **SOILS-1** which would require the applicant to develop and implement an approved DESCP would reduce the impacts of soil erosion during operation of the proposed project.

Although modeling and calculations can be used to estimate post-construction flows and provide a basis for structural design parameters, alluvial flows are very complex. Flood flows from the mountains are initially confined in incised channels, but at the site the flood flows are broadly distributed (known as sheet flow) and less confined and can take random paths across the fan. Predicted flow depths and velocities have a potential uncertainty because they do not account for the dynamics of erosion and sedimentation which carry and deposit sediments at various locations along the margin of the alluvial fan where the site is located. Where obstructions such as heliostats and fences are encountered, flows can have erosive effects which could undermine their stability. The consequences of flash flood damage or modified sedimentation and erosion rates may be significant. Staff proposes Condition of Certification **SOILS-5** requiring a Storm Water Damage Monitoring and Response Plan to reduce these potential impacts.

Offsite Erosion

The project's addition of impervious surfaces could also increase velocities of storm water runoff leaving its boundaries, possibly increasing the potential to erode offsite

areas downstream of the project. The applicant proposes an onsite retention area to address the increase in peak flows from project development by controlling the rate that storm water runoff leaves the site (HHSG 2011b, Attach 5.15ER). The area would retain storm water through use of a berm created along the western site boundary by elevating the middle two-thirds of the western perimeter roadway above existing grade. Runoff collected at the berm would slow down flows and allow water to infiltrate and evaporate. The retention area would be designed to drain within 24 hours using three drainage culverts, conveying flow under the roadway and into the adjacent area west of the project site. Runoff from large storms would fill the retention area then overtop the roadway, which would function as a broad-crested weir (CH2 2012ll), as shown on **Soils & Surface Water Figure 9**.

While the retention area would reduce potentially damaging post-construction peak flows, elements of this strategy could potentially still cause offsite erosion.

- By draining the retention area through three 18-inch pipes, water collected from a large area would be concentrated into three points. Flow velocities at the pipe outlets could scour and erode the soil offsite.
- The 180-acre temporary construction area, located offsite and downstream of the retention area, would be more susceptible to erosion compared to surrounding areas not disturbed by construction activities. Although the applicant proposes to restore this area to natural existing conditions, vegetation for soil stability would take time to establish.
- The fill material used in the construction of a typical roadway embankment would not be a sufficient barrier against water. The typical roadway embankment construction does include the same level of geotechnical engineering analysis required for flood control structures (such as a levee). Therefore, a typical roadway embankment would be subject to damage caused by piping, seepage, and erosion from overtopping.

The applicant submitted a Preliminary Draft DESCP/SWPPP (HHSG 2011a, App 5.15A) that states permanent erosion control measures would reduce potential soil related impacts. Although Velocity Dissipation Devices[13] were listed in the suite of erosion control measures, their importance in reducing offsite erosion warrants a more detailed discussion in the DESCP including specifics such as locations, installation, and ongoing maintenance during operations. In addition, the DESCP should also include a more detailed discussion on the proposed strategy to restore any disturbed areas, while at the same time meeting requirements of relevant conditions of certification in the **BIOLOGICAL RESOURCES** section of the **FSA**[14].

To address the potential significant offsite erosion from storm damage to the retention area berm (west perimeter road), staff proposes Condition of Certification **SOILS-5**

[13] Approved BMPs under Fact Sheet EC-10 of California Stormwater BMP Handbook (www.casqa.org)

[14] Including but not limited to Conditions of Certification: **BIO-8** (General Impact Avoidance and Minimization Measures), **BIO-18** (Weed Management Plan), and **BIO-19** (Special-Status Plant Impact Avoidance and Minimization Measures).

requiring a Storm Water Damage Monitoring and Response Plan to reduce these potential impacts in four ways:

1. Establish design criteria for berm construction based on site specific studies and reports to withstand storm water flows of a 100-year storm event.

2. Establish an ongoing maintenance plan to ensure all storm water management measures are functioning properly, through periodic inspection before the first seasonal storms and after each storm event throughout the year.

3. Establish and implement a response plan after every occurrence of damage (from a storm event or other cause) to clean up and repair damage to the berm.

4. Develop and implement a process to monitor incidents and propose modifications and/or improvements to address ongoing issues.

Staff believes that compliance with an approved DESCP in accordance with Condition of Certification **SOILS-1** and an approved Storm Water Monitoring and Response Plan in accordance with Condition of Certification **SOILS-5** would reduce the impacts of soil offsite erosion during operation of the proposed project.

Water Quality of Surface Waters

HHSEGS could have an adverse effect on water quality if discharges create pollution, contamination, or nuisance. Construction and operation of an industrial facility can impact the quality of surface waters by any of the following activities:

- Grading or clearing of land so that sediment is discharged into a water resource. Sediment is considered a pollutant with potential to cause or contribute to the degradation of a water resource's beneficial uses.
- Increasing impervious surface areas resulting in increased amount of storm water runoff volume and rate. This can cause substantial flooding, erosion, and/or siltation, which could impact water resources.
- Placing development in, or discharging sediment into, a river, stream, lake, wetland or water of the US and/or water of the state[15], or into a buffer area for one of these water bodies. Impacts or losses to these special aquatic resources may require specific mitigation measures.
- Storing equipment, raw materials, finished products, or waste products in a manner that exposes them to precipitation and/or storm water runoff. Contact runoff[16] could concentrate various pollutants that would then discharge to a water resource.
- Discharging wastewater from an industrial or commercial process. Because of the high concentrations of total dissolved solids and the further concentration through

[15] Refer to the **BIOLOGICAL RESOURCES** section of this **FSA** for further discussion on jurisdictional determination of wetlands or watercourses as a Water of the US or a Water of the State.

[16] Contact runoff refers to storm water in contact with exposed polluted or hazardous materials and/or surfaces can potentially result in contaminated runoff (containing trace oil, chemicals, metals, toxic substances, or other materials).

evaporation, the liquids could be considered “designated wastes” with regulated disposal requirements.

The following discussion analyzes project information to determine whether HHSEGS would sufficiently avoid or reduce the potential impacts listed above. Where appropriate, staff recommends conditions of certification to ensure that any impacts are less than significant and the project complies with applicable LORS.

Sediment Increase

To prevent the discharge of sediment, the HHSEGS would implement temporary BMPs during construction and permanent BMPs during operation to prevent or reduce soil erosion, as discussed in “Soil Erosion Due to Water and Wind” above. The SWRCB and RWQCBs have determined that standardized storm water and soil erosion BMPs are the most effective, practical means to protect surface waters by preventing or reducing pollution from nonpoint sources. Staff agrees that carefully chosen BMPs for both construction and operation activities could effectively prevent or reduce sediment discharge into water resources. Staff believes compliance with the conditions of certification relating to soil erosion (identified in the “Soil Erosion Due to Water and Wind” discussion above) would ensure that the impact of sediment to surface water quality would be less than significant.

Impervious Surface Area

To prevent an increase in storm water flows discharged offsite as a result of the increase of impervious area, HHSEGS proposes an onsite retention area located along the west perimeter road, as discussed in “Onsite Area Flooding” below. The retention area, located within the project boundary (see **Soils & Surface Water Figure 8**), would control the flow of water offsite to match the flow rate of pre-construction conditions. This “collection and treatment” approach creates a point-source discharge that could increase the volume and possible amounts of pollutants, even when peak discharge rates of post construction are matched to rates of preconstruction. Because this point-source discharge is not upstream of an impaired water body and provided the applicant addresses potential erosion caused by the retention area through Conditions of Certification **SOILS-1** and **SOILS-5** (see “Offsite Erosion” discussion above), staff does not identify any significant impacts to water quality as a result of added impervious surfaces or the retention area.

Aquatic Resources

To avoid impacts or losses to special aquatic resources, HHSEGS proposes to implement a Biological Resources Mitigation Implementation and Monitoring Plan during construction activities (refer to the **BIOLOGICAL RESOURCES** section of this **FSA**) in addition to implementing standardized storm water and soil erosion BMPs. Because details of such a plan are still unknown pending the identification of specific mitigation and monitoring requirements, the applicant submitted a plan outline as a suggested framework.

The applicant stated in its AFC that the U.S. Army Corp of Engineers (USACE) is not anticipated to assert jurisdiction over the ephemeral washes and, therefore, a CWA Section 404 Permit and Section 401 Water Quality Certification would not be needed.

Because compliance with these two permits would likely require additional mitigation measures, the applicant did not propose additional measures. The USACE has since reviewed and assessed the HHSEGS site and identified two drainages as "Waters of the US" (CH2 2012k). As a result, a Section 404 Permit would be required from USACE, which in turn would result in the requirement of a Section 401 Water Quality Certification from Lahontan RWQCB. Section 401 of the CWA gives the Regional Boards the authority to consider the impacts of the entire project and require mitigation for volume, velocity, and pollutant load of the discharge from new outfalls to surface waters designated as "Waters of the State".

USACE has not yet finalized their analysis and Lahontan RWQCB is currently reviewing the project for compliance with state water quality standards. If USACE and Lahontan RWQCB determine that additional mitigation measures would be necessary under CWA Sections 404 and/or 401, staff anticipates that compliance with those measures would address impacts to special aquatic resources and water quality. In the **BIOLOGICAL RESOURCES** section , staff recommends the applicant be required to provide a copy of the 404 and/or 401 Certifications, in accordance to Condition of Certification **BIO-7** (Biological Resources Mitigation Implementation & Monitoring Plan). See the **BIOLOGICAL RESOURCES** section of the **FSA** for a discussion of potential impacts and mitigation.

Polluted Runoff

To prevent contact runoff from discharging offsite during construction activities, the applicant has identified a combination of standard BMPs within the Preliminary Draft Construction DESCP/SWPPP for pollution control measures to be implemented during construction. The BMPs would limit or reduce potential pollutants at their source before they come into contact with storm water. These BMPs also involve daily activities of the construction site, are under the control of the construction contractor, and are additional "good housekeeping practices," which involve maintaining a clean and orderly construction site.

Staff agrees that implementation and maintenance of the identified BMPs during construction would reduce or avoid impacts of contact runoff and recommends Conditions of Certification **SOILS-1** and **-2** requiring an approved DESCP and Construction SWPPP. Furthermore, to reduce the potential impacts from operation of a temporary concrete batch plant during construction, Condition of Certification **SOILS-3** requires an industrial Storm Water Pollution Prevention Plan (Industrial SWPPP) to ensure proper control and use of equipment, materials, and waste products from temporary batch plant facilities. With implementation of these conditions of certification, impacts from polluted runoff would be avoided or reduced to less than significant during construction of the proposed HHSEGS project.

To prevent contact runoff from discharging offsite during operations, HHSEGS would collect contact runoff from power block and equipment washing in an oil/water separator. The effluent would be mixed with and processed as industrial wastewater (see "Operations Wastewater" discussion below). Staff also recommends Condition of Certification **SOILS-4** requiring that each operating solar plant comply with all requirements of the General NPDES Permit for Discharges of Storm Water Associated

with Industrial Activity, including the development of an Industrial SWPPP, unless otherwise documented that this permit is not required by the SWRCB[17]. Similar to the Industrial SWPPP, **SOILS-1** requires that the DESCP address appropriate methods and actions for the protection of water quality and soil resources for both the construction and operation phases of the project. Also, **SOILS-5** would reduce the potential of pollutants caused by storm damage from leaving the site.

Furthermore, Condition of Certification **WORKER SAFETY-2** would require a Hazardous Materials Management Program, and Condition of Certification **WASTE-4** would require an Operation Waste Management Plan. Both documents would be developed by the applicant to address handling, transportation, tracking, usage, storage, emergency response, spill control and prevention, training, record keeping, and reporting of hazardous wastes on the site. Other conditions of certification in the **WASTE MANAGEMENT** section of this **FSA** address wastes, including cleanup of all spills of hazardous substances. With implementation of these conditions of certification, impacts from polluted runoff would be avoided or reduced to less than significant during operation of the proposed project.

Operation Wastewater

To prevent the discharge of untreated industrial wastewater or untreated sanitary wastewater from entering nearby water resources, each HHSEGS Solar Plant would keep the potentially polluted waste water (contact runoff, general facility drainage, process wastewater, and sanitary waste) completely separated from non-contact storm water runoff, Sanitary waste would remain contained within the septic system. Industrial wastewater would remain within the power block and processed through the thermal evaporator system. Hazardous liquids would be meticulously handled to prevent spills and accidental release. Wastewater produced from the energy generation process would be processed through the thermal evaporator system. Potentially contaminated storm water (rain that falls onto industrial equipment or other surfaces that might contaminate the storm water) would be collected and processed through the thermal evaporator system. HHSEGS would transport the reject from the thermal evaporator and the sanitary waste from the septic tanks to approved facilities for offsite disposal. (See “Operations Wastewater” and “Sanitary Wastewater” discussions below.) Non-contact storm water would be directed away from the power blocks and allowed to flow toward the west. All BMPs and conditions of certification would strive to prevent any chemical or hazardous pollutants from mixing with the "clean" storm water. With implementation of these measures, impacts from sanitary or industrial wastewater would be avoided or reduced to less than significant during operation of the proposed project.

Flooding

Flooding is usually defined as the inundation of dry land adjacent to a channel when excess flow exceeds its banks. Because ephemeral streams like those at the site do not have permanent flow, their banks are formed in response to rainfall events which are

[17] For electric generating facilities, industrial storm water permits are required if fuel is burned to generate steam that is used to turn a generator. Concentrating solar power facilities are not one of the regulated industrial categories because solar energy replaces the need for fuel.

infrequent and vary in intensity. The extreme changes in flow conditions causes flooding, erosion, and sedimentation that can drastically alter the channel's shape and alignment. Consequently, desert washes can be transient and may vary in course from one storm event to another (resulting in heavy braiding of shallow channels). For purposes of this analysis, impacts of flooding will consider the natural behavior of ephemeral streams.

Onsite Area Flooding

Proposed construction of the HHSEGS project would alter existing onsite drainage patterns which could potentially cause or increase onsite flooding. For the majority of the project site, existing drainage patterns would generally remain the same. However, changes to a number of areas such as grading, adding impervious surfaces, diverting flows, and impeding flows can increase the amount of storm water runoff volume and rate. An analysis of each impact and the applicant's proposal to address impacts follows below.

Grading and Increase of Impervious Area

Heavy to medium grading would be performed within each solar plant's power block area and the common area complex, necessary to prepare the sites for construction of the various facilities. Grading would also be needed to create a system of roadways for access to each facility and maintenance of the heliostats, although grading in the solar fields would match natural contours and promote sheet flow where possible. Three areas of temporary grading would occur for construction laydown and parking: one within the large 180 acre area located adjacent to the site's west boundary, and one near each solar plant's power block area. Estimated amount of total grading (both temporary and permanent) would be about 438 acres, as shown in **Soils & Surface Water Table 6**. After project completion, the temporary parking and construction laydown areas would be restored to natural existing conditions, resulting in approximately 241 acres of land permanently altered by graded access roads and constructed facilities.

While most of the permanently graded area would remain "dirt" surface, the addition of concrete foundations and asphalt paving would create approximately 45 acres of impervious surface. Because water is not able to infiltrate into impervious surfaces, storm water runoff quickly concentrates and flows downstream, increasing both the volume and velocity of accumulated water. In addition, the heliostat assemblies would essentially function as thousands of rooftops and create approximately 806 acres of impervious surfaces, covering about 26 percent of the project site (see **Soils & Surface Water Table 6**). However, because the heliostats would be installed such that surface runoff flows to the pervious dirt areas of the solar field, impacts are considerably less severe than a contiguous stretch of impervious area.

Diversion Channels

In three areas (Solar Plant 1, Solar Plant 2, and the administration building), permanent diversion channels would be constructed to redirect storm runoff around these structures and prevent damage from flooding that occurs naturally due to existing topography. Solar Plant 2, in particular, is located in an area that experiences existing flood flows during storm events (see **Soils & Surface Water Figure 5**). The

Preconstruction Hydrology Analysis shows that a 100-year, 24-hour storm event[18] would likely result in flood flows approximately two feet deep, and approximately one foot deep from the more frequent 10-year, 24-hour storm event. The diversion channels around the administration building and each solar block would protect these structures from natural ephemeral flooding. Similarly, additional temporary diversion channels would also redirect flows around construction laydown and temporary parking areas during the construction activities of the project. Because of the general flow-through design of the solar fields, the diversion channels would not redirect runoff flows in a way that would adversely flood other areas either onsite or offsite. Also, **SOILS-5** (Storm Water Damage Monitoring and Response Plan) would require maintenance and monitoring of diversion channels during operations for added protection against storm damage.

Retention Basin

The applicant submitted an Existing Condition Hydrologic & Hydraulic Analysis (HHSG 2011a, App 5.15C) and a Final Post Construction Hydrologic & Hydraulic Analysis (HHSG 2011b, Attach 5.15ER) to compare the differences in peak flow, hydraulic depths, and velocities between the existing condition and the post construction conditions. Staff reviewed both reports and found the methodology and assumptions for both analyses appropriate and reasonable[19]. Because the applicant anticipates an increase in the project's post construction peak flows due to proposed changes such as grading, impervious surfaces, and diversion channels, the post construction analysis includes an onsite retention area along the west perimeter road (see **Soils & Surface Water Figure 8**).

The retention area would be created via a berm, constructed by elevating the west perimeter road above existing grade to a constant elevation of 2588.8 feet for a portion of the road's length[20]. The applicant estimates that the berm would decrease post construction runoff to better match preconstruction runoff. For smaller, more frequent rain events such as the 2-year, 24-hour storm, the road would stop runoff from flowing across that portion of the western project boundary, allowing the retained water to infiltrate and evaporate. Three 18-inch discharge pipes would be installed at the low point of the retention area to ensure it would drain within a 24-hour period after a storm event (CH2 2012ii). For larger storms, the retained water would build up to above the road elevation and weir over it (**see Soils & Surface Water Figure 9**). For the 100-year, 24-hour storm, the applicant calculates that post construction peak flow[21] would be

[18] A design storm event is a hypothetical storm event, of a given frequency interval and duration, used to estimate how often storms of a given magnitude will occur, based on historical rainfall information. A 100-year, 24-hour design storm event corresponds to a major storm (the probability of occurrence in any given year is one in 100, or a one percent chance) and is used to represent flows with the potential to cause property damage and other impacts.

[19] Staff verified that a preapproved hydrologic analysis methodology and appropriate protocols (HEC-1 and FLO-2D) were used to generate calculated values for the preliminary analysis.

[20] The north and south ends of the west perimeter road would match existing elevations. The elevated portion would be about 1500 feet in length, beginning approximately 3000 feet north of TecopaRoad and would return back to existing elevation approximately 2100 feet prior to the north end of the road.

[21] This peak flow was calculated at a point located downstream of the 180-acre temporary laydown area to account for its contribution to runoff. The analysis assumed this laydown area would be entirely graded.

10,783 cfs compared to the preconstruction peak flow of 10,790 cfs (HHSG 2011b, Attach 5.15ER).

The elevated west perimeter road (berm) would decrease post construction runoff to better match preconstruction runoff, but this retention area would also clearly cause substantial onsite flooding. For the 100-year, 24-hour storm, the berm would retain 195.4 acre-feet of water across approximately 125 acres of land, with depths ranging from about four feet deep (at the base of the road) to about half a foot deep (toward the east). Because the berm would function as a weir, the estimated onsite flooding would occur at the western site border, as shown on **Soils & Surface Water Figure 10**. Because drainage pipes would sufficiently ensure drainage of the retention area within a 24-hour period (thus reducing the risk of closely spaced storms exacerbating flood depths), this onsite flooding would not be expected to encroach into either of the Solar Power Plants or into the common area. Therefore, staff does not identify any significant impacts to these structures as a result of onsite flooding.

However, staff notes that long-term sediment transport to this retention area could alter the expected storage capacity at the base of the road and could over time affect flow velocities that weir over the berm. Also, the berm may experience potential damage from the weir flow over time (see the discussion under “Offsite Erosion” above). Permanent erosion control measures and sediment management for the berm should be identified and discussed in an updated DESCP.

Although the retention area would not impact the proposed structures, repeated flooding would occur among the heliostats in the solar fields, especially those located on the west side of the proposed site. Staff acknowledges the applicant has completed a thorough hydrologic analysis, but notes that predicted flow depths and velocities on undeveloped alluvial fans have potential uncertainty. The consequences of flash flood damage or modified sedimentation and erosion rates may be significant. Staff proposes Condition of Certification **SOILS-5** (Storm Water Damage Monitoring and Response Plan) to reduce potential impacts caused by large storm event in four ways:

1. Establish specifications for heliostat installation and west perimeter road (berm) construction based on site specific studies and reports (e.g. Pylon Insertion Depth and Heliostat Stability Report). This ensures that heliostats and the west perimeter road (berm) are designed to withstand storm water scour of a 100-year storm event.

2. Establish an ongoing maintenance plan to ensure all storm water management measures are functioning properly, though periodic inspection before the first seasonal storms and after each storm event throughout the year.

3. Establish and implement a response plan to clean up damage and prevent release of sediment or pollutants after every occurrence of damage from a storm event or other cause.

4. Develop and implement a process to monitor incidents and propose modifications and/or improvements to address ongoing issues.

Furthermore, as the proposed project plans evolve from the conceptual and preliminary phases, any changes affecting hydrology or hydraulics would require an updated

comprehensive analysis for purposes of **SOILS-5**. Examples include: the use of certain commercial dust suppressants applied onto dirt roads that would increase the total impervious area of the site, and structural changes to the proposed west perimeter road (berm) that would increase or decrease retention time.

In addition, standing water onsite might have impacts to biological resources given the scarcity of water in the desert. For example, standing water has the potential to attract nuisance predators such as ravens to the site. See the **BIOLOGICAL RESOURCES** section of this **FSA** for further discussion on the potential impacts of standing water to biological resources and possible mitigation required.

Offsite Area Flooding

Grading and Increase of Impervious Area

Numerous ephemeral drainages flow through the proposed HHSEGS site, originating from the east and discharging to the west toward the dry lake bed. Due to the episodic rainfall of the region and transient nature of the drainages, offsite flows can easily exceed these shallow channels and result in flooding. Modeling of the site in its present undeveloped state results in offsite flows to areas downstream (property west of the site) as indicated in **Soils & Surface Water Table 5**. As discussed above, proposed grading and construction of HHSEGS would increase the amount of impervious area onsite. This would increase the amount of storm water peak discharge leaving the site and could exacerbate the naturally occurring floods downstream of the site.

The applicant proposes to create a retention area that would decrease post construction runoff rates. Because the peak discharge of the 100-year, 24-hour storm event leaving the site during post construction conditions would be very close to discharge of preconstruction conditions, the impacts of offsite downstream flooding (to areas located west of the project site) would be reduced. Staff agrees that the proposed project would not exacerbate existing flooding conditions to the areas located west of the project site, and impacts would be less than significant.

Retention Area

Although the retention area would cause substantial onsite flooding, the inundated area (as shown in **Soils & Surface Water Figures 8**, **9**, and **10**) would not extend past the proposed site's borders to flood offsite areas. However, staff notes that long-term sediment transport to this retention area could alter the expected storage capacity at the base of the road and could affect flow velocities that weir over the berm. Also, the berm may experience potential damage from the weir flow over time (see the discussion under "Offsite Erosion" above). Permanent erosion control measures and sediment management for the retention area should be identified and discussed in an updated Drainage, Erosion, and Sediment Control Plan (DESCP). With this effective sediment management control, staff believes that offsite flooding due to the proposed retention area could be prevented.

Staff acknowledges the applicant has completed a thorough hydrologic analysis, but notes that predicted flow depths and velocities on undeveloped alluvial fans have potential uncertainty. The consequences of flash flood damage or modified

sedimentation and erosion rates may be significant. Staff proposes Condition of Certification **SOILS-5** (Storm Water Damage Monitoring and Response Plan) to reduce potential impacts to the retention area caused by large storm events.

Impediments to Existing Flow Conditions

Tecopa Road, a county road that borders the south side of the project site, has historically experienced flooding due to storm events (see the "Area Flooding" discussion above under "Local Setting – Charleston View"). The applicant's pre- and post-construction analysis do not show a significant difference in Tecopa Road flood depths between the existing condition (shown on **Soils & Surface Water Figure 5**) and the post construction conditions (shown on **Soils & Surface Water Figure 10**), but estimated post construction Tecopa Road flooding may not be accurate. The applicant's analysis represented post-construction site conditions by incorporating the following proposed elements: impervious surfaces (heliostats, buildings, asphalt roadways and parking lots), graded dirt roads, protective diversion berms around power blocks and administration complex, and elevated west perimeter road. The analysis did not incorporate the perimeter fence (with desert tortoise exclusion fencing) or the landscape screening[22] proposed along the perimeter of the project site. The tortoise fencing in particular has the potential to trap vegetation and debris which could block or slow the flow of water to the site (see **Soils & Surface Water Figure 11**). These two elements would impede existing flows and could exacerbate flood events at Tecopa Road.

As shown on **Soils & Surface Water Figure 12**, flows from the Stump Springs area cross Tecopa Road before encountering the HHSEGS property boundary. The perimeter fencing and landscape screen would impede these flows, causing a portion of the flow to be diverted west along Tecopa Road while the rest would flow onto the HHSEGS site. Staff identified the following potential impacts:

- increased depths and frequency of flooding along the roadway adjacent to the site, and
- increased flow along the roadway shoulder.

The following discussion analyzes project information to determine whether HHSEGS would sufficiently reduce the potential impacts listed above. Where appropriate, staff recommends conditions of certification to reduce impacts.

Adjacent Roadway Flooding

To estimate the potential increased flood depths caused by the proposed perimeter elements (fencing and landscaping), staff used Manning's equation for open channel flow. Manning's equation can be simplified for sheet flooding because water depth is much smaller than floodplain width (i.e. a foot deep compared to a mile wide), which results in the hydraulic radius approximately equal to the depth.

[22] See Condition of Certification **BIO-9** (Desert Tortoise Clearance Survey and Exclusion Fencing) in the **BIOLOGICAL RESOURCES** section of this **FSA** for requirements to minimize impacts to desert tortoise. See Condition of Certification **VIS-2** (Landscape Improvements, Permanent Fencing and Screening) in the **VISUAL RESOURCES** section for requirements to reduce the visual impacts to viewers from Tecopa Road and the Charleston View residential area.

Manning's equation	Simplified equation
$Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$	$D = \left[\frac{Q n}{1.49 W S^{1/2}} \right]^{3/5}$
where Q = flow rate (cfs) n = roughness coefficient of the channel A = cross-sectional area of the channel (square feet) R = hydraulic radius = A/P (feet) P = wetted perimeter, the amount in contact with water (feet) S = slope of the channel energy gradient	where D = water depth (feet) Q = flow rate (cfs) n = roughness coefficient of the floodplain W = floodplain width (feet) S = slope of the floodplain energy gradient

The simplified equation was used to make a direct relationship between the increase in flood depth and effects of the proposed perimeter elements by making the following assumptions:

- The roughness coefficient 'n' represents physical characteristics of the floodplain at the site perimeter. For preconstruction conditions, staff used an 'n' value of 0.03 to represent undisturbed desert terrain. To represent the change in floodplain characteristics due to the perimeter fence and landscape screening, an 'n' value of 0.16 was used[23].
- Because the perimeter fence only affects a portion of the floodplain rather than the entire area, staff represented the post-development flood depths by calculating the average of flood depths without the fence (n=0.03) and with the fence (n=0.16). Staff used the average of the two values, or n = 0.10, to represent the overall post-development 'n' for the area at and around the project site perimeter.
- The flow rate 'Q' represents the portion of flows from Stump Springs that encounters the site. Because the floodplain width and slope are assumed not to change from pre- to post-construction, the value of 'Q' would also stay constant. Therefore, the only component that would change in the simplified Manning's equation is the roughness coefficient 'n', which would result in a change in water depth (flooding).

Given these assumptions, the simplified equation above can be used to compare average flood depths before and after project development as follows:

$$\frac{D_{post}}{D_{pre}} = \left[\frac{n_2}{n_1} \right]^{3/5}$$

where: n_2 is the average post-development n = 0.10
n_1 is the pre-development n = 0.03

[23] Staff estimated the post-construction n using the USGS method (USGS1989). The base value for the flood plain's natural surface (n=0.03) is the same as preconstruction. Corrections were added for obstructions (perimeter fencing = 0.03) and vegetation (landscape screening = 0.10).

Therefore, the ratio of flood depth for post-development and pre-development conditions is 2.1. In other words, the elements proposed for the project's perimeter could potentially double existing flood depths at Tecopa Road.

Soils & Surface Water Table 7 shows estimated flood depths, assuming the site encounters half the flows from the Stump Springs area. Smaller storms could see an increase in flow depth of a few inches, while the larger storms could increase by more than a foot. Since depths of floods would increase for all storms, frequency of flooding would increase during smaller storms.

Soils & Surface Water Table 7
Estimated Flood Depths at Tecopa Road

Storm Event	Stump Springs flows	Flows to Site **Q**	Pre-Develop Flooding	Post-Develop Flooding	Pre vs. Post Increase
100 yr	15900 cfs	7950 cfs	2.1 ft	4.3 ft	2.2 ft
25 yr	7400 cfs	3700 cfs	1.3 ft	2.7 ft	1.4 ft
10 yr	3800 cfs	1900 cfs	0.9 ft	1.8 ft	0.9 ft
5 yr	2100 cfs	1050 cfs	0.6 ft	1.3 ft	0.7 ft
2 yr	300 cfs	150 cfs	0.2 ft	0.4 ft	0.2 ft

Notes:

- Values of Stump Springs flow rates for different storm events are from the applicant's calculated flows (HHSG 2011a, App 5.15C).
- Assumes the site crosses half the width of the floodplain created by flows from Stump Springs.
- Pre-Development n = 0.03 and Post-Development n = 0.10

The estimated flood depths presented above are rough averages taken across the area at and around the project site perimeter. Although flood depths at localized areas along the perimeter would be more accurately calculated using two-dimensional modeling computer software specifically designed for this purpose, staff concludes these estimates are sufficient to show that flooding impacts to Tecopa Road would be potentially significant.

Inyo County's requirement for Flood Damage Prevention (Title 14, Chapter 14.29) identifies areas of special flood hazard as the same identified by FEMA. While the project would comply with this section of Inyo County Code because it is located outside the FEMA Zone A boundary, staff used these requirements as guidance for determining significance with respect to flooding of Tecopa Road and proposing mitigation to reduce impacts to less than significant. Inyo County Code defines adverse affects as cumulative effects that would increase water surface elevation of the base flood (the 100-year flood) more than one foot at any point. Therefore, staff considers a depth increase of up to one foot to be a less than significant impact for the 100-year storm. This in turn would result in less than one foot depth increase for all storms less than the 100-year event as shown in **Soils & Surface Water Table 7.**

Staff proposes Condition of Certification **SOILS-6** to reduce incremental flooding for storms up to the 100-year, 24-hour storm, to less than one foot. Condition of Certification **SOILS-6** (Perimeter Drainage Management Plan) requires the project to

reduce flooding impacts by increasing the amount of flows crossing the perimeter at Tecopa Road. This can be accomplished with appropriate storm water control structures, such as a drop inlet for large storm events, staggered landscape planting that allows better flow around the vegetation, or dry wells to increase infiltration.

It is important to note that estimates shown in **Soils & Surface Water Table 7** assume the proposed tortoise fence contains debris occupying 50 percent of the cross-sectional area. Further blockage of flows (as shown in **Soils & Surface Water Figure 11**) would result in the fence becoming more of a barrier rather than an impedance, which would further increase the flooding impacts to Tecopa Road. **SOILS-5** (Storm Water Damage Monitoring and Response Plan) would require maintenance and aggressive fence cleaning to reduce the amount of trapped vegetation and debris.

Increased Roadway Flows

The perimeter fencing and landscape screen would impede the naturally occurring floodplain flows from the Stump Springs area, causing a portion of the flow to concentrate at the perimeter and be diverted west along Tecopa Road. With an increase of flow volumes and velocities, the diverted runoff would impact the roadway shoulder and adjacent property west of the site (as depicted by the solid black arrows on **Soils & Surface Water Figure 11**).

The concentrated flows could potentially undercut the asphalt pavement edges and cause pavement damage at the roadway shoulder. Staff could not determine the project's incremental contribution to roadway shoulder damage because a baseline could not be established. Tecopa Road was constructed in the early 1970s and does not comply with current Inyo County geometric roadway design standards[24]. Inyo County's Road Department records the days a flood event occurred and whether road repairs were made to fix flood damage, but logs do not indicate what portion of Tecopa Road was impacted by the noted event (CEC 2012ii). Staff recognizes that flood damage occurs on Tecopa Road, but the extent of damage to the section of road adjacent to the proposed site cannot be determined. The concentrated flows could also erode the soil as it continues along the fence, then erode the adjacent property west of the site as it spreads at the west end of the site.

Staff proposes Condition of Certification **SOILS-6** (Perimeter Drainage Management Plan) that requires the project to increase the amount of flows crossing the perimeter which would, in turn, reduce the amount of redirected concentrated flow along the shoulder of Tecopa Road. Condition of Certification **SOILS-6** also requires the project to implement erosion control measures to protect the area adjacent to Tecopa Road and the area west of the site from erosion due to these concentrated flows. Also **SOILS-5** (Storm Water Damage Monitoring and Response Plan) would require maintenance of erosion control features and repair of damage from a storm event or other cause. Condition of Certification **TRANS-3** (Restoration of All Public Roads, Easements, and Rights-of-Way) would require the project to restore the public roads after project construction to compliance with the applicable jurisdiction's specifications (see the

[24] For further discussion on the structural integrity of Old Spanish Trail Highway/Tecopa Road, see "Total Construction Traffic" in the **TRAFFIC AND TRANSPORTATION** section of this **FSA**.

TRAFFIC AND TRANSPORTATION section of this **FSA**). This roadway restoration to current design standards would be an improvement above existing (baseline) Tecopa Road features and would help reduce damage from concentrated shoulder flows.

Offsite Linear Facilities

The proposed offsite linear facilities east of the proposed HHSEGS project would not alter existing offsite drainage patterns. The gas pipeline would be constructed underground, and the pole structures for the overhead power transmission lines would not impede or adversely redirect existing flows. Staff believes that offsite flooding impacts of the proposed Hidden Hills Transmission Project and proposed KRGT natural gas pipeline would be less than significant.

Vicinity Flood Hazards

Flood hazards include direct flooding due to overtopping of nearby rivers or streams resulting from severe rainstorms, or secondary flooding due to seismic activity creating tsunamis (tidal waves) or seiches (waves in inland bodies of water).

To identify the different types of flood risks for a given location, flood hazard maps were developed by the Federal Emergency Management Agency (FEMA) to identify areas prone to flooding[25]. Comparing the HHSEGS site location to these maps (see **Soils & Surface Water Figure 3**) and considering the site's elevation (2600 feet above mean sea level (msl)), staff found that:

- Although the north tip and southwest corner of the project footprint are located in areas designated at Zone A (100-year flood hazard area), neither of the power blocks or the administration complex are within these zones. Only heliostat poles and at-grade access roads would be placed in the designated 100-year flood zone, and neither would impede nor significantly redirect Zone A flood flows[26].
- HHSEGS site is located roughly 200 miles inland with no dams in the region. In addition, no levees or inland bodies of water are located in the area.

The proposed project would not impede or significantly redirect flood flows of the FEMA designated 100-year floodplain. In addition, the project would not be affected by dam failure, tsunami, or seiche. Staff agrees with the applicant that HHSEGS would not have significant impacts pertaining to these identified flood hazard areas. (For discussion on additional potential hazards that could be caused by soil failure such as mudflow, landslide and liquefaction, see the **GEOLOGY and PALEONTOLOGY** section of this **FSA**.)

Water Supply

Refer to the **WATER SUPPLY** section of this **FSA** for a detailed analysis of the potential effects on groundwater supplies and groundwater quality.

[25] For further discussion of FEMA and potential flooding, see Area Flooding under Local Setting heading above.

[26] The elevated portion of the west perimeter road is located between two Zone A boundaries, separated by more than 200 feet to the north and more than 2000 feet to the south.

Wastewater

Construction Wastewater

Improper handling or containment of construction wastewater could cause a broad dispersion of contaminants to soil, surface waters, or groundwater. For example, hydrostatic testing[27] of a new pipeline can result in discharge of super-chlorinated water often used for the initial disinfection. Other constituents of concern include total dissolved solids (TDS) and total suspended solids (TSS). Discharge of any non-hazardous construction-generated wastewater would require compliance with discharge regulations.

Anticipated sources of wastewater, also referred as non-storm water discharges, would be sanitary wastes, wash water, concrete washout water, paint wash water, and piping hydrostatic test water. Clean water used for dust control and soil compaction would not be considered wastewater because flows would not discharge offsite.

The applicant submitted a Preliminary Draft Construction DESCP/SWPPP (HHSG 2011a, App 5.15A) identifying a combination of standard BMPs for non-storm water management measures to be implemented during construction as well as corresponding Construction Phase BMP Plans showing their locations. Sanitary waste would be contained in portable facilities and routinely disposed of at an offsite treatment/disposal facility by a licensed sanitary service. Concrete washout slurries would be discharged to a temporary washout facility and allowed to dry prior to disposal offsite. The DESCP/SWPPP states that non-storm water discharges would be eliminated, controlled, or treated in accordance with the Construction General NPDES Permit requirements to minimize or eliminate the release of pollutants in storm water.

Staff agrees that implementation and maintenance of BMPs during construction would reduce or avoid impacts from concrete washouts and sanitary waste. Although compliance with Conditions of Certification **SOILS-1** and **-2** (DESCP and Construction SWPPP) would implement these and other standard BMPs, the BMP's planned for treatment of wash water are not specifically addressed in the DESCP/SWPPP. The Final DESCP and SWPPP must be revised to specifically include the appropriate BMPs for proposed management and ensure disposal of wash water during construction would not result in significant impacts.

The applicant stated in the AFC that hydrostatic test water (approximately 400,000 gallons total from both solar plants) would be discharged to the surrounding area or used for dust control if test results meet regulatory standards (HHSG 2011a, Table 5.14-3) Otherwise, the hydrostatic test water would be trucked offsite for disposal at an approved facility. In addition, the AFC states the same approach would occur for the passivating[28] and chemical cleaning fluid wastes (estimated to range from 200,000 to 400,000 gallons total from both solar plants) produced from pipe cleaning and flushing.

[27] A hydrostatic test is a way in which leaks can be found in pressure vessels such as pipelines and plumbing. The test involves placing water, which is often dyed for visibility, in the pipe or vessel at the required pressure to ensure that it will not leak or be damaged.

[28] Passivating fluid is used to treat or coat a metal pipe in order to reduce the chemical reactivity of its surface.

Discharge of hydrostatic test water to land is regulated under SWRCB Order No. 2003-003-DWQ which specifically prohibits the discharge of hydrostatic test water unless all residual pollutant concentrations comply with groundwater quality objectives. Discharge of hydrostatic test water to surface waters would be subject to provisions of Lahontan Regional Board Order No. R6T-2008-0023 (Revised Waste Discharge Requirements and NPDES General Permit for Limited Threat Discharges to Surface Waters).

In addition, potential contaminants in the discharge of other wastewater streams (anticipated wash water and passivating/chemical cleaning fluid wastes) may also be subject to other Lahontan RWQCB regulations to protect water quality. Because more information is needed describing the management and disposal methods of wash water and pipe water discharges not meeting SWRCB and/or Lahontan RWQCB requirements, staff cannot determine whether these wastewater streams would result in significant impacts during construction. To ensure HHSEGS would sufficiently address these wastes, staff recommends Condition of Certification **SOILS-7** (Construction Wastewater Discharge) requiring the project owner to obtain the appropriate permit(s) from Lahontan RWQCB and/or the SWRCB for reuse onsite as dust control. If the wastewater discharge does not meet the requirements for reuse, then the project owner must submit proof of proper wastewater disposal, in accordance with waste discharge requirements of the Clean Water Act (CWA). Adoption of Condition of Certification **SOILS-7**, in addition to a complete and approved DESCP and Construction SWPPP as required in Conditions of Certification **SOILS-1** and **-2**, would reduce potential impacts from proposed management and disposal of wastewater during construction to a less than significant level.

Operations Wastewater

A thermal evaporator system would process the wastewater. Generally speaking, heat is applied to recirculating wastewater causing water to vaporize, producing a high quality distillate for reuse, and leaves behind virtually all the unwanted contaminants in a concentrated solute for disposal. HHSEGS would return approximately 90 percent of the operations wastewater for reuse back into the service water tank. The applicant states in the AFC that reject from the thermal evaporator would be trucked offsite for treatment or disposal at an approved facility.

To ensure protection of water quality from waste disposal, the SWRCB establishes specific requirements including a system to classify waste, according to the risk of impairment to water quality, as well as standards and regulations for proper disposal. For example, “hazardous waste” disposal is only accepted at a Class I disposal site and a “designated waste” at a Class II disposal site, while wastewater discharge would typically occur at a wastewater treatment facility.

Staff proposes Condition of Certification **SOILS-8** (Wastewater Collection System) requiring the project owner to submit proof of proper wastewater disposal, in accordance with waste discharge requirements of the Clean Water Act (CWA). Adoption of Condition of Certification **SOILS-8** would reduce potential impacts from proposed management and disposal of process wastewater during operations to a less than significant level.

Sanitary Wastewater

As noted previously, the HHSEGS project would require a septic system and leach field at each of the two power blocks and the administration complex. Each of the systems would be designed to treat up to 700 gallons per day of wastewater discharged from toilets, sinks, and showers. Septic tanks would be pumped out as needed by a qualified sanitary service provider.

The use of septic tanks and leach fields for onsite treatment and disposal of domestic wastes is an established practice. However, improper construction and operation of these systems may adversely impact nearby surface and ground waters. To ensure protection of human health and the environment from improper disposal of sewage, California Plumbing Code and Lahontan RWQCB establishes specific requirements for the discharge of sewage. Included in the requirements are soil percolation standards; minimum separation/set back distances to prevent impacts to groundwater and nearby water wells; and septic tank and leach field design, sizing and construction standards to ensure adequate capacity and proper treatment and disposal of the wastewaters. The Inyo County Environmental Health Services Department (ICEHSD) is responsible for permitting and requires persons constructing septic systems to apply for a permit for the construction and operation of the system.

Consistent with the Energy Commission's in-lieu permit provisions, staff proposes adoption of Condition of Certification **SOILS-9** (Septic System and Leach Field Requirements) requiring compliance with the requirements of the Inyo County Code (Title 7, Section 7.52.060), the California Plumbing Code (California Code of Regulations Title 24, Part 5), and the Lahontan RWQCB Basin Plan for all project sanitary waste disposal facilities, such as septic systems and leach fields. Adoption of Condition of Certification **SOILS-9** would both ensure compliance with LORS and, through the protectiveness provided by the County regulatory standards, reduce potential impacts from project septic systems to a less than significant level.

INDIRECT IMPACTS

Indirect impacts are effects caused by the project and occurring later in time or farther removed in distance, but still reasonably foreseeable. Indirect impacts usually result from a chain of events caused by the project, intended or not.

Soil Erosion and Surface Water Quality

With any new project, possible indirect impacts affecting soil and water resources would be in response to additional construction activities. For example, additional housing could be needed to accommodate workers for construction and operation of a proposed project, or additional industrial facilities may be attracted to an area containing an established solar facility. These in turn can further result in additional roads or other infrastructure. Potential impacts of these various resultant activities would be similar to the potential direct impacts of the project itself such as: potential erosion due to construction activities, potential flooding impacts due to structures within a 100-year flood zone or increase of impervious surfaces, potential contamination from industrial activities, and potential impacts from wastewater.

The **SOCIOECONOMICS** section of this **FSA** discusses growth-inducing impacts, and concludes that the project's construction and operation workforces would not induce a substantial population growth or displacement of population, or induce substantial increases in demand for housing. The **GROWTH INDUCING IMPACTS** section of this **FSA** concludes that neither the project's gas pipeline nor the electricity generated by the HHSEGS would induce any additional growth in the project area. The scarcity of local groundwater resources and the existing land use designations are serious constraints to any significant economic development in the project area. Based on this information, staff believes the HHSEGS project would not indirectly result in significant impacts to soil resources or surface water quality.

Water Supply and Groundwater Quality

Refer to the **WATER SUPPLY** section of this **FSA** for a detailed analysis of the potential effects on groundwater supplies and groundwater quality.

CUMULATIVE IMPACTS AND MITIGATION

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of reasonably foreseeable future projects (California Code of Regulations, Title 14, section 15130). The construction and operation activities of the various projects could potentially overlap and result in cumulative impacts to the same resource(s).

Soil Erosion and Surface Water Quality

The project site is in Inyo County, along the California and Nevada border. **Soils & Surface Water Table 8** lists the projects in the vicinity of the proposed HHSEGS site that have been approved or are under review. These specific projects were considered for the HHSEGS cumulative impacts to water quality and hydrology because of their location within the Pahrump Valley. **Soils & Surface Water Figure 13** (also see **Cumulative Effects Figure 2**) displays the project locations on a map in relation to the proposed HHSEGS site.

Soils & Surface Water Table 8
Projects Reviewed for Cumulative Impacts

Map ID	Project Name (Agency ID#)	Location	Ownership	Status	Project Description
A	St. Therese Mission	Tecopa Road near Charleston View	Magnificat Ventures Corp, Las Vegas NV	Inyo County approved project June 2011	17.5 acre environmental park, memorial and internment center
B	Pahrump Valley General Aviation Airport	Pahrump, NV (~ 10 miles northwest of HHSEGS site)	Nye County	Environmental review phase (const may overlap with HHSEGS const)	Public-use general aviation airport on 650 acres of BLM land
C	Element Solar (NVN 089655)	Pahrump Valley (6.5 miles northeast of HHSEGS site)	First Solar Development	POD submitted[1]	100 MW photovoltaic project with 2,560 acres of BLM land requested

Map ID	Project Name (Agency ID#)	Location	Ownership	Status	Project Description
H	Sandy Valley (NVN 090476)	Clark County, NV (~8 miles southeast of HHSEGS site)	BrightSource Energy Solar Partners	POD submitted[1]	750 MW renewable energy project with 15,190 acres of BLM land requested
N	Hidden Hills Valley Electric Transmission Project (NVN 089669)	Mainly in Clark County, NV (direct service to HHSEGS site)	Valley Electric Association	Environmental review phase (DEIS expected late December, 2012)	Transmission and natural gas pipeline alignments. This is a "connected action" to the proposed HHSEGS project.

Note 1: The Plan of Development (POD) includes basic project information needed to initiate the environmental analysis and review process with the Bureau of Land Management (BLM). This step occurs prior to publication of a Notice of Intent to prepare an Environmental Impact Statement.

These projects have the potential to increase local soil erosion and storm water runoff. Without the use of storm water BMPs and erosion control BMPs, these changes could incrementally increase local soil erosion and storm water runoff leading to significant impacts to the quality of Pahrump Valley's surface waters. By complying with all applicable erosion and storm water management LORS, including the Water Quality Control Plan for the Lahontan Region (Basin Plan) in California and applicable requirements of the Nevada Division of Environmental Protection's regulatory agencies, the proposed HHSEGS project would not contribute to a potentially significant cumulative impact[29].

Offsite Flooding

Staff considered the effects of the St. Therese Mission project to analyze cumulative offsite flooding because it is located on the same alluvial fan area as the HHSEGS site and is also bordered by Tecopa Road (as shown on **Soils & Surface Water Figure 13**). In addition, St. Therese Mission includes a perimeter fence and landscaping along its border adjacent to Tecopa Road similar to HHSEGS. As discussed in Direct Impacts above (Offsite Area Flooding: Impediments to Existing Flow Conditions), the fencing and landscaping could potentially flood Tecopa Road and increase storm water flows along the roadway shoulder. The relatively close proximity of the two projects has the potential of combining impacts to further exacerbate flooding and erosive flows.

Staff found that St. Therese Mission is located on a portion of the alluvial fan that avoids floodplain flows from the Stump Springs area (see **Soils & Surface Water Figure 3**). Therefore, its perimeter fence and landscaping do not encounter the large flows that would result in significant flooding to Tecopa Road as would the HHSEGS site. Based on this information, staff does not believe that the effects of the two projects would combine to cumulatively result in Tecopa Road flooding worse than potential flooding caused by the HHSEGS project alone. In other words, mitigated impacts from Condition

[29] CEQA also allows the lead agency to determine that a project's contribution to a cumulative impact is not significant "if the project will comply with the requirements in a previously approved plan or mitigation program which provides specific requirements that will avoid or substantially lessen the cumulative problem … within the geographic area in which the project is located." (California Code of Regulations, Title 14, section 15064(h)(3)).

of Certification **SOILS-6** (intended to reduce potential Tecopa Road flooding) would not contribute to a significantly cumulative impact.

Water Supply and Groundwater Quality

Refer to the **WATER SUPPLY** section of this **FSA** for a detailed analysis of the potential cumulative effects on groundwater supplies and groundwater quality.

COMPLIANCE WITH LORS AND STATE POLICY

CLEAN WATER ACT, ANTIDEGRADATION POLICY, PORTER-COLOGNE WATER QUALITY CONTROL ACT, AND SWRCB ORDERS 2009-0009-DWQ, 2003-003-DWQ, AND 97-03-DWQ

The Clean Water Act (CWA) (33 USC, section 1257 et seq.) requires states to set standards to protect water quality, which include regulations of storm water and wastewater discharge during construction and operation of a facility. California established its regulations to comply with the CWA under the Porter-Cologne Water Quality Control Act. The SWRCB regulates storm water discharges associated with construction of projects affecting areas greater than or equal to 1 acre. Under Order 2009-0009-DWQ, the SWRCB has issued a National Pollutant Discharge Elimination System (NPDES) General Permit for storm water discharges associated with construction activity, Order 2003-03-DWQ is for water discharges to land that has a low threat to water quality (includes water from hydrostatic testing of pipes), and Order 97-03-DWQ is for storm water discharges associated with industrial activity. Projects qualify under these permits if specific criteria are met and an acceptable Storm Water Pollution Prevention Plan (SWPPP) is prepared and implemented after notifying the SWRCB with a Notice of Intent.

The HHSEGS would satisfy these requirements of the SWRCB and Lahontan RWQCB with the development of a DESCP in accordance with Condition of Certification **SOILS-1**, the development of construction SWPPPs in accordance with Condition of Certification **SOILS-2**, compliance with requirements for hydrostatic test water discharge in accordance with Condition of Certification **SOILS-7**, and the development of industrial SWPPPs in accordance with Conditions of Certification **SOILS-3** and **-4**. In addition, proposed Condition of Certification **SOILS-5** would reduce potential impacts from damaging storm events.

CALIFORNIA CODE OF REGULATIONS TITLE 20, DIVISION 2, CHAPTER 3, ARTICLE 1

These data collection regulations known as Quarterly Fuel and Energy Reports (QFER) are to obtain necessary information in order for the California Energy Commission to develop policy reports and analyses related to energy. Power plant owners are required to periodically report specific operational data to the California Energy Commission, including water supply and water discharge information. Through compliance with Condition of Certification **SOILS-8** (Wastewater Collection System), HHSEGS would provide the required data for wastewater disposal.

INYO COUNTY GENERAL PLAN AND RENEWABLE ENERGY ORDINANCE

The Inyo County General Plan lists Water Resources goals and policies, which include Policy WR-1.4 that new industrial developments reducing polluted runoff from entering surface waters by complying with the Clean Water Act, reducing direct-source pollution into surface waters, and implementing appropriate mechanisms to reduce wastewater discharge. The General Plan also identifies goals for Public Services and Utilities, including Wastewater goals (PSU-4) which ensure adequate wastewater collection, treatment, and disposal; and Stormwater Drainage goals (PSU-5) which include polices that new project design and maintenance activities improve runoff quality and encourage use of natural stormwater drainage systems.

Title 21 of the Inyo County Code (Renewable Energy Ordinance) encourages and regulates the development of renewable energy resources within Inyo County. The ordinance requires developers of solar thermal, photovoltaic, and wind energy power plants to protect the health, safety, and welfare of the County's citizens, the County's environment, and to ensure the County and its citizens do not bear an undue financial burden from the project. Under this ordinance, a proposed project must implement necessary mitigation measures by obtaining a renewable energy permit, a renewable energy development agreement, or a renewable energy impact determination. Furthermore, this ordinance requires compliance with the Inyo County General Plan.

Although compliance with **SOILS-1** through **-9** would reduce polluted runoff from entering surface waters, staff believes that HHSEGS does not specifically reduce direct-source discharge. As discussed in "Onsite Area Flooding" above, an onsite retention area would accumulate runoff from a majority of the HHSEGS site along the west perimeter road before discharge offsite. However as discussed in "Water Quality of Surface Waters" above, staff does not identify any significant impacts to water quality as a result of the retention area provided staff recommended mitigation measures are implemented.

SWRCB RES. 2008-0030 (LOW IMPACT DEVELOPMENT)

SWRCB and Lahontan RWQCB encourage a low-impact planning approach for new development projects. Low Impact Development (LID) is an alternative management approach to the traditional "end-of-pipe" centralized collection and treatment approach of simply collecting onsite runoff flows in order to control offsite discharge through a single discharge point. Although the post construction peak discharge rate matches the preconstruction rate, the post construction flows are typically sustained for a longer period of time which increases the volume of runoff during a given rain event. This can increase the amount of pollutants and the erosive energy of discharge.

LID focuses on an integrated system of decentralized, small-scale control measures spread throughout the site. By distributing storm water rather than concentrating it, the erosive forces of this runoff can be avoided. LID features often take advantage of soil infiltration, vegetation, and evaporation to mimic the natural hydrologic regime. Examples of measures include:

- Reducing imperviousness, conserving natural resources and ecosystems, maintaining natural drainage courses, reducing use of pipes, and minimizing clearing and grading.
- Providing runoff storage measures dispersed uniformly throughout a site's landscape with the use of a variety of detention, retention, and runoff practices.
- Maintaining predevelopment time of concentration[30] by strategically routing flows, increasing surface roughness, and disconnecting[31] impervious surfaces to maintain travel time and control the discharge.

However, LID measures may not be suitable for all sites, with considerations made to expected rainfall intensities, climate (i.e., relative humidity, solar radiation, air temperature, wind speed) and, in particular, soil permeability. Also, LID by itself may not completely replace the need for conventional storm water controls to mitigate excess flow rates or to provide enhanced storm water treatment.

The proposed HHSEGS site appears suitable for implementation of LID measures, based on the dry hot climate and sandy native soils. The applicant submitted a Preliminary Draft DESCP which contains the following measures:

- Vegetation would not be removed but would be mowed (if needed) in areas where grading is not required for access or construction.
- Most of the natural drainage features would be maintained and any grading required would be designed to promote sheet flow where possible.
- Relatively small rock filters and local diversion berms through the heliostat fields to discourage water from concentrating.
- Areas compacted during construction activities would be restored, as appropriate, to approximate preconstruction compaction levels.
- Heliostat assemblies, which contribute to the project's total impervious area, would be installed such that their surface runoff flows to the pervious dirt areas of the solar field.

Staff believes that implementation of the above measures, which would be approved by staff in accordance with Condition of Certification **SOILS-1**, sufficiently complies with this SWRCB policy. Although the applicant does not specifically demonstrate that all components of LID are met, namely the objective of maintaining preconstruction runoff volume, the above measures would help reduce the increase in volume. Furthermore, neither Inyo County nor Lahontan RWQCB requires minimum standards for use of LID practices for this area.

[30] The time of concentration refers to the amount of time it takes for water to travel from a watershed's most distant point to the watershed's outlet. Maintaining storm water's natural time of concentration allows the water to slowly permeate into the ground.

[31] The impacts of disconnected impervious surfaces are considerably less severe than a contiguous stretch of impervious area.

FACILITY CLOSURE

HHSEGS is designed for an operating life of 25 to 30 years (HHSG 2011a, § 2.3.2.1). Facility closure can be either temporary or permanent, and closure options range from "unplanned temporary closure," with the intent of a restart at some time, to the removal of all equipment and facilities. Closure can result from two circumstances: (1) the facility is closed suddenly and/or unexpectedly because of unplanned events, such as a natural disaster or economic forces or (2) the facility is closed in a planned, orderly manner, such as at the end of its useful economic or mechanical life or due to gradual obsolescence.

In the event of a temporary or unplanned closure, HHSEGS would be required to comply with all applicable conditions of certification, including an emergency Risk Management Plan to manage the possible release of hazardous substances present onsite (see the **HAZARDOUS MATERIALS** section of this **FSA**). Depending on the expected duration of the shutdown, other appropriate measures would be taken such as removing chemicals from storage tanks or equipment.

Permanent closure (decommissioning) requires a Facility Closure Plan, as discussed in the **FACILITY DESIGN** and **GENERAL CONDITIONS** sections of this **FSA,** which would be submitted to the Energy Commission for approval prior to decommissioning. Future conditions that could affect decommissioning are largely unknown at this time, however compliance with all applicable LORS, and any local and/or regional plans would be required. The plan would address all concerns in regard to potential erosion and impacts on water quality. Refer to the **FACILITY DESIGN** section of this **FSA** for further discussion on temporary and permanent facility closure.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Staff published the Preliminary Staff Assessment ([PSA], CEC 2012u) on May 24, 2012. The table below contains staff's responses to comments received pertinent to topics addressed in this section. The comments were submitted by:

- Agency - Inyo County (INYO 2012j)
- Agency - Bureau of Land Management (BLM 2012b)
- Intervenor - Cindy MacDonald (MAC 2012c)
- Applicant – Hidden Hills Solar I, LLC; and Hidden Hills Solar II, LLC (CH2 2012ee)

Comment #	COMMENT and RESPONSE
1	**Inyo County**
1.79 Pg 12: Consistency with General Plan	COMMENT: Goal PSU-4/Wastewater: To ensure adequate wastewater collection, treatment, and disposal. Consistency: Compliant. The project proposes adequate wastewater management for the project site. Identified by PSA as LORS?: No.

Comment #	COMMENT and RESPONSE
	Goal PSU-5/Stormwater Drainage: To collect and dispose of stormwater in a manner that minimized inconvenience to the public, minimizes potential water-related damage, and enhances the environment Consistency: Compliant. The project proposes adequate stormwater drainage for the project site. Identified by PSA as LORS?: No. RESPONSE: Text added identifying PSU-4 and PSU-5 in the Inyo County LORS. See page 45.
2	**Bureau of Land Management**
2.3 Pg. 2: Soils & Surface Water	COMMENT: An assumption is made in Table 6 (page 4.10-12) of the PSA that there will be negligible soil disturbance throughout the heliostat field. Soil disturbance is a direct result of the installation of solar cells or mirrors and, to date, all technologies require some level of disturbance. Ground disturbance can occur even in relatively level areas. RESPONSE: In the construction industry, disturbed area or soil disturbance area typically means an area that is altered as a result of clearing, grading, and/or excavation. Staff use of "negligible" in describing heliostat installation in the field (vehicle driving, vegetation mowing, and foot traffic) reflected that no grading would be required. Staff changed the description to “Area of Land Grading and Excavation” to avoid confusion. See Total Soil Disturbance discussion in the **Soils & Surface Water** section on page 15.
2.4 Pg. 2: Soils & Surface Water	COMMENT: Neither the applicant's plan of development nor the PSA's proposed SOILS-5 condition of certification address the possibility that flow across the roadway may cause this berm to fail, nor do they address any potential impacts of the resulting offsite flooding and scour. SOILS-5 does not require the berm to be stabilized with riprap, gunite, or similar material that would prevent piping around the 18-inch culvert that would be the sole drainage point. Armoring the key points in this berm will be necessary to minimize risk to offsite soil resources. Alternatively, the applicant may choose not to install a berm along the western perimeter and simply allow floodwaters to pass through the heliostat field unimpaired, although this may result in heliostat being damaged or washed away. RESPONSE:

Comment #	COMMENT and RESPONSE
	Included language in **SOILS-5** on page 88 about protection and damage to the west perimeter road. See discussion on page 32.
10	**Intervenor - Cindy MacDonald** **SOILS & SURFACE WATERS**
10.1	COMMENT: (p.14-1 #1) Why should the public believe the CEC and applicant would "*ensure all appropriate environmental review has been completed*" at any other stage of the proposed project if they won't even do it now? RESPONSE: The entire sentence reads as follows: "For activities outside of the project boundaries the owner shall ensure all appropriate environmental review and approval has been completed before field activities begin." Activities outside the project boundaries do not fall within Energy Commission jurisdiction. Compliance staff would enforce Energy Commission conditions of certification as well as work with local agencies should an issue develop outside the project boundaries.
10.2 10.3 10.4	COMMENT 10.2: (p.14-1 #2) How does it serve the public interest to develop and analyze data regarding potentially significant impacts of the proposed project only after the proposed project is approved? COMMENT 10.3: (p.14-2 #3) How are "mitigation measures" reducing the project's impacts and meeting CEQA requirements if those impacts aren't even disclosed, analyzed or vetted until after the proposed project is approved? COMMENT 10.4: (p.14-2 #4) If only general and superficial data and/or analysis are substituted for site-specific data and critical analysis, how can the proposed project site be credibly deemed "suitable" or "feasible"? RESPONSE TO ALL: The proposed project is defined in the AFC and during Discovery. Staff analyzes the project, identifies impacts and evaluates feasible mitigation measures in the PSA and FSA, to provide an independent recommendation to the Commissioners. The Commissioners use the evidentiary record, augmented by analyses from the applicant and interveners, and hearings, to render a decision on the proposed project.
10.5	COMMENT 10.5: (p.14-6 #1) Why didn't the CEC Staff address the issues associated with potential soil unsuitability at the proposed project site in the Preliminary Staff

Comment #	COMMENT and RESPONSE
10.6	Assessment as outlined in the Preliminary Geotechnical Report? COMMENT 10.6: (p.14-6 #2) Given the potential gravity of the lack of site suitability or the possibility that the proposed project may be infeasible based on the findings of the Preliminary Geotechnical Report, why wouldn't the applicant INSIST on obtaining a Final Geotechnical Report before moving forward with the AFC process or at any time since? <u>RESPONSE TO ALL:</u> Staff does not agree with the commenter's statement about "the lack of site suitability or the possibility that the proposed project may be infeasible based on the findings of the Preliminary Geotechnical Report". The Preliminary Geotechnical Report concluded that "there are no known geotechnical or geologic conditions that would preclude development of the proposed project at the subject site". After further analysis, staff made a similar determination concluding that the project (as mitigated) would not result in significant geologic impacts. (See the **Geology and Paleontology** section of this **FSA**.)
10.7 10.8	COMMENT 10.7: (p.14-6 #3) Since heliostat assembly's are structures and the Preliminary Geotechnical Report warned that "surface runoff should…..not [be] permitted to flow or infiltrate….beneath structures", what is going to happen to the thousands of heliostats that will be positioned in the South, Southwest and Western portions of the project site that are in an acknowledged flood zone and subjected to high intensity stormwater and surface runoff? COMMENT 10.8: (p.14-6 #4) Since the Preliminary Geotechnical Report warned of soils with "high collapse potential" as is clearly illustrated by the photo of the van, what is going to be the reality behind the applicant's "fool proof" highly advanced computer controlled "Glint and Glare Heliostat Positioning Plan" when the heliostat's shift and sink just as the van did due to water infiltration causing soil collapse? <u>RESPONSE TO ALL:</u> The "structures" discussed in the geotechnical report are those with elements of horizontal construction, such as concrete slabs-on-grade, exterior concrete flatwork, and pavement sections (like roads and parking lots). The heliostat foundations are 6 inch diameter rods (pylons) driven at least 10 feet into the ground. The design of the heliostat foundation will not allow flow or infiltration of runoff beneath the pylon. The AFC states that earthwork within the power blocks and common

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	area would be "excavated and compacted to the recommendations of the associated geotechnical report" (AFC Section 2.4.1.1). This would remove the unsuitable soil and replace with suitable soil to create a stable layer, per California Building Code requirements and proposed conditions of certification **GEN-1**, **GEN-5** and **CIVIL-**1 discussed in the **Facility Design** section of this **FSA**. Expansive soils do not present the same challenges for pylons because amount of material exposed to the swelling/shrinking soils at the surface is much smaller than a concrete building. The bigger risks to heliostats are above ground forces from water and wind. **SOILS-5** requires heliostat stability and includes a monitoring plan that inspects for heliostat and mirror damage. Staff included in **SOILS-5** (page 87) a requirement to also test pylon stabilization with saturated soil and standing water.
10.9	COMMENT: (p.14-6 #5) If heliostat assemblies shift, sink and/or collapse due to a rain event, how will this impact the heliostat's ability to transfer energy/heat to the power towers and the "renewable" portion of the proposed projects energy production? <u>RESPONSE:</u> **SOILS-5** would implement a plan to reduce storm water impacts by establishing specifications for heliostat installation based on site specific studies and reports. This ensures that heliostats are designed to withstand a 100-year storm event.
10.10	COMMENT: (p.14-9 #1) Given the fact that the CEC Staff has already identified that the location of the proposed project site near the bottom of an alluvial fan system may result in “significant” impacts, why have they not pursued developing modeling of impacts during the CEQA equivalency process to determine site suitability and project feasibility? <u>RESPONSE:</u> Site suitability and project feasibility was address in the **Geology and Paleontology** section of this **FSA**. Assessment of geologic hazards include faulting and seismicity, liquefaction, dynamic compaction, hydrocompaction, subsidence, expansive soils, landslides, tsunamis, seiches, and others as may be dictated by site-specific conditions. The Preliminary Geotechnical Report concluded that "there are no known geotechnical or geologic conditions that would preclude development of the proposed project at the subject site". After further analysis, staff made a similar determination concluding that the project (as mitigated) would not result in significant geologic impacts. (See the **Geology and Paleontology** section of this **FSA**.)

Comment #	COMMENT and RESPONSE
10.11 10.12	COMMENT 10.11: (p.14-9 #2) How is the modeling of potential storm water impacts to the proposed project site *after* the project's approval considered a mitigation measure that reduces project impacts? COMMENT 10.12: (p.14-9 #3) How can the current approach taken by the CEC Staff to determine potential impacts and develop mitigation measures to protect the environment from storm water impacts only *after* project approval be defined as "conservative" or meet CEQA equivalency standards? <u>RESPONSE TO ALL:</u> The Post Construction Hydrologic & Hydraulic Analysis (modeling) submitted with the AFC was needed for evaluation and review of potential environmental impacts that may result from implementation of the proposed project. The analysis was based on a preliminary design of the project, which is sufficient for staff to determine if potential impacts are mitigable. Should the project be approved, a revised analysis must be submitted to reflect the project final design, including mitigation measures.
10.13	COMMENT: (p.14-9 #4) Could modeling of site-specific storm water impacts also yield a potential "catastrophic" conclusion such as the Ivanpah site modeling results did? Could impacts be even greater at the Hidden Hills site? <u>RESPONSE:</u> Staff reviewed the applicant's pre- and post-construction hydrology analyses (modeling) and then compared the results to Ivanpah's hydrology analysis. The Ivanpah project site contains significantly steeper terrain: some channels are more than five feet deep with many more that are one to two feet deep, and modeled post-construction flow velocities reached over 5 feet/second across large areas of braided flow zones. The Hidden Hills site contains one channel that measured 1.6 feet deep with the remaining measured 0.6 foot or less. When post-construction flow velocities were modeled, highest velocities (over 5 feet/second) occurred in the largest channel for approximately 200 feet length. Braided flow zones reached up to 3 feet/second.
10.14	COMMENT 10.14: (p.14-9 #5) What if the site-specific storm water modeling impacts reveals the HHSEGS project site is unsuitable for the proposed project but it has already been approved? COMMENT 10.15: (p.14-9 #6)

Comment #	COMMENT and RESPONSE
10.15	Does it matter if site-specific storm water modeling reveals the HHSEGS project site is not suitable or feasible and cannot be reasonably mitigated because project approval is already a foregone conclusion, regardless of its impacts to the environment? <u>RESPONSE TO ALL:</u> Staff did not find that the site is unsuitable for the proposed project, based on the pre- and post-construction hydrology analyses (modeling) as well as the preliminary geotechnical report. Staff believes the preliminary studies are adequate to identify whether there are any potentially significant impacts from storm water flows in accordance with CEQA requirements. Through the proposed conditions of certification staff will ensure the final designs incorporate the measures necessary to ensure there are no significant impacts.
10.16	COMMENT: (p.14-12 #1) Despite Staff acknowledging the potentially significant environmental impacts of the heliostats/mirrors in relation to generally known site-specific issues, why hasn't Staff or the applicant developed any of the aforementioned reports to insure project site suitability, feasibility and reasonably foreseeable environmental impacts, degradation and/or damage? <u>RESPONSE:</u> The Pre- and Post-Construction Hydrologic & Hydraulic Analyses (modeling) submitted with the AFC were adequate for evaluation and review of potential environmental impacts that may result from implementation of the proposed project. Staff believes the preliminary studies are adequate to identify whether there are any potentially significant impacts from storm water flows in accordance with CEQA requirements. Through the proposed conditions of certification staff will ensure the final designs incorporate the measures necessary to ensure there are no significant impacts.
10.17 10.18 10.19	COMMENT 10.17: (p.14-12 #2) Specifically, how many heliostats/mirrors structures would have to be impacted by storm water inundation, flooding and/or standing water to be considered potentially significant? Significant? 100? 1,000? 10,000? 100,000? COMMENT 10.18: (p.14-12 #3) What is number of heliostats/mirror structures impacted by storm water inundation, flooding and/or standing water that would render a determination of unmitigatable impacts to the proposed project site? COMMENT 10.19: (p.14-13 #4) How many heliostat/mirrors could be potentially carried offsite due to

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	a significant storm event before they were deemed a significant adverse impact to the environment and surrounding property owners?
10.20	COMMENT 10.20: (p.14-13 #5) How much broken glass could be littered around the site before those impacts would be deemed potentially significant or significant? 100 lbs? 1,000 lbs? 10,000 lbs? 100,000 lbs?
10.21	COMMENT 10.21: (p.14-13 #6) How much broken mirror glass could potentially be carried offsite before it would be deemed a significant adverse impact to the environment and surrounding property owners? 100 lbs? 1,000 lbs? 10,000 lbs? 100,000 lbs?
	<u>RESPONSE TO ALL:</u> Impacts from storm water inundation, flooding, and/or standing water is typically in terms of the potential to cause injuries to people or property damage to buildings. If heliostats are not damaged from standing water, then no heliostats are impacted. A CEQA impact would occur if a damaged heliostat releases a contaminant into the standing water. No numerical threshold is established for specific number of heliostats for determining significance. The Lahontan Basin plan establishes water quality objectives that protect the beneficial uses of surface water and groundwater in the Region. (The following have been identified for the Pahrump Valley: Ammonia; Bacteria, Coliform; Biostimulatory Substances; Chemical Constituents; Total Residual Chlorine ; Color; Dissolved Oxygen; Floating Materials; Oil and Grease; Non-degradation of Aquatic Communities and Populations; Pesticides; pH; Radioactivity; Sediment; Settleable Materials; Suspended Materials; Taste and Odor; Temperature; Toxicity; Turbidity.) **SOILS-5** would implement a plan to reduce storm water impacts from damaged heliostats in four ways: 1. Establish specifications for heliostat installation based on site specific studies and reports. This ensures that heliostats are designed to withstand storm water scour of a 100-year storm event. 2. Establish an ongoing maintenance plan to ensure all storm water management measures are functioning properly, though periodic inspection before the first seasonal storms and after each storm event throughout the year. 3. Establish and implement a response plan to implement after every occurrence of damage (from a storm event or other cause) to clean up damage and prevent release of sediment or pollutants. 4. Develop and implement a process to monitor incidents and propose modifications and/or improvements to address ongoing issues.

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	See **SOILS-5** language on page 88 and discussion on page 32.
10.22	COMMENT: (p.14-13 #7) Given the fact that Staff already projects broken mirrors and mirror shards will be an inseparable part of the proposed project, who has analyzed the potential glint and glare impacts of this debris - either in the heliostat assemblies or dispersed throughout the landscape - in relation to motorists, recreational viewers, and local residents? RESPONSE: Staff does not consider mirror shards to be an inseparable part of the proposed project. Instead, the goal of **SOILS-5** is to prevent mirror shards as much as possible. Should mirror damage occur, **SOILS-5** requires clean up. The perimeter screening/fencing in **VIS-2** would also reduce impacts to motorists, recreational viewers, and local residents. For additional discussion on Glint and Glare, please refer to the **Traffic and Transportation** section of this **FSA**.
10.23	COMMENT: (p.14-17 #1) Did Staff make an error in estimating impervious surfaces from heliostat/mirror assemblies or have design changes increased the number of heliostat/mirror assemblies on the proposed site? RESPONSE: The discrepancy in amount of impervious area from heliostats (806 acres vs. 851 acres) was a typo. The correct amount is 806 acres, as shown in Table 6. The estimate of 851 acres includes all impervious areas, not just the heliostats. See page 30. The commenter is incorrect in stating that the project site is currently 25 percent impervious simply because the native soil composition contains 25 percent high runoff potential components (Hydrologic Soil Group D). Impervious surfaces prevent the infiltration of water into the soil. These areas are mainly artificial structures such as pavements (roads, sidewalks, driveways and parking lots) and rooftops. Existing conditions on the proposed project site contain zero percent impervious area.
10.24	COMMENT: (p.14-17 #2) Based on historical experience in the area, it is probable that the highest concentration of clay and clay like soils will most likely be located in the South, Southwest and West end of the proposed project site. If this turns out to be the case as a result of the Final Geotechnical Report, what differences will this make (if any) to offsite flooding in this area? RESPONSE:

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	Using a preapproved hydrologic analysis methodology, the applicant analyzed storm water runoff of the site for both pre-construction and post-construction scenarios. Although soil type at the site is a definite factor, the flooding is largely contributed to increasing impervious area and modifications to the naturally occurring drainage patterns.
10.25	COMMENT: (p.14-17 #3) What evidence and/or data is available that supports the estimated soil disturbance acreage, impervious surface acreage and where is it located in the AFC files or subsequent documents? <u>RESPONSE:</u> Soil disturbance acreage information is found in Appendix C of Post Construction Hydrologic & Hydraulic Analysis (Road construction, large laydown construction area) and Attachment I of Construction DESCP/SWPPP (laydown areas at each solar plant site). Staff use of "negligible" soil disturbance in describing heliostat installation in the field (vehicle driving, vegetation mowing, and foot traffic) reflected that no grading would be required. Staff changed the description from “Soil Disturbance Area” to “Area of Land Grading and Excavation” to avoid confusion. Please see **Soils & Surface Water Table 6** on page 15. Impervious surface acreage information from: Appendix C of Post Construction Hydrologic & Hydraulic Analysis (heliostats, paved roads, buildings, powerblocks)
10.26 10.27	COMMENT 10.26: (p.14-18 #4) What is the accurate design element for the roads that will circle the power towers; the 20 ft. drive zones or the 10 ft. maintenance paths? COMMENT 10.27: (p.14-18 #5) What is the difference in total affected acreage between these two design elements for the drive zones versus the maintenance paths? <u>RESPONSE TO ALL:</u> Because the applicant's post-construction calculations used 10-foot wide concentric drive zones around each solar tower, staff considers this to be the intended design. Staff did not assess the project using 20-foot wide concentric drive zones because the post-construction calculations indicated 10-foot wide roads and not 20-foot wide roads. Paved roads: 16 acres Fully graded dirt roads (12' & 20'): 18.2 acres Partially graded dirt roads (10'): 171 acres

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10.28	COMMENT: (p.14-18 #6) If chemical dust suppressants are used to control fugitive dust over the life of the project, shouldn't the impervious surfaces they create be included in the impervious surface evaluations? RESPONSE: Yes. The Post Construction Hydrologic and Hydraulic Analysis used the assumption that the 10' partially graded dirt roads are compacted, rather than impervious. If the chemical dust suppressant used for these road results in impervious areas, then an updated report is required for **SOILS-5**. See discussion on page 33.
10.29	COMMENT: (p.14-18 #7) If the applicant and/or CEC CPM approve the use of Pennz-Suppress D for dust suppression over the life of the project, what potential impacts will this product have to water, water quality and biological resources in and around the proposed project site? RESPONSE: Should the proposed project be approved, the CPM would consult with technical staff (air, water, and biological resources) prior to approving a particular dust suppression product. This verification is included in Air Quality section Conditions of Certification **AQ-SC3** (Construction Fugitive Dust Control) and **AQ-SC7** (Operation Dust Control Plan).
10.30	COMMENT: (p.14-18 #8) Gravel surfaces and roads in the area have proven to be reasonably effective in slowing storm water runoff, ponding and structure collapse. Given its advantages in the area, would the CEC Staff recommend the drive zone/maintenance paths be surfaced with gravel to reduce impervious surfaces between the heliostat fields as well as reducing potential impacts for onsite and offsite flooding? RESPONSE: Staff recognizes gravel as an effective means of erosion control of disturbed soil. It is an approved BMP under "Non-Vegetative Stabilization" (Fact Sheet EC-16 of California Stormwater BMP Handbook, www.casqa.org). Depending on the final designs for drainage management staff may require use of this BMP.
10.31	COMMENT: (p.14-18 #9) In the Applicants Supplemental Response to Data Adequacy Review, a reference was made to Appendix 5.15R containing revisions to previous errors. However, this Appendix has not been posted on the CEC website and still remains unavailable for public review. Will the CEC finally post this document?

Comment #	COMMENT and RESPONSE
	RESPONSE: See Docket TN#62125, 09/07/2011, CH2MHill / J. Carrier, Supplement to the Application for Certification, 325 pages
10.32	COMMENT: (p.14-18 #10) Given the fact that the heliostat/mirror assemblies alone will increase the impervious surface area by 26%, wouldn't this be considered a significant unmitigatable change to the existing landscape? Wouldn't this fact require stricter onsite controls to reduce these unmitigatable impacts from adversely affecting the environment? RESPONSE: The increase of impervious area due to the heliostats would be a significant impact, but staff has determined the impact to be mitigable. Compliance with the proposed conditions of certification would ensure potential impacts are reduced to less than significant.
10.33	COMMENT: (p.14-18 #11) In a CEC sponsored workshop on July 2, 2012, regarding Alternatives, a chart was shown comparing the impacts of the HHSEGS to other renewable technologies. Here, it determined the impacts of the HHSEGS to onsite and offsite flooding and other storm water related events as "less than significant". Given the number of issues raised, such as increasing the currently existing impervious surfaces by 26% due to the heliostat/mirror assemblies alone or potential catastrophic impacts to heliostat/mirror assemblies from storm water velocities associated with alluvial fans, would Staff revisit this determination and more fully explore the adverse environmental impacts in the Final Staff Assessment? RESPONSE: The increase of impervious area due to the heliostats would be a significant impact, but staff has determined the impact to be mitigable. Compliance with the proposed conditions of certification would ensure potential impacts are reduced to less than significant.
10.34	COMMENT 10.34: (p.14-19 #1) How can review, analysis and appropriate mitigation measures be developed during the AFC CEQA equivalency process if key information and data is out of date and potentially irrelevant? RESPONSE: Staff does not agree that key information is out of date or irrelevant. The data is better described as general and estimated, primarily because the area has not been developed. The applicant submitted in the AFC a pre- and post-construction hydrology studies based on the

Comment #	COMMENT and RESPONSE
	best available data as well as preliminary studies (such as the preliminary geotechnical analysis) based on present-day site-specific data. Subsequently through responses to data requests, additional information was collected and submitted (such as the soil infiltration analysis). CEQA allows lead agencies to identify performance standards that will govern the development of specific mitigation measures, provided that sufficient information is known in order to evaluate whether the project as designed can achieve the identified mitigation. Depending on the project, a conceptual design or a preliminary design of facilities would meet CEQA's requirement that mitigation measures are feasible and enforceable.
10.35	COMMENT 10.35: (p.14-19 #2) Since the CEC Staff is aware of the potential problems associated with an out of date DESCP, will they require an updated version be made available for review during the AFC CEQA equivalency process? RESPONSE: The proposed design submitted in the AFC is preliminary. This allows for the analysis of potential environmental impacts with the possibility of implementing reasonable design changes to reduce or avoid impacts. During this process, the applicant has proposed changes to the original AFC including: removal of two boilers from each power block (reducing air emissions), undergrounding some onsite linear facilities (reducing visual impacts), and modifications to the west perimeter retention area (in the process of finalizing its preliminary design). Staff is requiring the applicant to update the DESCP to reflect and address these changes and other changes that would result from the environmental review (such as additional mitigation measures required from other technical sections of this **FSA**). Staff has not identified significant issues in the proposed changes because activities can be addressed with existing approved BMPs (California Stormwater BMP Handbook, www.casqa.org).
10.36	COMMENT: (p.14-23 #1) Will Staff please provide a clear definition of what a Zone A flood zone definition is? RESPONSE: Flood zones are geographic areas that the FEMA has defined according to varying levels of flood risk. Each zone reflects the severity or type of flooding in the area. Zone A is defined as a special flood hazard area subject to inundation by the 1 percent annual chance flood also known as the 100-year flood (the flood that has a 1

Comment #	COMMENT and RESPONSE
	percent chance of being equaled or exceeded in any given year). Because detailed analyses are not performed for Zone A, no depths or base flood elevations are shown within these zones. This can be rephrased as: a flood hazard area in which the flood zone has no base flood level.
10.37	COMMENT: (p.14-23 #2) While Staff has determined that heliostat pylons and maintenance roads located in the southern portion of the proposed project site will not significantly impede or redirect current flood flows, what impacts would increasing the impervious surfaces have on this area with respect to volume, velocity and rates of flooding? <u>RESPONSE:</u> The applicant's computer model of existing flow conditions uses site specific data with 1-foot contour topography. To model the amount of flooding within the retention area, the applicant made the following adjustments to represent post-construction site conditions: impervious surfaces (heliostats, buildings, asphalt roadways and parking lots), graded dirt roads, protective diversion berms around power blocks, and the elevated west perimeter road. The post-construction model shows exacerbated flooding in the retention area due to the increase of impervious surfaces, but flooding did not significantly increase at the site's south perimeter or north perimeter. Similar results were shown when velocities were modeled.
10.38	COMMENT: (p.14-23 #3) Since one of the definitions for a Zone A flood classification is, its area is “approximate”, why has Staff deemed that merely 200 or 2,000 ft. is fully capable of separating the two zones when definitive data is not available? <u>RESPONSE:</u> FEMA prepares these maps to identify flood-prone areas for programs such as the National Flood Insurance Program (NFIP) that provide federal flood insurance to home and business owners and renters exposed to flood hazards. Staff’s use of the word “approximate” in describing the FEMA Zone A boundaries was because their maps of this area do not include base flood elevations. The 200 foot separation is between to the FEMA Zone A boundary (where water depth is undetermined) and the south end of the proposed berm. The applicant's computer model is a more detailed analysis using1-foot contour topography to calculate flood depths. The post-construction model shows exacerbated flooding between 2-feet and 4-feet deep in the retention area caused by the elevated west

Comment #	COMMENT and RESPONSE
	perimeter road. This more detailed analysis shows that onsite flooding does not spread into the FEMA designated Zone A areas located north or south of the retention area. Based on the computer modeling, the exacerbated onsite flooding would not redirect Zone A boundaries to housing or buildings.
10.39	COMMENT: (p.14-23 #4) Why did Staff confine the majority of their analysis regarding storm water flows and potential flood impacts to; a) onsite evaluations, b) non-residential areas located near the proposed project boundaries, and c) the east/west axis versus the north/south axis? <u>RESPONSE:</u> Staff assessed the potential for the proposed project to exacerbate flood conditions in the vicinity of the project, both onsite and offsite. Specifically, it addresses the question listed in CEQA Guidelines (Appendix G, VIII. Hydrology and Water Quality): Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site? Staff's analysis focused on the "east/west axis" because the natural terrain of the area directs flows from east to west, as shown on topographic maps of the vicinity. Grading or other modifications to the terrain can increase velocities of naturally occurring flows across the site, which increases the potential for flooding downstream (west of the site). Obstructions that impede naturally occurring flows (such buildings, power plant structures, elevated roads, fences, and vegetation) can increase the potential for flooding onsite as well as upstream (east of the obstruction). The community of Charleston View is roughly the same elevation as the proposed project. In other words, it is neither upstream nor downstream of the project site. Staff recognizes the confusion caused by the sentence (in Surface Water Features): “The majority of runoff flows through the southern portion of the site due to offsite flows originating from the east.” Throughout the site, natural flow direction is from east to west. The modeling of a 100-year storm shows that the majority of sheetflow flooding occurs through Solar Field 2, which is the southern HALF of the project site. Staff has corrected this on page 9.
10.40	COMMENT: (p.14-23 #5) What are the projected impacts to the Old Spanish Trail Highway during a 100-year, 24- hour storm event if the proposed project is approved?

Comment #	COMMENT and RESPONSE
	RESPONSE: Staff added a discussion on the potential flooding to Old Spanish Trail Highway (also called Tecopa Road). See “Offsite Area Flooding: Impediments to Existing Flow Conditions” on page 34.
10.41	COMMENT: (p.14-24 #6) Can the retention area result in excessive flooding and inundation by following the western perimeter road to join up with other flood flows coming from the south that match the FEMA floodplain maps? RESPONSE: The applicant's computer model of existing flow conditions uses site specific data with 1-foot contour topography. To model the amount of flooding within the retention area, the applicant made adjustments to represent post-construction site conditions: impervious surfaces (heliostats, buildings, asphalt roadways and parking lots), graded dirt roads, protective diversion berms around power blocks, and elevated west perimeter road. The post construction model shows exacerbated flooding in the retention area, but flooding did not spread into the FEMA designated Zone A areas located north or south of the retention area. Flooding would not "match" and meet up with the FEMA delineation for Zone A.
10.42	COMMENT: (p.14-24 #7) Did the CEC Staff check the applicant’s figures for accuracy in the “Estimated Peak Discharge Along Western Boundary” located in Table 5? RESPONSE: The applicant analyzed storm water runoff of the site for both pre-construction and post-construction scenarios. - Staff verified that a pre-approved hydrologic analysis methodology was used. - Staff used in-house software for an independent analysis to compare pre-construction peak flows, and results were similar to those of the applicant. - Staff studied the post-construction analysis and found its approach and assumptions reasonable. Appropriate protocols (HEC-1 and FLO-2D) were used to generate calculated values for the preliminary analysis. The applicant's analysis was based on a preliminary design of the project, which is sufficient for staff to determine if potential impacts are mitigable. Should the project be approved, a revised analysis must be submitted to reflect the project final design, including mitigation measures.

Comment #	COMMENT and RESPONSE
10.43 10.44	COMMENT 10.43: (p.14-24 #1) What does “help reduce the increase in volume” translate to in terms of degree of actual impact reductions? 1%? 10? 50? Please explain. COMMENT 10.44: (p.14-24 #2) After the measures referred to that would help reduce the increase in volume are implemented, would the remaining impacts still be potentially significant, significant or unmitigatable? <u>RESPONSE TO ALL:</u> Compliance with LID policy is one approach to reducing CEQA impacts related to water quality and flooding. Several counties in California have aggressively promoted the SWRCB's LID policy by implementing new county standards and ordinances. Neither Inyo County nor Lahontan RWQCB requires minimum standards for use of LID practices applicable to the proposed project, so the applicant is not obligated to follow all components of LID. The applicant is proposing several BMPs, and along with staff proposed conditions of certification, CEQA impacts would be less than significant (see discussions under Water Quality and Flooding). Because the applicant isn't required to follow any LID ordinances, they are not required to calculate the increase in volume of storm water runoff caused by the proposed project.
10.45	COMMENT: (p.14-25 #1 (a)) Would Staff recommend as a Condition of Certification, the allowance of onsite septic tanks but eliminate the connected leach fields to ensure the applicant would have to dispose of all wastes offsite versus allowing wastes to seep into local groundwater over the life of the project? <u>RESPONSE:</u> Based on information submitted to date, staff does not identify a reason to restrict the project to the exclusive use of septic tanks and prohibiting the use of leach fields. **SOILS-9** requires that septic systems meet ICEHSD permit requirements.
10.46	COMMENT: (p.14-25 #1 (b)) Would Staff please clearly explain what this means, what the applicant would be exempt from, what the differences between operating with and without the permit are, why the applicant would qualify for a NONA, and how onsite waste disposal generated from the cement batch plant may differ between the two options? <u>RESPONSE:</u>

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	The NPDES Industrial General Permit is a federal permit issued by the California SWRCB, and therefore outside the jurisdiction of the California Energy Commission. Staff was informed by the SWRCB that this permit would be required for concrete batch plant activities. Based on this information, Staff developed **SOILS-3** to ensure that copies of permit-related documents were forwarded to the Compliance Project Manager (Energy Commission Staff). Because this is a federal permit, Staff recognizes that the applicant has the option of requesting an exemption from the issuing agency who has the discretion of either allowing or denying the request. This is also the reason staff developed **SOILS-4**.
10.47	COMMENT 10.47: (p.14-27 #1) Where is the discussion and analysis of impacts to water and soil quality resulting from the HHSEGS's introduction of chemical and hazardous materials to the environment during construction and operations?
10.48	COMMENT 10.48: (p.14-27 #2) When Staff refers to "*could increase the volume*" of pollutants, what is this based on and what degree of volume are they discussing?
10.49	COMMENT 10.49: (p.14-27 #3) When Staff refers to increasing "*possible amounts of pollutants*", what is this based on, what kind of pollutants are they referring to, and what is the possible amount of increases they are referencing?
10.50	COMMENT 10.50: (p.14-28 #4) Since storm water runoff from the entire proposed project site will predominately be directed toward the single point retention area, what are the kinds and volume of both individual and cumulative chemical and hazardous material pollutant impacts if combined with storm water and deposited in this singular area?
10.51	COMMENT 10.51: (p.14-28 #5) What protection will be provided in the retention area to prevent storm water runoff that has combined with onsite chemicals and hazardous materials (i.e., diesel, oil, etc.)? For example, will the retention area be lined with a non-permeable non-toxic substance to prevent saturation of soils and eventual seepage into local groundwater resources?
10.52	COMMENT 10.52: (p.14-28 #6) If the retention area is protected through the installation of a non-permeable, non-toxic liner that prevents soil/water contamination, how will this prevent pollutants from eventually discharging into the environment through the drainage culvert?

Comment #	COMMENT and RESPONSE
10.53	COMMENT 10.53: (p.14-28 #7) Where has Staff analyzed, discussed and determined impacts of the construction and operations of the HHSEGS with respect to possible adverse impacts to soil resources? <u>RESPONSE TO ALL:</u> All streams of wastewater would be kept completely separated from each other. Sanitary waste would remain contained within the septic system. Industrial wastewater would remain within the power block and processed through the thermal evaporator system. Hazardous liquids would be meticulously handled to prevent spills and accidental release. Wastewater produced from the energy generation process would be processed through the thermal evaporator system. Potentially contaminated storm water (rain that falls onto industrial equipment or other surfaces that might contaminate the storm water) would be collected and processed through the thermal evaporator system. "Clean" storm water would be directed away from the power blocks and allowed to flow toward the west. All BMPs and conditions of certification would strive to prevent any chemical or hazardous pollutants from mixing with the "clean" storm water. The commenter's statement that "all the onsite hazardous materials, emissions, and chemical introductions... just disappear from the equation" is not an accurate description of staff's assessment. The installation of a liner at the proposed retention area is not necessary because this runoff is separated from all other wastewater streams. Staff used the phrase "could increase the volume (of water) and possible amounts of pollutants" to describe a POTENTIAL impact of the proposed retention area, <u>absent</u> any BMPs or conditions of certification. No calculations were made to estimate individual or cumulative volumes of chemical or hazardous pollutants because no amount is allowed. See discussion on page 29.
10.54 10.55	COMMENT 10.54: (p.14-28 #8) The applicant intends to use lead-acid batteries to power the heliostat/mirror assemblies. These batteries may number up well over one hundred thousand. What impacts will storm water runoff have if it contacts these batteries and/or sweeps them into the retention area? COMMENT 10.55: (p.14-28 #9) If a 100-year 24-hour storm event is capable of dislodging 18,000 heliostat/mirror assemblies (or more) from the proposed project site such as was modeled by the BLM for the Ivanpah site, wouldn't this indicate that 18,000 lead-acid batteries (or more) would also be dislodged during this same storm event? What would be the impacts to water and soil quality if this happened?

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10.56	COMMENT 10.56: (p.14-28 #10) How many lead-acid batteries being dislodged and swept into the retention area and/or surrounding environment would it take to become a "significant adverse impact" to the environment? To water quality? To soil resources? RESPONSE TO ALL: The battery to operate a heliostat's pointing motor would be mounted to each heliostat above the ground. The battery is roughly the same size as a car battery with the same construction; each containing lead plates and one to two quarts of sulfuric acid. Like a car battery, it is sealed in a strong case and chances are extremely low that it would leak if dropped from that height. However, should a spill occur, the acid can be neutralized and it would not generate any significant toxic gases. Lead-acid batteries are more fully discussed in the **Hazardous Materials Management** section of this **FSA**. Additionally, Lead-acid batteries would have to be disposed of properly as hazardous waste, as required in the **Waste Management** section of this **FSA**.
10.57	COMMENT 10.57: (p.14-28 #11) What site-specific data does Staff rely upon to reach their determination that the construction and operation of the HHSEGS will not result in significant degradation of water quality or soil resources over the proposed project's life span? REPONSE: Staff reviewed publically available information and information submitted by the applicant in the AFC and related supplemental material such as subsequent data responses. Staff also consulted with various local and State agencies in addition to applying professional analysis and judgment.
10.58	COMMENT 10.58: (p.14-28 #12) How far into the project's lifetime did Staff analyze or model site-specific cumulative impacts of listed chemicals, hazardous materials and substances that will be utilized over the proposed project's lifetime that resulted in Staff's "*not identifying any significant impacts to water quality as a result of the retention area"*? RESPONSE: The AFC states that HHSEGS would be designed for an operating life of 25 to 30 years. Staff's analysis covers the entire operating life in addition to decommission and closure activities after the proposed project discontinues operations.
10	**Intervenor - Cindy MacDonald**

Comment #	COMMENT and RESPONSE
	Other Technical Sections (as indicated)
AIR RESOURCES 10.23	COMMENT 10.23: (p.3-9, #1) If the applicant chooses to directly wire the heliostats, how many feet/yards/miles of trenching will be required and what does this translate to in terms of acreage disturbance at the project site? RESPONSE: Based on the Ivanpah project (that uses BrightSource technology and is currently under construction), wires would connect a group of heliostats together with the wire fastened down at the ground surface. Several groups are connected to an above ground electrical box. Multiple electrical boxes would be located throughout the solar field. Underground cables would connect the electrical boxes to the service building of the respective solar power plant. Much of the trenching (roughly 2 feet deep) would occur along the footprint of the spur roads that cut across the solar fields, so no additional soil disturbance would occur in these areas. However, trenching would likely occur between spur roads also, which would be additional soil disturbance. The applicant has not provided the amount of additional trenching this would require. Staff will have the applicant address potential impacts in the final DESCP required in **SOILS -1**.
AIR RESOURCES 10.26	COMMENT 10.26: (p.3-10, #1) How many roads circle the power towers for each plant under each design element (20-ft versus 10 ft)? RESPONSE: Because the applicant's post-construction calculations used 10-foot wide concentric drive zones around each solar tower, staff considers this to be the intended design. Staff did not assess the project using 20-foot wide concentric drive zones because the post construction calculations indicated 10-foot wide roads and not 20-foot wide roads. Because the circular layout of each solar field is contained within two irregular shapes, the number of roads surrounding each tower varies depending on direction from the solar tower. The "Civil Overall Site Plan" (AFC, Appendix 5.15A, Pg. 897, www.energy.ca.gov\\sitingcases\\hiddenhills\\documents\\applicant\\afc\\Volume-2-Appendixes) shows the layout of 10-foot wide dirt roads. Solar Plant 1 would have 13 complete circles, but as many as 41 roads. Solar Plant 2 would have 8 complete circles, but as many as 33 roads. The applicant has not submitted site plans showing 20-foot wide dirt roads within the solar fields.
AIR RESOURCES 10.27	COMMENT 10.27: (p.3-10, #2) What is the projected total surface in acreage values for each of these maintenance road design elements and what is the difference in

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	values between them? Example, 20-ft roads result in 500 acres of disturbance, 10-ft roads result in 1,000 acres of disturbance. RESPONSE: Because the applicant's post-construction calculations used 10-foot wide concentric drive zones around each solar tower, staff considers this to be the intended design. Staff did not assess the project using 20-foot wide concentric drive zones because the post-construction calculations indicated 10-foot wide roads and not 20-foot wide roads. Paved roads: 16 acres Fully graded dirt roads (12' & 20'): 18.2 acres Partially graded dirt roads (10'): 171 acres
AIR RESOURCES 10.28	COMMENT 10.28: (p.3-10, #3) How many miles of roads for each kind of road (paved, fully graded, partially graded) is the completed proposed project projected to have? RESPONSE: When assessing amount of soil disturbance, staff is concerned with area of roadway rather than number of miles.
AIR RESOURCES 10.29	COMMENT 10.29: (p.3-10, #4) What is the total number of square feet for each kind of road (paved, fully graded, partially graded) that will be incorporated into the proposed project sites operational design? RESPONSE: 1 acre = 43,560 square feet Paved roads: 16 acres = 696,960 square feet Fully graded dirt roads (12' & 20'): 18.2 acres = 792,792 square feet Partially graded dirt roads (10'): 171 acres = 7,448,760 square feet
AIR RESOURCES 10.64	COMMENT 10.64: (p.3-17, #4) How can the 200,000 to 400,000 gallons of recycled water be counted on for dust control if its discharge depends on the fluid sample levels of contamination? RESPONSE: The reuse of this wastewater (hydrostatic test water or passivating/cleaning fluid) was accounted for in the applicant's calculation when requesting the use of 288 AFY of water for construction activities.
AIR RESOURCES 10.65	COMMENT 10.65: (p.3-17, #5) What happens to this recycled water if it fails to register as “clean”? How will it be disposed of?

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	RESPONSE: Water discharge (hydrostatic test water or passivating/cleaning fluid) that does not meet requirements for reuse onsite would be trucked offsite for disposal at an approved facility. **SOILS-7** (Construction Wastewater Discharge) requires disposal offsite at an appropriately licensed facility.
AIR RESOURCES 10.66 AIR RESOURCES 10.67	COMMENT 10.66: (p.3-17, #6) Will the applicant just dilute the recycled water until it registers as "clean"? If so, how much additional water would this require? COMMENT 10.67: (p.3-17, #7) If the fluid samples fail to register as "clean" and the applicant dilutes it with additional water until it can register as clean enough for discharge, isn't the same amount of "nonclean" chemicals being discharged into the environment? If so, what is the cumulative affect of this discharge to soil, water and biological resources over the life of the proposed project? RESPONSE TO ALL: The NPDES General Permit relating to this wastewater is a federal permit issued by the California SWRCB, and therefore outside the jurisdiction of the California Energy Commission. Staff was informed by the Water Board that this permit would be required. Based on this information, Staff developed **SOILS-7** (Construction Wastewater Discharge) to ensure that copies of permit-related documents were forwarded to the Compliance Project Manager (Energy Commission Staff). Because this is a federal permit, Water Board staff administers and enforces its requirements. This permit program is designed to ensure there are no discharges from project operations that would result in water quality impacts.
AIR RESOURCES 10.108	COMMENT 10.108: (p.3-32, #2) How can the soil disturbance of installing 170,000 heliostat/mirror assemblies be considered "negligible"? RESPONSE: In the construction industry, disturbed area or soil disturbance area typically means an area that is altered as a result of clearing, grading, and/or excavation. Staff use of "negligible" in describing heliostat installation in the field (vehicle driving, vegetation mowing, and foot traffic) reflected that no grading would be required. Staff changed the description from "Soil Disturbance Area" to "Area of Land Grading and Excavation" to avoid confusion. Please see the Total Soil Disturbance discussion and **Soils & Surface Water Table 6.**

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AIR RESOURCES 10.109	COMMENT 10.109: (p.3-32, #3) Where is the site-specific data located that describes how the heliostat/mirror assemblies will be installed, how many will be installed per day per ATV and how long this process is expected take? RESPONSE: The general installation procedure for heliostats is found in the **Project Description** section of this **FSA**. Information about the number of heliostats installed per day is not included, and staff does not need to know that in order to complete its analysis. The applicant may be able to answer this question for the commenter.
LAND USE 10.12	COMMENT 10.12: (p. 10-4, #1) What will be the affected acreage of “temporary housing” and where will it be located?
LAND USE 10.13	COMMENT 10.13: (p. 10-4, #2) How many temporary housing units would be installed, when would they be installed and for how long would they remain active?
LAND USE 10.14	COMMENT 10.14: (p. 10-4, #3) What will be the affected resources and impacts of temporary housing if the CPM authorizes it? Topics should include construction worker traffic analysis, additional roadways if required, additional septic tanks//leach fields if required, additional water requirements, impacts to biological, cultural/historic and visual resources, etc.
LAND USE 10.15	COMMENT 10.15: (p. 10-4, #4) What will happen to the area that lodged the temporary housing once it is no longer needed? How will it be developed, maintained and/or reclaimed?
LAND USE 10.16	COMMENT 10.16: (p. 10-4, #5) What is the projected amount of revenue the “transient tax” would generate for Inyo County and/or the State of California based on this temporary housing? RESPONSE TO ALL: The text "from temporary worker housing" was a typo in **SOILS-8** (Septic System and Leach Field Requirements). The text was unintentional and is no longer included in the condition (renumbered **SOILS-9**). The analysis in the **Socioeconomics** section of this **FSA** shows that no additional housing, temporary or otherwise, would need to be constructed as a result of project construction and operations. There is enough available housing in the area to accommodate those workers who may temporarily relocate closer to the project site during

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	construction.
OPERATIONS 10.10	COMMENT: (p. 12.-3, #8) What is the reason(s) for the differing design elements description and discrepancy? RESPONSE: **Traffic and Transportation** (pg. 622 of PSA) took information from AFC, Project Description, Section 2.1.2.4. **Soils and Surface Water** (pg. 571 of PSA) took information from the Preliminary Construction SWPPP-DESCP (Appendix 5.15A of AFC) in two locations: Post-construction Hydrology Calculations (Attachment H, pg 706) and Grading and Drainage (Attachment I, pg 897).
OPERATIONS 10.11	COMMENT: (p. 12.-3, #9) Which one of these design descriptions is currently accurate? RESPONSE: Because the applicant's post-construction calculations used 10-foot wide concentric drive zones around each solar tower and not 20-foot wide, staff considers this to be the intended design.
OPERATIONS 10.12	COMMENT: (p. 12.-3, #10) Which one of these design elements is incorporated in the AFC files and where is it located? RESPONSE: **Traffic and Transportation** (pg. 622 of PSA) took information from AFC, Project Description, Section 2.1.2.4. **Soils and Surface Water** (pg. 571 of PSA) took information from the Preliminary Construction SWPPP-DESCP (Appendix 5.15A of AFC) in two locations: Post-construction Hydrology Calculations (Attachment H, pg 706) and Grading and Drainage (Attachment I, pg 897).
OPERATIONS 10.13	COMMENT: (p. 12.-4, #11) How many roads circle the power towers for each plant under *each* design element? RESPONSE: Because the circular layout of each solar field is contained within two irregular shapes, the number of roads surrounding each tower varies depending on direction from the solar tower. The "Civil Overall Site Plan" (AFC, Appendix 5.15A, Pg. 897,

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	www.energy.ca.gov/sitingcases/hiddenhills/documents/applicant/afc/Volume-2-Appendixes) shows the layout of 10-foot wide dirt roads. Solar Plant 1 would have 13 complete circles, but as many as 41 roads. Solar Plant 2 would have 8 complete circles, but as many as 33 roads. The applicant has not submitted site plans showing 12-foot wide dirt roads within the solar fields.
OPERATIONS 10.14	COMMENT 10.14: (p. 12.-4, #12) What is the projected total surface in acreage values for *each* of these maintenance road design elements and what is the difference in values between them? Example, 20-ft roads result in 500 acres of disturbance, 10-ft roads result in 1,000 acres of disturbance.
OPERATIONS 10.15	COMMENT 10.15: (p. 12.-4, #13) Do changes in acreage values for maintenance paths/drive zones result in changes to the number of installed heliostats/mirrors? If so, by how many?
OPERATIONS 10.16	COMMENT 10.16: (p. 12.-4, #14) What are the differences in impacts to the Low Impact Design element of the proposed project if the 20-ft drive zones are utilized versus the 10-ft maintenance paths?
OPERATIONS 10.17	COMMENT 10.17: (p. 12.-4, #15) What are the differences between sheet flow, drainage and surface run off between these two design elements?
OPERATIONS 10.18	COMMENT 10.18: (p. 12.-4, #16) Which of the two designs provide the highest level of environmental protection and/or the least amount of environmental impacts and by what degree? <u>RESPONSE TO ALL:</u> Because the applicant's post-construction calculations used 10-foot wide concentric drive zones around each solar tower, staff considers this to be the intended design. Staff did not assess the project using 20-foot wide concentric drive zones. 1 acre = 43,560 square feet Paved roads: 16 acres = 696,960 square feet Fully graded dirt roads (12' & 20'): 18.2 acres = 792,792 square feet Partially graded dirt roads (10'): 171 acres = 7,448,760 square feet
WASTE MGMT 10.2	COMMENT: (p. 18-1, #2) Do California and/or Inyo County allow industrial facilities to discharge waste that could potentially seep into underground water tables residing below the proposed project site?

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	RESPONSE: The Clean Water Act and California Water Code do not allow direct discharge of industrial waste that would degrade groundwater or surface waters. Inyo County and the Regional Water Quality Control Board allow industrial facilities to dispose sanitary and domestic wastewater to an onsite wastewater treatment system (typically consisting of a septic tank, distribution piping, and leach field) provided specific standards are met and a permit is approved.
WASTE MGMT 10.3	COMMENT: (p. 18-1, #3) If so, are there any restriction on what can be discharged into leach fields and under what authority (LORS) are these restrictions established? RESPONSE: California currently does not have statewide rules and regulations regarding onsite wastewater treatment, but the State Water Resource Control Board is in the process of preparing uniform regulations for California. Until then, new septic systems in Inyo County must comply with the Uniform Plumbing Code (Section 107(d), Chapter 1 Part 1) and the Lahontan Basin Plan (Section 4.4, Individual Wastewater Treatment Systems). HHSEGS would be required to comply with the adopted LORS in effect at the time any new onsite septic system would be constructed. Inyo County Environmental Health Services Department (ICEHSD) is responsible for permitting and inspecting the installation septic systems to ensure LORS are met. ICEHSD has published an onsite sewage treatment and disposal guide which includes information on site evaluation and system design. http://www.inyocounty.us/EnvironmentalHealth/residential_septic_systems.html
WASTE MGMT 10.4	COMMENT: (p. 18-2, #1) What waste disposal system is going to be utilized for the proposed HHSEGS, septic tanks with leach fields or septic tanks without leach fields that require sanitary wastes to be disposed of offsite? RESPONSE: The use of a septic tank and the use of a leach field are not mutually exclusive. The proposed septic system basically consists of a septic tank, distribution piping, and leach field. Waste water enters tank, allowing solids to settle and scum to float. The settled solids are anaerobically digested, reducing the volume of solids. The excess liquid drains in a relatively clear condition from the tank outlet to a piping network, often lain in a stone-filled trench, that distributes

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	wastewater throughout the leach field. Waste collected in the septic tank that is not decomposed by the anaerobic digestion eventually has to be removed, or else the septic tank fills up and undecomposed wastewater discharges directly to the leach field.
WASTE MGMT 10.5	COMMENT: (p. 18-2, #2) If the septic tank/leach field system is utilized, what are the impacts of discharging this waste into the surrounding environment such as soils and above local water tables? RESPONSE: Improper construction and operation of the septic system could release bacteria and other contaminants into the surrounding area. Regulations are in place to protect groundwater. New septic systems in Inyo County must comply with the Uniform Plumbing Code (Section 107(d), Chapter 1 Part 1) and the Lahontan Basin Plan (Section 4.4, Individual Wastewater Treatment Systems). Included in the requirements are soil percolation standards; minimum separation/set back distances to prevent impacts to groundwater and nearby water wells; and septic tank and leach field design, sizing and construction standards to ensure adequate capacity and proper treatment and disposal of the wastewaters. Inyo County Environmental Health Services Department (ICEHSD) is responsible for permitting and inspecting the installation septic systems to ensure LORS are met. ICEHSD has published an onsite sewage treatment and disposal guide which includes information on site evaluation and system design. http://www.inyocounty.us/EnvironmentalHealth/residential_septic_systems.html
WASTE MGMT 10.6	COMMENT: (p. 18-2, #3) Since no detailed description or critical analysis has yet to occur regarding the engineering and design element of the pipe and drainage systems in relation to the septic tank/leach field waste disposal systems, how can the CEC Staff and/or public know if hazardous wastes and semi-hazardous wastes can potentially be disposed of and discharged into the surrounding environment via the septic tank/leach field system?
WASTE MGMT 10.7	COMMENT: (p. 18-3, #4) What data is available that can confirm no hazardous or semi-hazardous materials will be disposed of via the septic tank/leach field system? RESPONSE TO ALL: The disposal of hazardous wastes or semi-hazardous waste into the

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	septic system is simply illegal. A number of LORS are in place to regulate the generation, transportation, treatment, storage, and disposal of hazardous waste (see Table 1 in the **Waste Management** section of this **FSA**). In addition, condition of certification **WASTE-4** requires an Operation Waste Management Plan for all wastes generated, including hazardous waste. The plan must cover the management methods to be used for each waste stream, including temporary on-site storage, housekeeping and best management practices to be employed, and disposal requirements and sites. As discussed in the **Waste Management** section of this **FSA**, staff concludes that the proposed project would comply with all applicable LORS regulating the management of hazardous and non-hazardous wastes during both facility construction and operation.
WASTE MGMT 10.8	COMMENT: (p. 18-3, #5) Where is the engineering design description in the AFC project data (or subsequent documents) that clearly depicts the septic tank/leach field systems will only be connected to toilets, showers, and sinks associated exclusively with domestic type waste disposal? <u>RESPONSE:</u> The AFC states in the Project Description (Section 2.2.6.1) and the Water Resources section (5.15.3.3.3) that the septic system would collect wastewater discharges from toilets, sinks, and showers. Staff does not require engineering design drawings to verify this during the licensing process, because **SOILS-9** requires that septic systems meet ICEHSD permit requirements. Septic system design would need approval and installation would be inspected to ensure that only domestic type wastewater would connect to the system.
WASTE MGMT 10.9	COMMENT: (p. 18-3, #6) If the septic tank/leach field system is utilized, what mitigation measures can be used to prevent potential soils and underground water systems from being effected by cumulative waste discharges over the life of the proposed project? <u>RESPONSE:</u> **SOILS-9** (Septic System and Leach Field Requirements) would ensure compliance with LORS and, through the protectiveness provided by the County regulatory standards, would reduce potential impacts from the septic systems.
WASTE MGMT 10.10	COMMENT: (p. 18-3, #7) Would Staff recommend as a Condition of Certification, the allowance of onsite septic tanks but eliminate the connected leach fields to ensure the applicant would have to dispose of all wastes offsite

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	versus allowing wastes to seep into local soils and groundwater over the life of the project? RESPONSE: Based on information submitted to date, staff does not identify a reason to restrict the project to the exclusive use of septic tanks and prohibiting the use of leach fields. **SOILS-9** requires that septic systems meet ICEHSD permit requirements.
WASTE MGMT 10.23 WASTE MGMT 10.24	COMMENT: (p. 18-9, #1) Can the CEC know about the potential inclusion of temporary worker housing at or near the proposed project site -not include any data, analysis, potential impact discussions or proposed mitigation measures under CEQA equivalency requirements – and still approve the siting of the proposed project? COMMENT: (p. 18-9, #2) Should temporary worker housing be utilized on or near the proposed project site, what is the maximum number of units that would be authorized and what would be their corresponding waste disposal needs? RESPONSE TO ALL: The text "from temporary worker housing" was a typo in **SOILS-8** (Septic System and Leach Field Requirements). The text was unintentional and is no longer included in the condition (renumbered **SOILS-9** on page 92). The analysis in the **Socioeconomics** section of this **FSA** shows that no additional housing, temporary or otherwise, would need to be constructed as a result of project construction and operations. There is enough available housing in the area to accommodate those workers who may temporarily relocate closer to the project site during construction.
WASTE MGMT 10.26	COMMENT: (p. 18-10, #8) How can the 200,000 to 400,000 gallons of recycled water be counted on for dust control if its discharge depends on the fluid sample levels of contamination? RESPONSE: The reuse of this wastewater (hydrostatic test water or passivating/cleaning fluid) was accounted for in the applicant's calculation when requesting the use of 288 AFY of water for construction activities.
WASTE MGMT 10.27	COMMENT: (p. 18-10, #9) What happens to this recycle water if fails to register as clean? How will it be disposed of?

Comment #	COMMENT and RESPONSE
	RESPONSE: Water discharge (hydrostatic test water or passivating/cleaning fluid) that does not meet requirements for reuse onsite would be trucked offsite for disposal at an approved facility. **SOILS-7** (Construction Wastewater Discharge) requires disposal offsite at an appropriately licensed facility. See discussion on page 40.
WASTE MGMT 10.28 WASTE MGMT 10.29	COMMENT: (p. 18-10, #10) Will the applicant just dilute the recycled water until it registers as clean? If so how much additional water would this require? COMMENT: (p. 18-10, #11) If the fluid samples fail to register as clean and the applicant dilutes it with additional water until it can register as clean enough for discharge, isn't the same amount of non-clean chemicals being discharged into the environment? If so, what is the cumulative affect of this discharge to soil, water and biological resources over the life of the proposed project? RESPONSE: The NPDES General Permit relating to this wastewater is a federal permit issued by the California SWRCB, and therefore outside the jurisdiction of the California Energy Commission. Staff was informed by the Water Board that this permit would be required. Based on this information, Staff developed **SOILS-7** (Construction Wastewater Discharge) to ensure that copies of permit-related documents were forwarded to the Compliance Project Manager (Energy Commission Staff). Because this is a federal permit, Water Board staff administers and enforces its requirements. This permit program is designed to ensure there are no discharges from project operations that would result in water quality impacts.
13	**Applicant – Hidden Hills Solar I, LLC and Hidden Hills Solar II, LLC**
13.1 (p.233 #1)	COMMENT: Page 4.10 4, Table 2, Title: Please consider revising the title of the table as follows: “Lahontan RWQCB Basin Plan Beneficial Use Designation for Minor Surface Waters in the Pahrump Valley” RESPONSE: Agreed. Change made on page 5.
13.2 (p.233 #2)	COMMENT: Page 4.10 6, Table 3: The following notes should be added to Table 3: (1) The percent composition cannot be applied to the HHSEGS site. This percent composition generally applies to the entire

Comment #	COMMENT and RESPONSE
	generalized soil association, which is extremely large. For example, within the HHSEGS site there may be only a few of these series present. (2) At least one of these series is expected to contain a petrocalcic horizon. (3) Here are many areas with cryptobiotic crusts and desert pavement; wind and water erosion could potentially be problematic once these are disturbed. RESPONSE: Staff agrees the first note should be added, but the second and third notes are too site-specific for Table 3 on page 6. Mention of the soil's hardpan layer and presence of surface crusts are found elsewhere in the analysis.
13.3 (p.233 #3)	COMMENT: Page 4.10 7, Surface Water Features, 3rd paragraph, 3rd sentence: "Waters of the State" are defined by the State Water Resources Control Board, not the Department of Fish and Game; therefore please revise the sentence as follows: The Lahontan RWQCB and California Department of Fish and Game is are currently reviewing the project; to determine whether any of the onsite washes are "Waters of the State".the RWQCB will verify the extent of jurisdictional waters of the State on the site, and CDFG will verify which of these features will be subject to streambed alteration requirements under Section 1600 of the Fish and Game Code. RESPONSE: Agreed. Change made on page 8 with modification.
13.4 (p.233 #4)	COMMENT: Page 4.10 7, 5th paragraph, last sentence: "The majority of runoff flows through the southern portion of the site due to offsite flows originating from the east." This sentence is not clear. Does it mean that offsite runoff is mostly on the southern boundary? Seems that it would mostly be on the western boundary. RESPONSE: Staff recognizes the confusion caused by the sentence (in Surface Water Features). Throughout the site, natural flow direction is from east to west. The modeling of a 100-year storm shows that the majority of sheetflow flooding occurs THROUGH Solar Field 2, which is the southern HALF of the project site. Staff has corrected this on page 9.
13.5 (p.233 #5)	COMMENT: Page 4.10 11, Linear Facilities, Offsite: The description of the electric transmission line and the natural gas pipeline have been modified. The revised description contained previously in the Applicant's

Comment #	COMMENT and RESPONSE
	General Document Comments should be used. RESPONSE: The description on page 14 now matches the language in the Project Description section of the **FSA**.
13.6 (p.234 #6)	COMMENT: Page 4.10 11, Linear Facilities, Offsite, last paragraph, 1st sentence: CEQA does not have connected actions. Therefore, delete the sentence "~~Although the Hidden Hills Transmission Project is located entirely in Nevada (and therefore outside Energy Commission jurisdiction), this proposed transmission project is considered in this PSA as a connected action to the proposed HHSEGS project.~~" RESPONSE: Staff does not agree with this comment. See discussion under "Project Impacts Outside the State Border" in the **Executive Summary** of this **FSA**.
13.7 (p.234 #7)	COMMENT: Page 4.10 13, Soil Erosion, 1st paragraph: Please modify the first paragraph since it is vague and replace it with the following from the AFC: Disturbed areas would be stabilized with effective soil cover (such as aggregate, paving, or vegetation) as soon as feasible but no later than 14 days after construction or disturbance is complete in that portion of the site. To reduce erosion potential, best management practices (BMPs) will be implemented in accordance with the SWPPP/DESCP. Vegetation will remain but will be cut (when necessary) to a height that will allow clearance for heliostat function while leaving the root structures intact. Occasional cutting of the vegetation will be performed as needed to permit unobstructed heliostat mirror movement. RESPONSE: Agreed. Change made on page 16 with modification.
13.8 (p.234 #8)	COMMENT: Page 4.10 15, Contaminated Soil and Water, 2nd sentence: This sentence reads, in part: "It is recommended that near surface soils be tested for the potential presence of *these compounds to assess* if there are any potential for unacceptable exposure risks…" (Emphasis added). Please clarify what compounds are being referred to. RESPONSE: This was a typo. Text was updated on page 18 to reflect information in **Waste** section.

Comment #	COMMENT and RESPONSE
13.9 (p.234 #9)	COMMENT: Page 4.10 20, 2nd bullet, 2nd sentence: Please revise the sentence as follows: "Since the initial filing of the original AFC, ~~several~~ some changes to the project have occurred such as the removal of two boilers from each power block ~~facility layout and basic shape of each power block, the new alignment of onsite linear facilities, relocation of the project switchyard~~ and modifications to the west perimeter retention area. RESPONSE: Changes made with modification. Staff is aware that the proposed switchyard is back at the original location, but the facility layout and basic shape of the powerblock has changed. Original powerblock layout in the AFC (HHSG 2011a, Figure 2.2-1) is different from updated layout from Supplemental Data Response, Set 2 (CH2 2012p, Figure 2.2-1 R1).
13.10 (p.234 #10)	COMMENT: Page 4.10 21, 3rd paragraph, 1st sentence: The proposed project does not constitute an "unusual circumstance." These best management practices (BMPs) are effective and have been proven in other desert projects. RESPONSE: Staff does not intend to imply that BMPs are not effective in desert projects. The unusual circumstance refers to the complex flows characteristic of undeveloped alluvial fans, compared to the more predictable flows of a traditional, continuously flowing stream. The paragraph on page 24 was re-written to explain the need for a Storm Water Damage Monitoring and Response Plan (**SOILS-5**).
13.11 (p.234 #11)	COMMENT: Page 4.10 21, 3rd bullet, Footnote 6: Determination of "Waters of the State" is the job of the SWRCB (or the Lahontan RWQCB), not the California Department of Fish and Game (CDFG). Therefore, please revise: "(~~by California Department of Fish and Game and~~ Lahontan RWQCB)" in the footnote. RESPONSE: Change made on page 26 with modification.
13.12 (p.234 #12)	COMMENT: Page 4.10 26, 3rd paragraph: Regarding the 2nd sentence, VTN performs hydrologic modeling in all sorts of desert environments. Please provide some reasoning for stating "…modeling is imprecise and untested in this desert environment."

Comment #	COMMENT and RESPONSE
	RESPONSE: Staff agrees that VTN followed preapproved hydrologic analysis methodology and appropriate protocols (HEC-1 and FLO-2D) for the preliminary analysis. The intent of that sentence was to say that alluvial flows are very complex. This area does not have the benefit of historical flood data to compare to the estimated flow calculations. The paragraph on page 24 was re-written to explain the need for a Storm Water Damage Monitoring and Response Plan (**SOILS-5**).
13.13 (p.234 #13)	COMMENT: Page 4.10 30, last paragraph, 2nd sentence: Please delete the portion of the following sentence. It is inconsistent with the Socioeconomics PSA section concludes that "there is sufficient existing labor force in the region and the workforce would reside in existing, available housing" (CEC PSA Socioeconomics, page 4.9 15). The portion of the sentence which should be deleted reads: "For example, ~~additional housing may be needed to accommodate workers for construction and operation of the project, or~~ …" RESPONSE: This sentence was intended to be a general statement applicable to any new project. Staff made edits on page 41 removing implications that this statement is specific to the project.
13.14 (p.235 #14)	COMMENT: SOILS-1: Changes to condition. RESPONSE: Staff does not agree with relocation of the "Verification" heading. Other changes made on page 83 with modification.
13.15 (p.237 #15)	COMMENT: SOILS-2: Changes to condition. RESPONSE: Changes made on page 85 with modification.
13.16 (p.237 #16)	COMMENT: SOILS-4: No comments RESPONSE: N/A
13.17 (p.237 #17)	COMMENT: SOILS-5: Changes to condition. RESPONSE: Staff does not agree with relocation of the "Verification" heading. Other changes made on page 89 with modification.

Comment #	COMMENT and RESPONSE
13.18 (p.240 #18)	COMMENT: SOILS-6 (Construction Wastewater Discharge, renumbered SOILS-7): No comments RESPONSE: N/A
13.19 (p.240 #19)	COMMENT: SOILS-7 (Wastewater Collection System, renumbered SOILS-8): No comments RESPONSE: N/A
13.20 (p.240 #20)	COMMENT: SOILS-8 (Septic System and Leach Field Requirement, renumbered SOILS-9): Changes to condition. RESPONSE: Changes made on page 92 with modification.

STAFF CONCLUSIONS AND PROPOSED FINDINGS

Based on the assessment of the proposed Hidden Hills Solar Electric Generating System (HHSEGS), California Energy Commission (Energy Commission) staff proposes the following findings:

- Compliance with an approved DESCP in accordance with Condition of Certification **SOILS-1** would reduce the impacts of soil erosion during construction and operations.
- Condition of Certification **SOILS-5** would reduce impacts of potential storm water damage to heliostat assemblies.
- Conditions of Certification **SOILS -1**, **-2**, and **-3** would reduce or avoid impacts of contact runoff during construction activities. Conditions of Certification **SOILS -1** and **-4** would reduce or avoid impacts of contact runoff during operations.
- Condition of Certification **SOILS-6** would reduce potential offsite flooding impacts to Old Spanish Trail Highway/Tecopa Road. The proposed HHSEGS project would not impede or significantly redirect flood flows of the designated 100-year floodplain. In addition, the project would not be affected by dam failure, tsunami, or seiche.
- The discharge of construction wastewater would be in compliance with LORS and would have no adverse environmental impact provided the requirements of Conditions of Certification **SOILS-1** and **-7** are met.
- The discharge of sanitary waste and industrial wastewater would be in compliance with LORS and would have no adverse environmental impact provided the requirements of Conditions of Certification **SOILS-8** and **-9** are met.
- Compliance with Conditions of Certification **SOILS-2** through **-9**, the HHSEGS project would conform with applicable federal, state, and local LORS and state policy related to water quality and hydrology.

- Staff has not identified any significant impacts that would occur in Nevada regarding water quality and hydrology caused by the proposed HHSGES project. The water quality and hydrology impacts from the linear facilities (transmission line and natural gas line portions) within the state of Nevada would be assessed by BLM under the requirements of the National Environmental Policy Act (NEPA) of 1969.

PROPOSED CONDITIONS OF CERTIFICATION

DRAINAGE, EROSION, AND SEDIMENTATION CONTROL PLAN (DESCP)

SOILS-1 Prior to site mobilization, the project owner shall obtain the CPM's approval for a site specific DESCP that ensures protection of water quality and soil resources of the project site and all onsite linear facilities for both the construction and operation phases of the project. This plan shall address appropriate methods and actions, both temporary and permanent, for the protection of water quality and soil resources, demonstrate no increase in off-site flooding potential, and identify all monitoring and maintenance activities. The project owner shall complete all engineering plans, reports, and documents necessary for the CMP to conduct a review of the proposed project and provide a written evaluation as to whether the proposed grading, drainage improvements, and flood management activities comply with all requirements presented herein. The DESCP may be combined with Condition of Certification SOILS-2 (Construction SWPPP). The plan shall be consistent with the grading and drainage plan as required by Condition of Certification **CIVIL-1** and shall contain the following elements:

Vicinity Map: A map shall be provided indicating the location of all project elements with depictions of all major geographic features to include watercourses, washes, irrigation and drainage canals, major utilities, and sensitive areas.

Site Delineation: The site and all project elements shall be delineated showing boundary lines of all construction areas and the location of all existing and proposed structures, underground utilities, roads, and drainage facilities. With legend, indicate types and locations of storm water control measures built to permanently control storm water pollution. Distinguish between pollution prevention, treatment, and containment devices. Identify sanitary waste facilities. Adjacent property owners shall be identified on the plan maps. All maps shall be presented at a legible scale

Drainage: The DESCP shall include the following elements:

a. Topography. Topography for offsite areas are required to define the existing upstream tributary areas to the site and downstream to provide enough definition to map the existing storm water flow and flood hazard. Spot elevations shall be required where relatively flat conditions exist.

b. Proposed Grade. Proposed grade contours shall be shown at a scale appropriate for delineation of onsite ephemeral washes, drainage ditches, and tie-ins to the existing topography.

c. Hydrology. Existing and proposed hydrologic calculations for onsite areas and offsite areas that drain to the site; include maps showing the drainage area boundaries and sizes in acres, topography and typical overland flow directions, and show all existing, interim, and proposed drainage infrastructure and their intended direction of flow. Show each discharge location from the site.

d. Hydraulics. Provide hydraulic calculations to support the selection and sizing of the onsite drainage network, diversion facilities and BMPs.

Watercourses and Critical Areas: The DESCP shall show the location of all onsite and nearby watercourses including washes, irrigation and drainage canals, and drainage ditches, and shall indicate the proximity of those features to the construction site. Maps shall identify high hazard flood prone areas. Maps shall show with legend locations of expected sources of pollution generation (i.e. outdoor work and storage areas, delivery areas, trash enclosures, fueling areas) during construction activities and separate maps for operational activities.

Clearing and Grading: The plan shall provide a delineation of all areas to be cleared of vegetation, areas to be preserved, and areas where vegetation would be cut to allow clear movement of the heliostats. The plan shall provide elevations, slopes, locations, and extent of all proposed grading as shown by contours, cross-sections, cut/fill depths or other means. The locations of any disposal areas, fills, or other special features shall also be shown. Existing and proposed topography tying in proposed contours with existing topography shall be illustrated. The DESCP shall include a statement of the quantities of material excavated at the site, whether such excavations or fill is temporary or permanent, and the amount of such material to be imported or exported or a statement explaining that there would be no clearing and/or grading conducted for each element of the project. Areas of no disturbance shall be properly identified and delineated on the plan maps.

Soil Wind and Water Erosion Control: The plan shall address exposed soil treatments to be used during construction and operation of the proposed project for both road and non-road surfaces including specifically identifying all chemical based dust palliatives, soil bonding, and weighting agents appropriate for use at the proposed project site that would not cause adverse effects to vegetation; BMPs shall include measures designed to prevent wind and water erosion including application of chemical dust palliatives after rough grading to limit water use. All dust palliatives, soil binders, and weighting agents shall be approved by the CPM prior to use.

Project Schedule: The DESCP shall identify on the topographic site map the location of the site-specific BMPs to be employed during each phase of construction (initial grading, project element construction, and final

grading/stabilization). BMP implementation schedules shall be provided for each project element for each phase of construction.

Best Management Practices: The DESCP shall show the location, timing, and maintenance schedule of all erosion- and sediment-control BMPs to be used prior to initial grading, during project element excavation and construction, during final grading/stabilization, and after construction. BMPs shall include measures designed to control dust and stabilize construction access roads and entrances. The maintenance schedule shall include post-construction maintenance of treatment-control BMPs applied to disturbed areas following construction.

Erosion Control Drawings: The erosion-control drawings and narrative shall be designed, stamped and sealed by a professional engineer or erosion-control specialist.

Agency Comments: The DESCP shall include copies of recommendations from the County of Inyo and the California Department of Fish and Game (CDFG). If the DESCP is combined with the Construction SWPPP, the document shall include copies of recommendations from the Lahontan Regional Water Quality Control Board (RWQCB).

Monitoring Plan: Monitoring activities shall include routine measurement and photographs of the volume of accumulated sediment in the onsite drainage ditches, and storm water diversions.

Verification: The DESCP shall be consistent with the grading and drainage plan as required by Condition of Certification **CIVIL-1**, and relevant portions of the DESCP shall be submitted to the chief building official (CBO) for review and approval. In addition, the project owner shall do all of the following:

- No later than ninety (90) days prior to start of site mobilization, the project owner shall submit a copy of the DESCP to Inyo County for review and comment. If the DESCP is combined with the Construction SWPPP, the project owner shall submit a copy of the document to the Lahontan RWQCB for review and comment. The CPM shall consider comments received.
- During construction, the project owner shall provide an analysis in the monthly compliance report on the effectiveness of the drainage-, erosion- and sediment control measures and the results of monitoring and maintenance activities.
- Once operational, the project owner shall provide in the annual compliance report information on the results of storm water BMP monitoring and maintenance activities.

CONSTRUCTION - NPDES GENERAL PERMIT (SOLAR PLANT 1 & 2)

SOILS-2 The project owner shall fulfill the requirements contained in State Water Resources Control Board's *National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities Order No. 2009-0009-DWG, NPDES No. CAS000002* and all subsequent revisions and amendments. The

project owner shall develop and implement a construction Storm Water Pollution Prevention Plan (SWPPP) for the construction of the project.

Verification: At least thirty (30) days prior to site mobilization, the project owner shall submit the construction SWPPP to the CBO and CPM and a copy shall be kept accessible onsite at all times. Within ten (10) days of its mailing or receipt, the project owner shall submit to the CPM any correspondence between the project owner and the Lahontan RWQCB about the general NPDES permit for discharge of storm water associated with this activity. This information shall include any updates to the construction SWPPP, a copy of the notice of intent sent by the project owner to the State Water Resources Control Board and the notice of termination.

INDUSTRIAL - NPDES GENERAL PERMIT (CONCRETE BATCH PLANT)

SOILS-3 For the operation of the temporary concrete batch plant, the project owner shall comply with the requirements of the State Water Resources Control Board's NPDES General Permit for Discharges of Storm Water Associated with Industrial Activities (Order No. 97-03-DWQ, NPDES No. CAS000001) and all subsequent revisions and amendments. The project owner shall develop and implement a Storm Water Pollution Prevention Plan (SWPPP) for the operation of the temporary concrete batch plant. The project owner may also submit a Notice of Non- Applicability (NONA) to the RWQCB to apply for an exemption to the general NPDES permit.

Verification: At least thirty (30) days prior to operation of the temporary concrete batch plant, the project owner shall submit copies to the CPM of the operational SWPPP and shall retain a copy on site. Within 10 days of its mailing or receipt, the project owner shall submit to the CPM any correspondence between the project owner and the Lahontan RWQCB about the general NPDES permit for discharge of storm water associated with this activity. This information shall include a copy of the notice of intent sent by the project owner to the State Water Resources Control Board and the notice of termination. A letter from the RWQCB indicating that there is no requirement for a general NPDES permit for discharges of storm water associated with industrial activity would satisfy this condition.

INDUSTRIAL - NPDES GENERAL PERMIT (SOLAR PLANT 1 & 2)

SOILS-4 For the operation of Solar Plant 1 and 2, the project owner shall comply with the requirements of the State Water Resources Control Board's NPDES General Permit for Discharges of Storm Water Associated with Industrial Activities (Order No. 97-03-DWQ, NPDES No. CAS000001) and all subsequent revisions and amendments. The project owner shall develop and implement a Storm Water Pollution Prevention Plan (SWPPP) for the operation of each solar plant. The project owner may also submit a Notice of Non- Applicability (NONA) to the RWQCB to apply for an exemption to the general NPDES permit.

Verification: At least thirty (30) days prior to operation of each solar plant, the project owner shall submit copies to the CPM of the operational SWPPP and shall retain a copy on site. Within 10 days of its mailing or receipt, the project owner shall submit to the CPM any correspondence between the project owner and the Lahontan RWQCB

about the general NPDES permit for discharge of storm water associated with this activity. This information shall include a copy of the notice of intent sent by the project owner to the State Water Resources Control Board and the notice of termination. A letter from the RWQCB indicating that there is no requirement for a general NPDES permit for discharges of storm water associated with industrial activity would satisfy this condition.

STORM WATER DAMAGE MONITORING AND RESPONSE PLAN

SOILS-5: The project owner shall reduce impacts caused by large storms by ensuring heliostats and the west perimeter road (berm) withstand the 100-year storm event, establishing ongoing maintenance and inspection of storm water controls, and implementing a response plan to clean up damage and address ongoing issues.

The project owner shall ensure that the heliostats and west perimeter road (berm) are designed and installed to withstand storm water scour that may occur as a result of a 100-year, 24-hour storm event. The analysis of the storm event and resulting heliostat stability will be provided within a Pylon Insertion Depth and Heliostat Stability Report to be completed by the project owner. This analysis will incorporate results from site-specific geotechnical stability testing, as well as hydrologic and hydraulic storm water modeling performed by the project owner. The modeling will be completed using methodology and assumptions approved by the CPM.

The project owner shall also develop a Storm Water Damage Monitoring and Response Plan to evaluate potential impacts from storm water, including damage to west perimeter road (berm) and heliostats that fail due to storm water flow or otherwise break and scatter mirror debris or other potential pollutants on to the ground surface.

The basis for determination of pylon embedment depths and berm design shall employ a step-by-step process as identified below and approved by the CPM:

A. Determination of peak storm water flow within each sub-watershed from a 100-year event:

- Use of San Bernardino County (SBC) Hydrology Manual to specify hydrologic parameters to use in calculations; and
- HEC -1 and Flo-2D models will be developed to calculate storm flows from the mountain watersheds upstream of the project site, and flood flows at the project site, based upon hydrologic parameters from SBC.

- The use of dry wells or injection wells shall be considered for management of storm water flows that may affect the west perimeter road (berm). These infiltration devices shall be designed and operated in accordance with USEPA Class V Injection Well requirements. The groundwater recharge that may be achieved by these wells can be

considered as credit for mitigation in accordance with **WATER SUPPLY-1**.

B. Determination of potential total pylon scour depth:

- Potential channel erosion depths will be determined using the calculated design flows, as determined in A above, combined with Flo-2D to model onsite sediment transport.
- Potential local scour will be determined using the calculated design flows, as determined in A above, combined with the Federal Highway Administration (FHWA) equation for local bridge pier scour from the FHWA 2001 report, "Evaluating Scour at Bridges."

C. The results of the scour depth calculations and pylon stability testing will be used to determine the minimum necessary pylon embedment depth within the active channels. In the inactive portions of the alluvial fans that are not subject to channel erosion and local scour, the minimum pylon embedment depths will be based on the results of the pylon stability testing. Minimum pylon embedment depth within the retention area will be based on additional site-specific testing for pylon stability under conditions of saturated soil and standing water.

D. The results of the calculated peak storm water flows and channel erosion and heliostat scour analysis together with the recommended heliostat installation depths shall be submitted to the CPM for review and approval sixty (60) days before the start of heliostat installation.

The Storm Water Damage Monitoring and Response Plan shall be submitted to the CPM for review and approval and shall include the following:

- Detailed maps showing the installed location of all heliostats within each project phase;
- Description of the method of removing all soil spoils should any be generated;
- Each heliostat should be identified by a unique ID number marked to show initial ground surface at its base, and the depth of the pylon below ground;
- Minimum Depth Stability Threshold to be maintained of pylons to meet long-term stability for applicable wind, water (flowing and static), and debris loading effects;
- Above and below ground construction details of a typical installed heliostat;
- BMPs to be employed to minimize the potential impact of broken mirrors to soil resources;
- Construction plans and details of the western perimeter road (berm), including erosion control measures; Include an appendix showing analysis of the berm's function as discharge control (weir) and retention area (area and duration of standing water)

- Methods and response time of mirror cleanup and measures that may be used to mitigate further impact to soil resources from broken mirror fragments; and
- Monitoring, documenting, and restoring the adjacent offsite downstream property when impacted by sedimentation, berm damage, or broken mirror shards.

A plan to monitor and inspect periodically, before first seasonal and after every storm event:

- Security and Tortoise Exclusion Fence: Inspect for damage and buildup of sediment or debris
- Heliostats within drainages or subject to drainage overflow or flooding: Inspect for tilting, mirror damage, depth of scour compared to pylon depth below ground and the Minimum Depth Stability Threshold, collapse, and downstream transport.
- Drainage channels: Inspect for substantial migration or changes in depth, and transport of broken glass.
- Constructed diversion channels: Inspect for scour and structural integrity issues caused by erosion, and for sediment and debris buildup.
- Adjacent offsite downstream property: Inspect for changes in the surface texture and quality from sediment buildup, erosion, or broken glass.

Short-Term Incident-Based Response:

- Security and Tortoise Exclusion Fence: repair damage, and remove built-up sediment and debris.
- Heliostats: Remove broken glass, damaged structure, and damaged wiring from the ground, and for pylons no longer meeting the Minimum Depth Stability Threshold, either replace/reinforce or remove the mirrors to avoid exposure for broken glass.
- Drainage channels: no short-term response necessary unless changes indicate risk to facility structures.
- West perimeter road (berm) and constructed diversion channels: repair damage, maintain erosion control measures and remove built-up sediment and debris.

Long-Term Design-Based Response:

- Propose operation/BMP modifications to address ongoing issues. Include proposed changes to monitoring and response procedures, frequency, or standards.
- Replace/reinforce pylons no longer meeting the Minimum Depth Stability Threshold or remove the mirrors to avoid exposure for broken glass.

- Propose design modifications to address ongoing issues. This may include construction of active storm water management diversion channels and/or detention ponds.

Inspection, short-term incident response, and long-term design based response may include activities both inside and outside of the project boundaries. For activities outside of the project boundaries the owner shall ensure all appropriate environmental review and approval has been completed before field activities begin.

Verification: At least sixty (60) days prior to installation of the first pylon, the project owner shall submit to the CPM a copy of the Pylon Insertion Depth and Heliostat Stability Report for review and approval prior to construction. At least sixty (60) days prior to commercial operation, the project owner shall submit to the CPM a copy of the Storm Water Damage Monitoring and Response Plan for review and approval prior to commercial operation. The project owner shall retain a copy of this plan onsite at the power plant at all times. The project owner shall prepare an annual summary of the number of heliostats failed due to damage, cause and extent of the damage, and cleanup and mitigation performed for each damaged heliostat. The annual summary shall also report on the effectiveness of the berm against storms, including information on the damage and repair work or associated erosion control elements of the berm. The project owner shall submit proposed changes or revisions to the Storm Water Damage Monitoring and Response Plan to the CPM for review and approval.

PERIMETER DRAINAGE MANAGEMENT PLAN

SOILS-6: The project owner shall develop and implement a Perimeter Drainage Management Plan to reduce flooding and erosion damage to the section of Old Spanish Trail Highway/Tecopa Road adjacent to the project site. The post-development flood depth calculated for the 100-year, 24-hour storm shall not increase more than one foot at any point on Tecopa Road adjacent to the project site.

The project owner shall provide a detailed hydraulic analysis utilizing FLO-2D which models pre- and post-development flood conditions for the 2-, 5-, 10-, 25-, and 100-year storm events. Boundaries of the analysis shall include the floodplain area from where Stump Springs area runoff flows cross the Nevada border to one mile west of the HHSEGS west property line. The methodology and assumptions for the modeling shall be reviewed and approved by the CPM.

The Perimeter Drainage Management Plan shall be submitted to the CPM for review and approval and shall incorporate the following:

- Vegetation shall be placed to promote infiltration and flow into the solar field. Vegetation planting and establishment shall comply with Condition of Certification **VIS-2**. Vegetation management shall include control of invasive vegetation as prescribed in Condition of Certification **BIO-18**. Fencing shall comply with VIS-2 and **BIO-9**.

- Landscape area between the roadway and perimeter fence shall implement erosion protection from flow velocity of two feet per second along the roadway and discharge from these flows to adjacent property west of the project site.
- Storm water control and conveyance structures (i.e. drop inlets, culverts) shall be designed to prevent desert tortoise from entering the structure or entering the project site. Localized ponding shall not remain longer than 24 hours.
- The use of dry wells or injection wells shall be considered for management of flood flows and artificial recharge of the groundwater aquifer in the project area. These infiltration devices shall be designed and operated in accordance with USEPA Class V Injection Well requirements. The groundwater recharge that may be achieved by these wells can be considered as credit for mitigation in accordance with **WATER SUPPLY-1**.
- Maintenance methods and scheduling shall be identified in the Plan to ensure proper operation of storm water control and conveyance structures and other Best Management Practices (BMPs)
- Elements of monitoring, inspection, and damage response (short-term and long-term) prescribed in Condition of Certification **SOILS-5** shall be implemented in maintenance of storm water conveyance and erosion control features identified in the Perimeter Drainage Management Plan.

Verification: At least sixty (60) days prior to perimeter fence installation, the project owner shall submit to the CPM a copy of the preliminary Perimeter Drainage Management Plan for review.

In combination with Condition of Certification **CIVIL-1**, at least fifteen (15) days (or project owner- and CBO-approved alternative time frame) prior to the start of site grading the project owner shall submit the documents described above to the CBO for design review and approval. In the next monthly compliance report following the CBO's approval, the project owner shall submit a written statement certifying that the documents have been approved by the CBO.

Any proposed changes or revisions to the approved Storm Water Damage Monitoring and Response Plan must be reviewed and approved by the CPM.

CONSTRUCTION WASTEWATER DISCHARGE

SOILS-7 Prior to hydrostatic test water discharge to land, the project owner shall fulfill the requirements contained in State Water Resources Control Board (SWRCB) *Order No. 2003-003-DWQ Statewide General Waste Discharge Requirements (WDRs) for Discharges to Land with a Low Threat to Water Quality (General WDRs)* and all subsequent revisions and amendments.

Prior to hydrostatic test water discharge to surface waters or designated Waters of the State, the project owner shall fulfill the requirements contained in Lahontan RWQCB *Order No. R6T-2008-0023 (Revised Waste Discharge*

Requirements and NPDES General Permit for Limited Threat Discharges to Surface Waters) and all subsequent revisions and amendments.

Prior to transport and disposal of any facility construction-related wastewaters offsite, the project owner shall test and classify the stored wastewater to determine proper management and disposal requirements. The project owner shall provide evidence that wastewater is disposed of at an appropriately licensed facility. The project manager shall ensure that the wastewater is transported and disposed of in accordance with the wastewater's characteristics and classification and all applicable LORS (including any CCR Title 22 Hazardous Waste and Title 23 Waste Discharges to Land requirements).

Verification: The project owner shall submit to the CPM copies of all relevant correspondence between the project owner and the SWRCB or Lahontan RWQCB about the hydrostatic test water discharge requirements within 10 days of its receipt or submittal. This information shall include copies of the Notice of Intent and Notice of Termination for the project. A letter from the SWRCB or Lahontan RWQCB indicating that there is no requirement for the discharge of hydrostatic test water would satisfy the corresponding portion of this condition.

Prior to transport and disposal of any facility construction-related wastewaters offsite, the project owner shall test and classify the stored wastewater to determine proper management and disposal requirements. The project manager shall ensure that the wastewater is transported and disposed of in accordance with the wastewater's characteristics and classification and all applicable LORS (including any CCR Title 22 Hazardous Waste and Title 23 Waste Discharges to Land requirements). The project owner shall provide evidence to the CPM of proper wastewater disposal, via a licensed hauler to an appropriately licensed facility, in the monthly compliance report.

WASTEWATER COLLECTION SYSTEM

SOILS-8 The project owner shall recycle and reuse all process wastewater streams to the extent practicable. Prior to transport and disposal of any facility operation wastewaters that are not suitable for treatment and reuse onsite, the project owner shall test and classify the stored wastewater to determine proper management and disposal requirements. The project owner shall provide evidence that industrial wastewater and contact storm water are being disposed of at an appropriately licensed facility. The project owner shall ensure that the wastewater is transported and disposed of in accordance with the wastewater's characteristics and classification and all applicable LORS (including any CCR Title 22 Hazardous Waste and Title 23 Waste Discharges to Land requirements). An annual summary of industrial wastewater discharge shall be submitted to the CPM in the annual compliance report.

Verification: Prior to transport and disposal of any facility operation wastewaters that are not suitable for treatment and reuse onsite, the project owner shall test and classify the stored wastewater to determine proper management and disposal requirements. The project manager shall ensure that the wastewater is transported and disposed of in accordance with the wastewater's characteristics and classification and all applicable LORS (including any CCR Title 22 Hazardous Waste and Title 23 Waste

Discharges to Land requirements). The project owner shall provide evidence to the CPM of proper industrial wastewater disposal, via a licensed hauler to an appropriately licensed facility, in the annual compliance report.

The project owner shall submit an industrial wastewater discharge summary report to the CPM in the annual compliance report for the life of the project operation. The report shall include the results of chemical analysis for proper disposal offsite, average TDS concentration, monthly range, monthly average, daily maximum within each month, and annual discharge volume by the project. After the first year and for subsequent years, this information shall also include the yearly range and yearly average discharge volume by the project.

SEPTIC SYSTEM AND LEACH FIELD REQUIREMENTS

SOILS-9 The project owner shall comply with the requirements and all subsequent revisions and amendments of the Inyo County Environmental Health Services Department (Inyo County Codes 7.52.020 and 7.52.060), the California Plumbing Code (California Code of Regulations Title 24, Part 5), and the Lahontan RWQCB Basin Plan while designing, constructing, and operating the HHSEGS sanitary waste disposal facilities such as septic systems and leach fields. Compliance shall include an engineering report on the septic system and leach field design, operation, maintenance, and loading impact to groundwater.

The project owner shall submit all necessary information and the appropriate fee to the Inyo County Environmental Health Services Department to ensure that the project has complied with county sanitary waste disposal facilities requirements. Written assessments prepared by Inyo County regarding the project's compliance with these requirements must be submitted to the CPM for review and approval.

Verification: At least thirty (30) days prior to use of the septic systems, the project owner shall submit to the CPM for review and approval a written assessment prepared by Inyo County regarding the project's compliance with the requirements above.

REFERENCES

BLM 2011 – Bureau of Land Management. Project Fact Sheet: Hidden Hills Transmission Project. November 2011.

BLM 2012b – BLM/A. Lueders and J. Kenna (tn: 66238) BLM Comment Letter Regarding PSA. 7/16/2012

CEC 2012u – California Energy Commission/M. Monasmith (tn: 65442) Preliminary Staff Assessment. 5/24/2012

CEC 2012ii – California Energy Commission/M. Monasmith (tn: 67868) Record of Conversation with Candace Hill and D. Crom re flooding on Tecopa Road. 8/31/2012

CH2 2012k – CH2MHill/J. Carrier (tn: 64364) Applicant's Data Response Set 1C-2. 3/23/2012

CH2 2012p – CH2MHill/J. Carrier (tn: 64558) Supplemental Data Response, Set 2, Boiler Optimization Plan and Design Change. 4/2/2012

CH2 2012u – CH2MHill/J. Carrier (tn: 64836) Supplemental Data Response, Set 3. 4/18/2012

CH2 2012y – CH2MHill/J. Carrier (tn: 65092) Applicant's Data Response, Set 2E 5/04/2012

CH2 2012ee– CH2MHill/J. Carrier (tn: 66319) Applicant's PSA Comments, Set 2. 7/23/2012

CH2 2012hh– CH2MHill/J. Carrier (tn: 66549) Applicant's Letter Confirming Relocation of the Switchyard and Gas Metering Station. 8/10/2012

CH2 2012ii– CH2MHill/J. Carrier (tn: 67060) Applicant's Supplemental Data Response, Set 4B. 9/10/2012

CH2 2012ll– CH2MHill/J. Carrier (tn: 65209) Applicant's Supplemental Data Response Set 4. 5/11/2012

DWR 2004 – California Department of Water Resources. California's Groundwater – Bulletin 118, Update 2004, Pahrump Valley Groundwater Basin. Website publication: http://www.water.ca.gov/pubs/groundwater/bulletin_118/

HHSG 2011a – BrightSource Energy/J. Woolard (tn: 61756) Application for Certification, Volume 1 & 2. 08/5/2011

HHSG 2011b – BrightSource Energy/C. Jensen (tn: 62125) Supplement to AFC for HHSEGS. 09/07/2011

INYO 2012j – Inyo County/M. Fortney (tn: 66310) Inyo County Comments on PSA. 7/17/2012

J&S 2001 – Jones & Stokes. Goals and Policies Report for the Inyo County General Plan, prepared for Inyo County. December 2001.

MAC 2012c - Cindy MacDonald (tn: 66291) Cindy McDonald's Supplemental Comments and Analysis. 07/23/2012

RWQCB 2005 – California Regional Water Quality Control Board, Lahontan Region. Water Quality Control Plan for the Lahontan Region (Basin Plan) amended 2005.

USGS 1989 - U.S. Geological Survey/Arcement and Schneider. “Guide for Selecting Manning's Roughness Coefficients for Natural Channels and Flood Plains”, U.S. Geological Survey Water-Supply Paper 2339, Denver, Colorado. 1989.

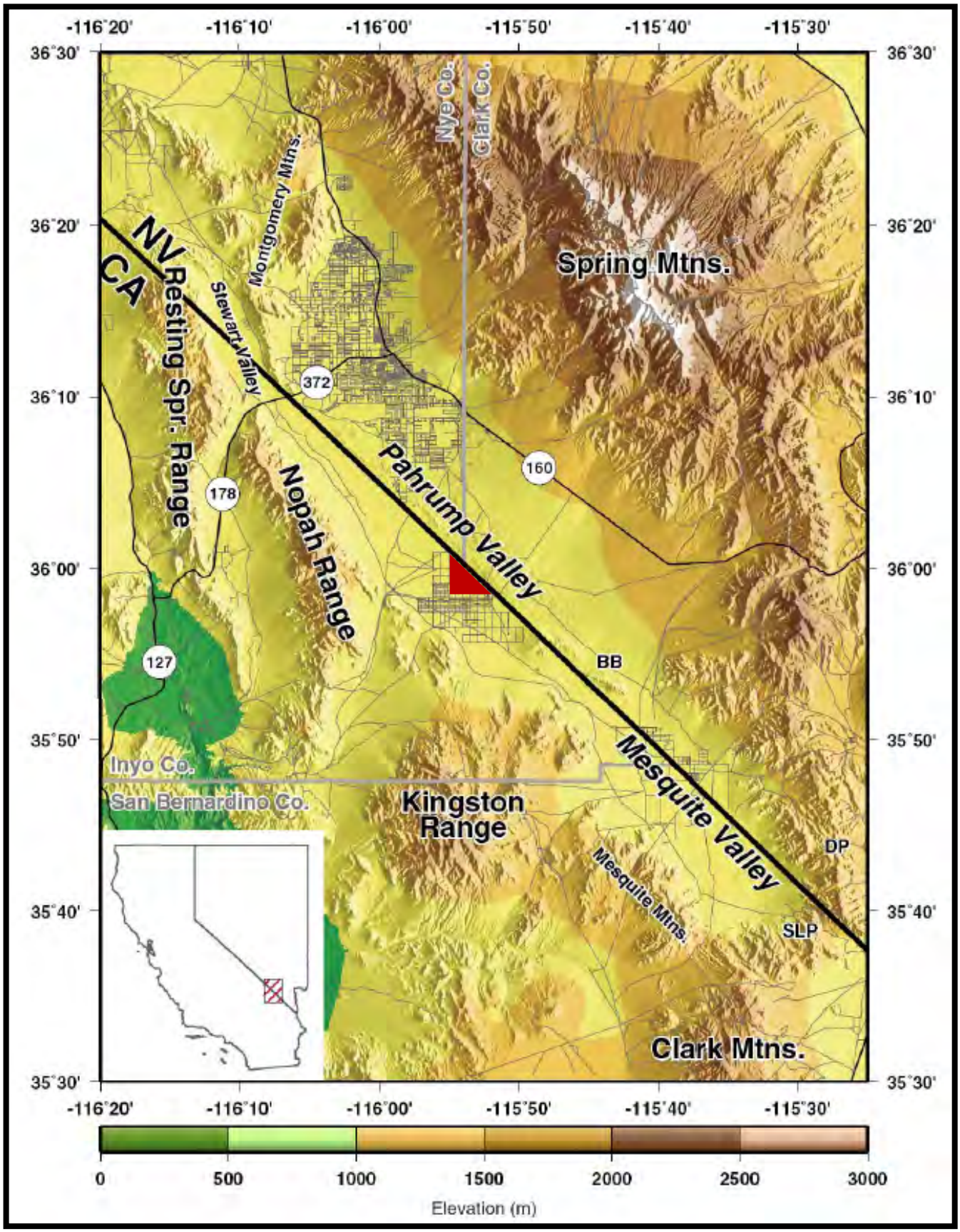
ACRONYMS

Acronyms Used in the Soils & Surface Water Section

AFC	Application for Certification
BLM	U.S. Bureau of Land Management
BMP	Best Management Practice
CEQA	California Environmental Quality Act
cfs	cubic feet per second
CWA	Clean Water Act
DESCP	Drainage, Erosion, and Sediment Control Plan
FEMA	Federal Emergency Management Agency
FSA	Final Staff Assessment
GPS	global positioning system
HHSEGS	Hidden Hills Solar Electrical Generating System
ICEHSD	Inyo County Environmental Health Services Department
kV	kilovolt
LID	Low Impact Development
LORS	Laws, Ordinances, Regulations and Standards
msl	mean sea level
MW	megawatts
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
PSA	Preliminary Staff Assessment
QFER	Quarterly Fuel and Energy Reports
RWQCB	Regional Water Quality Control Board
SRSG	solar receiver steam generator
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TDS	total dissolved solids
TSS	total suspended solids
USACE	U.S. Army Corp of Engineers
WDR	Waste Discharge Requirements

SOILS & SURFACE WATER - FIGURE 1

Hidden Hills Solar Electric Generating System (HHSEGS) – Vicinity Map

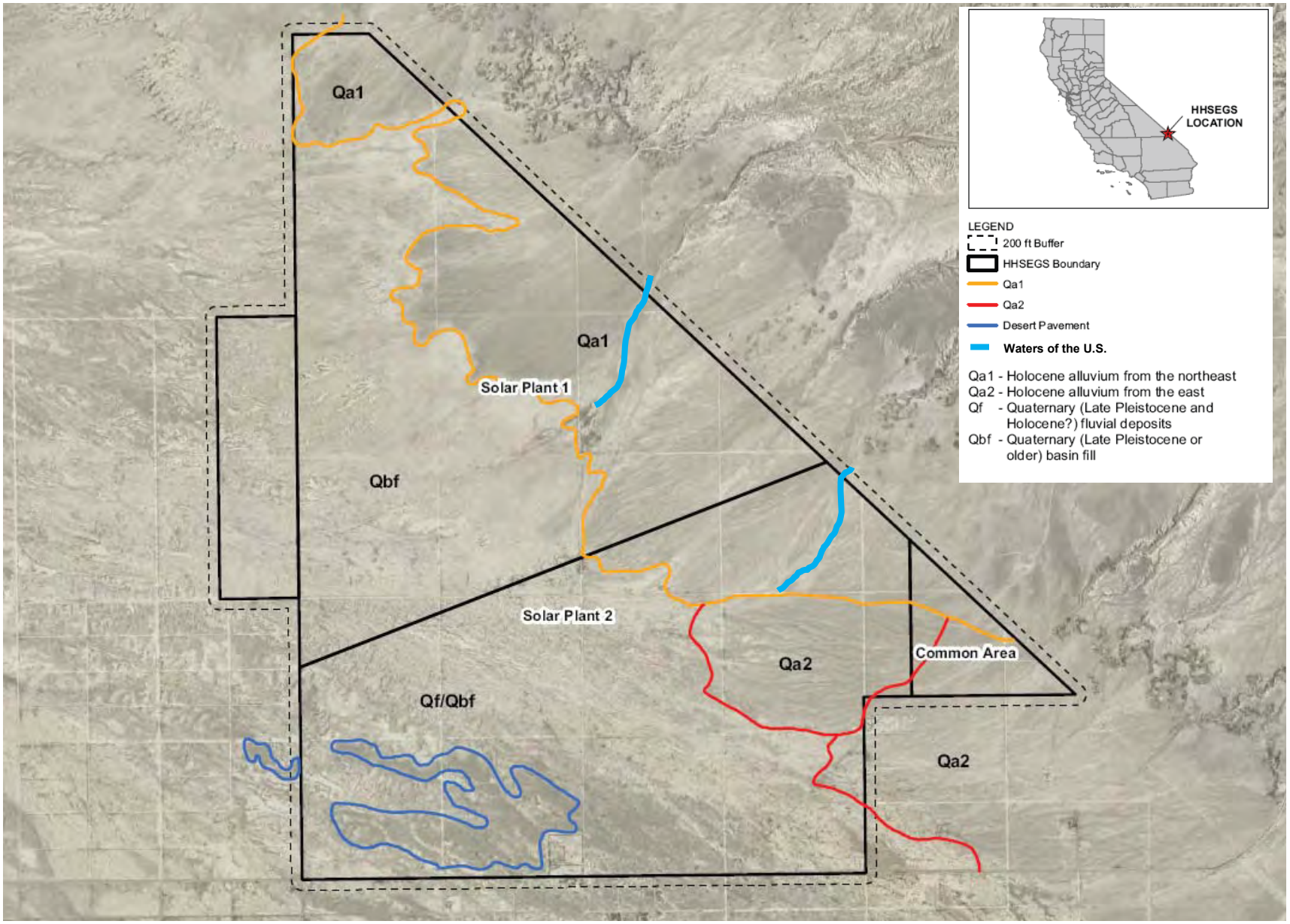


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Geosphere, April 2010, Figure 1, Page 94

SOILS & SURFACE WATER - FIGURE 2

Hidden Hills Solar Electric Generating System (HHSEGS) – Alluvial Fans and Waters of the U.S.



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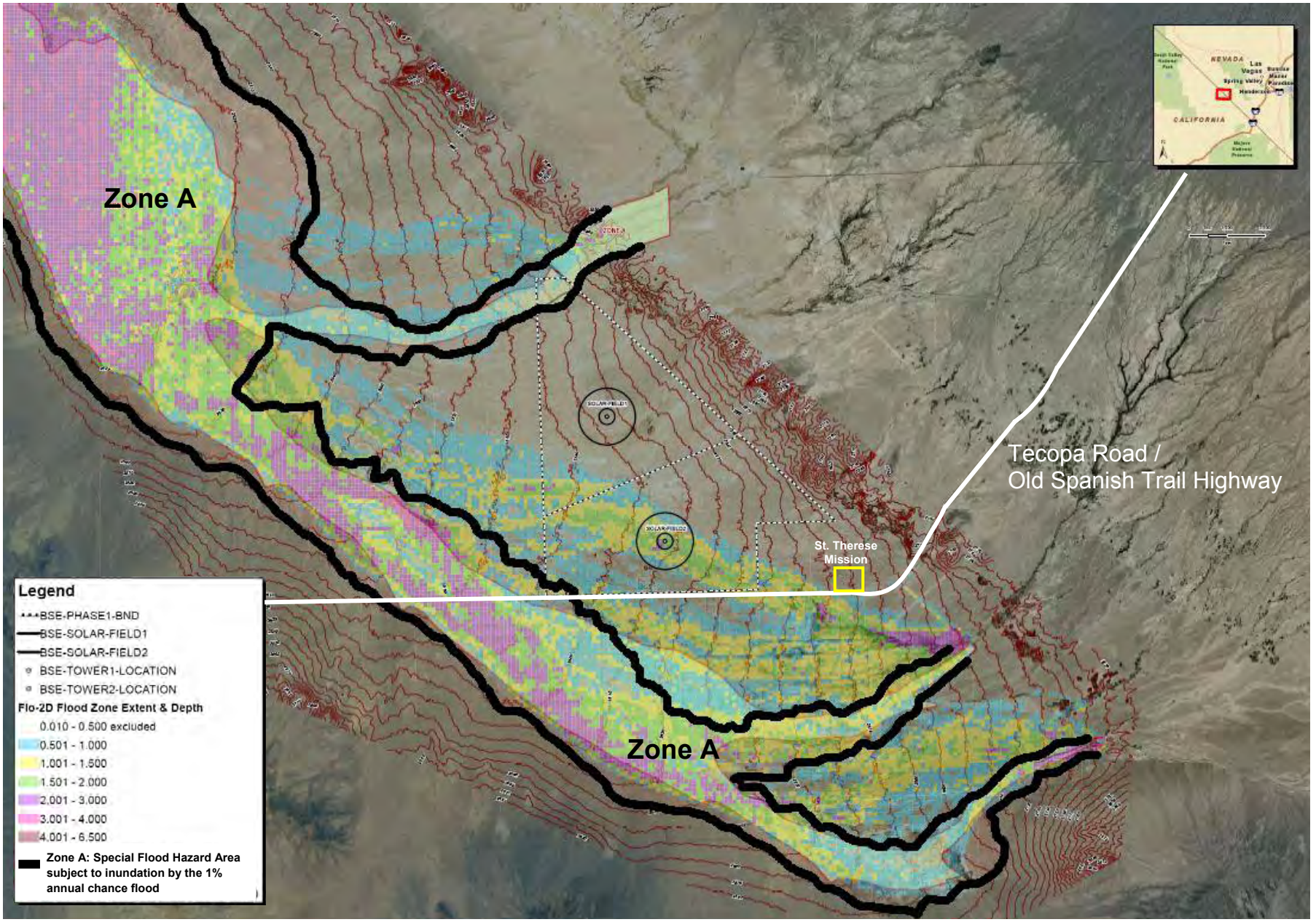
SOURCE: Figure DR 101-1, Land Surface Units; CH2MHill, Fig 1, URS and BrightSource Energy

SOILS & SURFACE WATER - FIGURE 3

Hidden Hills Solar Electric Generating System (HHSEGS) – Federal Emergency Management Agency – Flood Insurance Rate Map



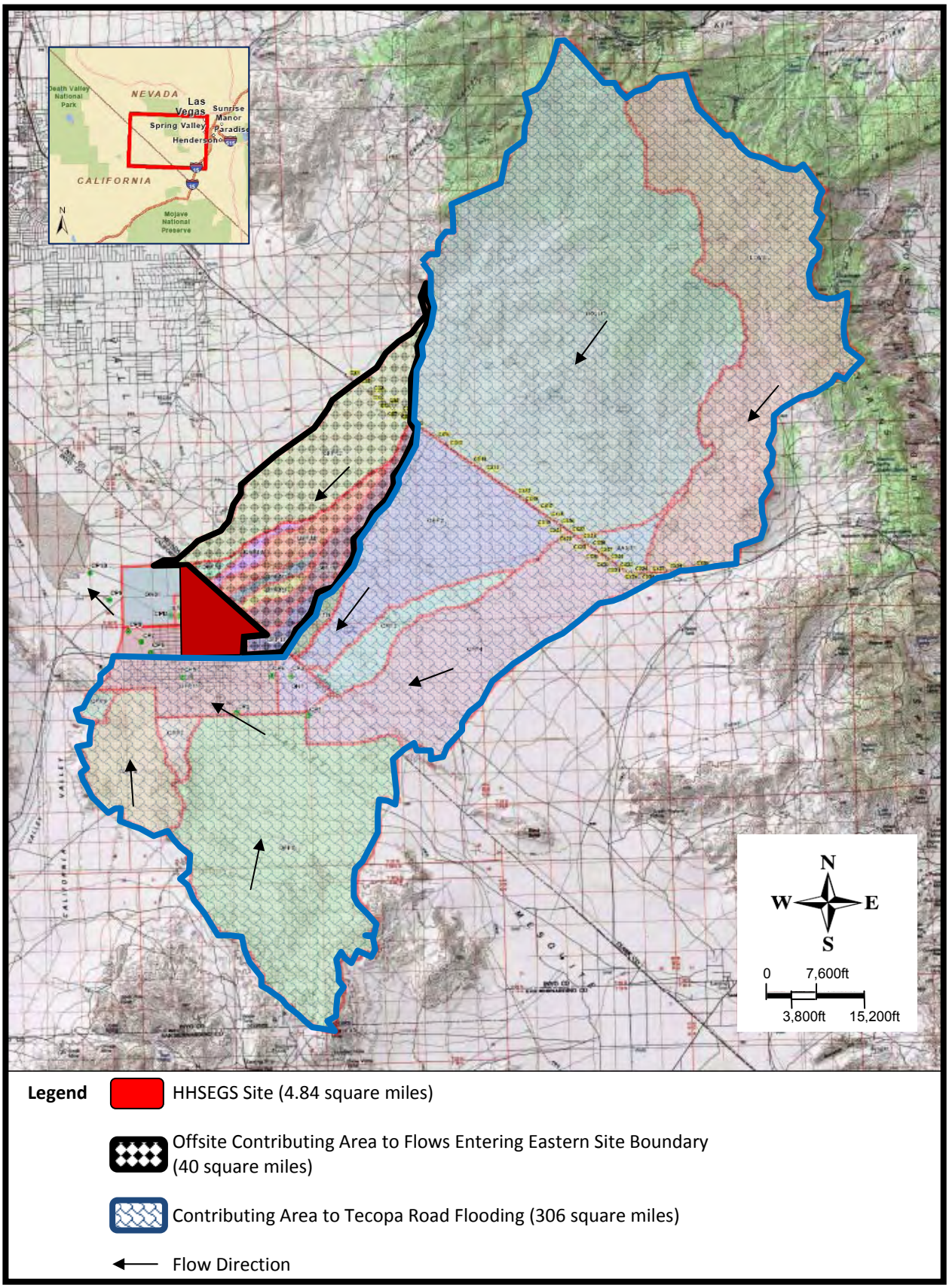
SOILS & SURFACE WATER

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: 3/28/2011, VTN Consulting and BrightSource Energy

SOILS & SURFACE WATER - FIGURE 4

Hidden Hills Solar Electric Generating System (HHSEGS) -
Watershed Areas Contributing to Runoff

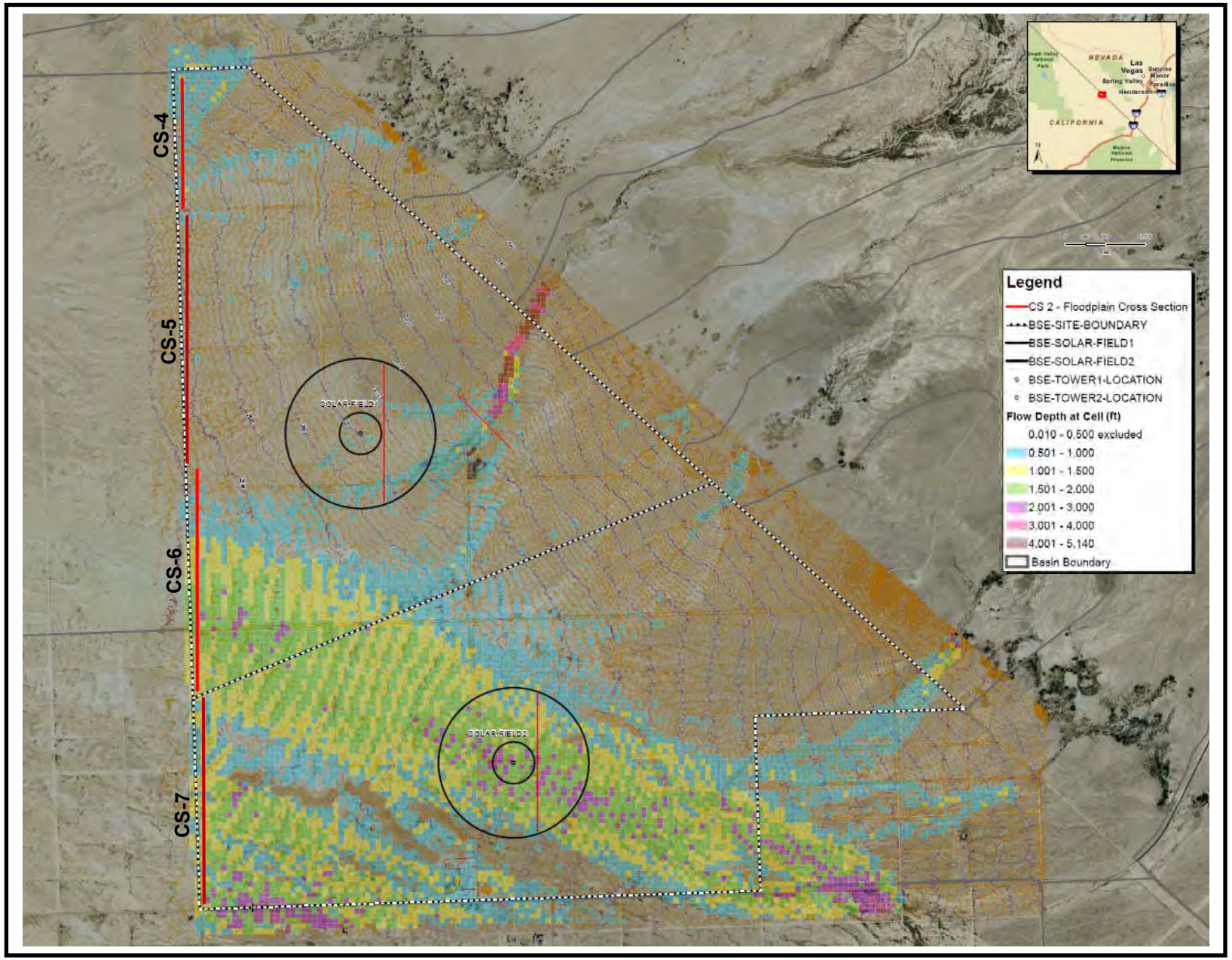


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: 5/16/2011, VTN Consulting and BrightSource Energy

SOILS & SURFACE WATER - FIGURE 5

Hidden Hills Solar Electric Generating System (HHSEGS) – Preconstruction Depth Map (24 hour – 100 year Rain Event)

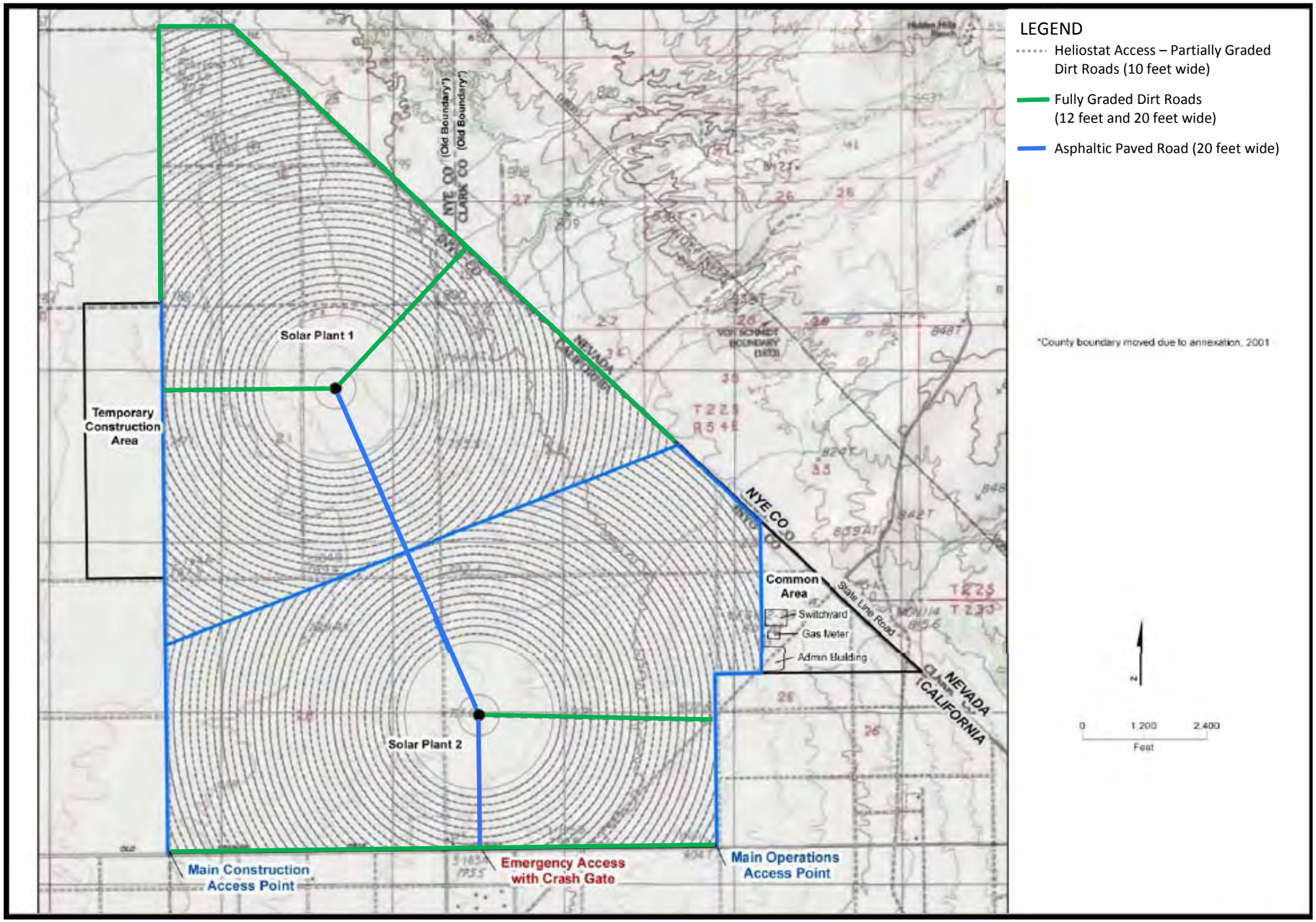


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: 4/4/2011, VTN Consulting and BrightSource Energy

SOILS & SURFACE WATER - FIGURE 6

Hidden Hills Solar Electric Generating System (HHSEGS) – Road Types

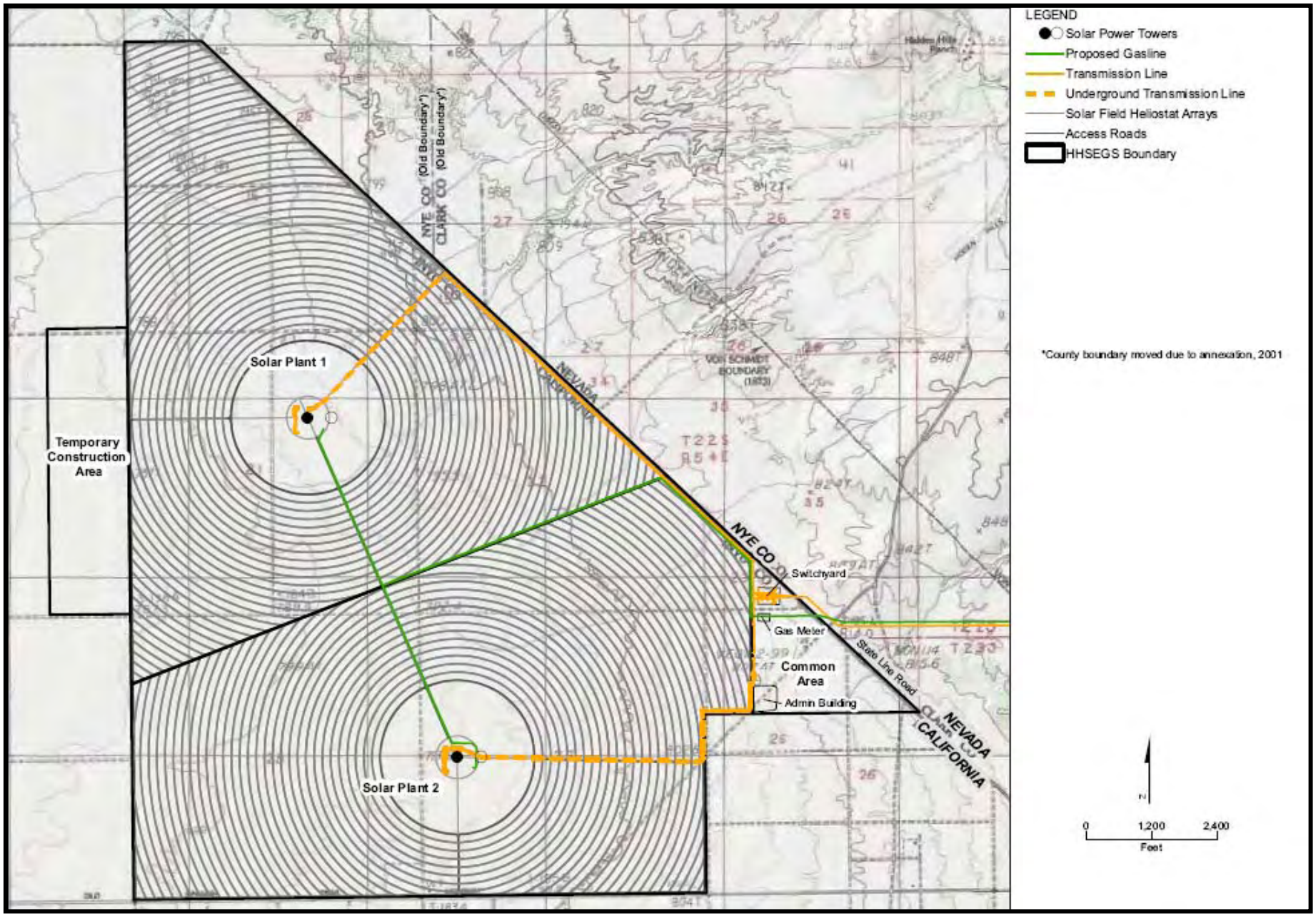


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: 4/22/2011, Dwg No. C-1000, CH2MHill and BrightSource Energy

SOILS & SURFACE WATER - FIGURE 7

Hidden Hills Solar Electric Generating System (HHSEGS) – Linear Facilities



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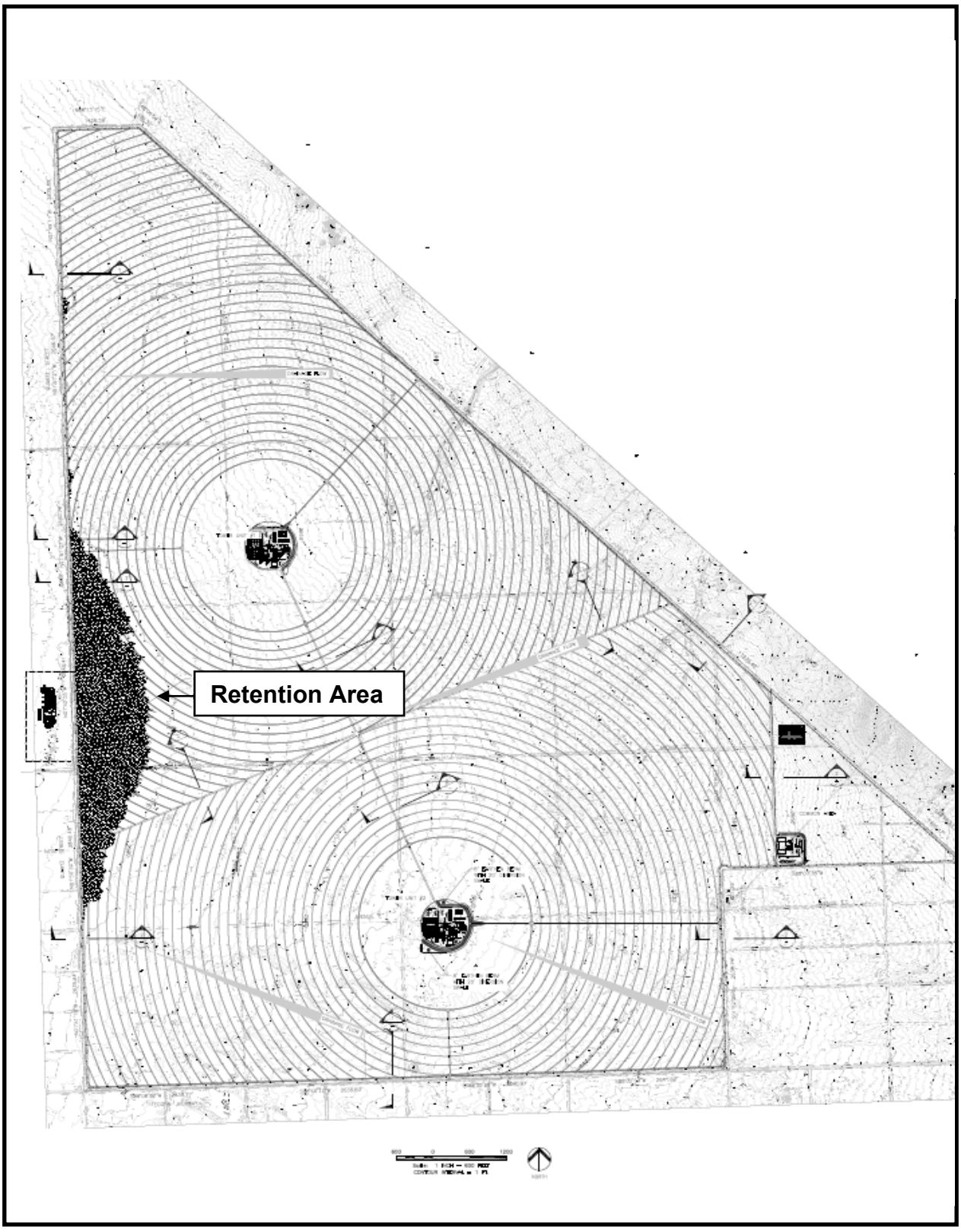
SOURCE: Figure 2.1-2R1, CH2MHill

SOILS & SURFACE WATER - FIGURE 8

Hidden Hills Solar Electric Generating System (HHSEGS) – Retention Area

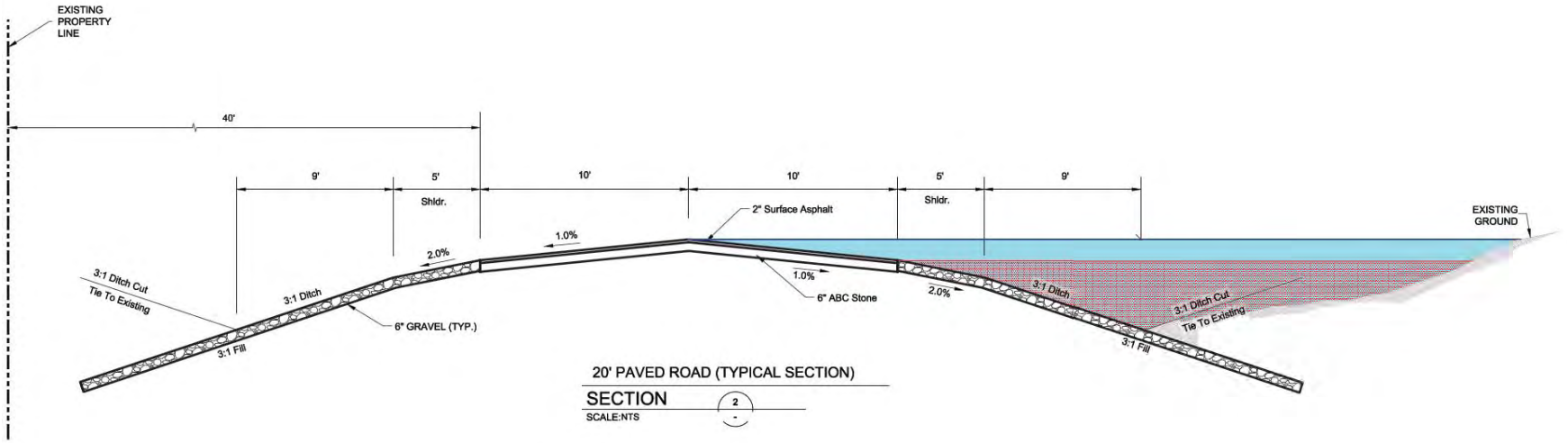


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: 4/22/2011, Dwg No. C-2000, BrightSource Energy and CH2MHill

SOILS & SURFACE WATER - FIGURE 9

Hidden Hills Solar Electric Generating System (HHSEGS) – Retention Area Cross-Section



LEGEND

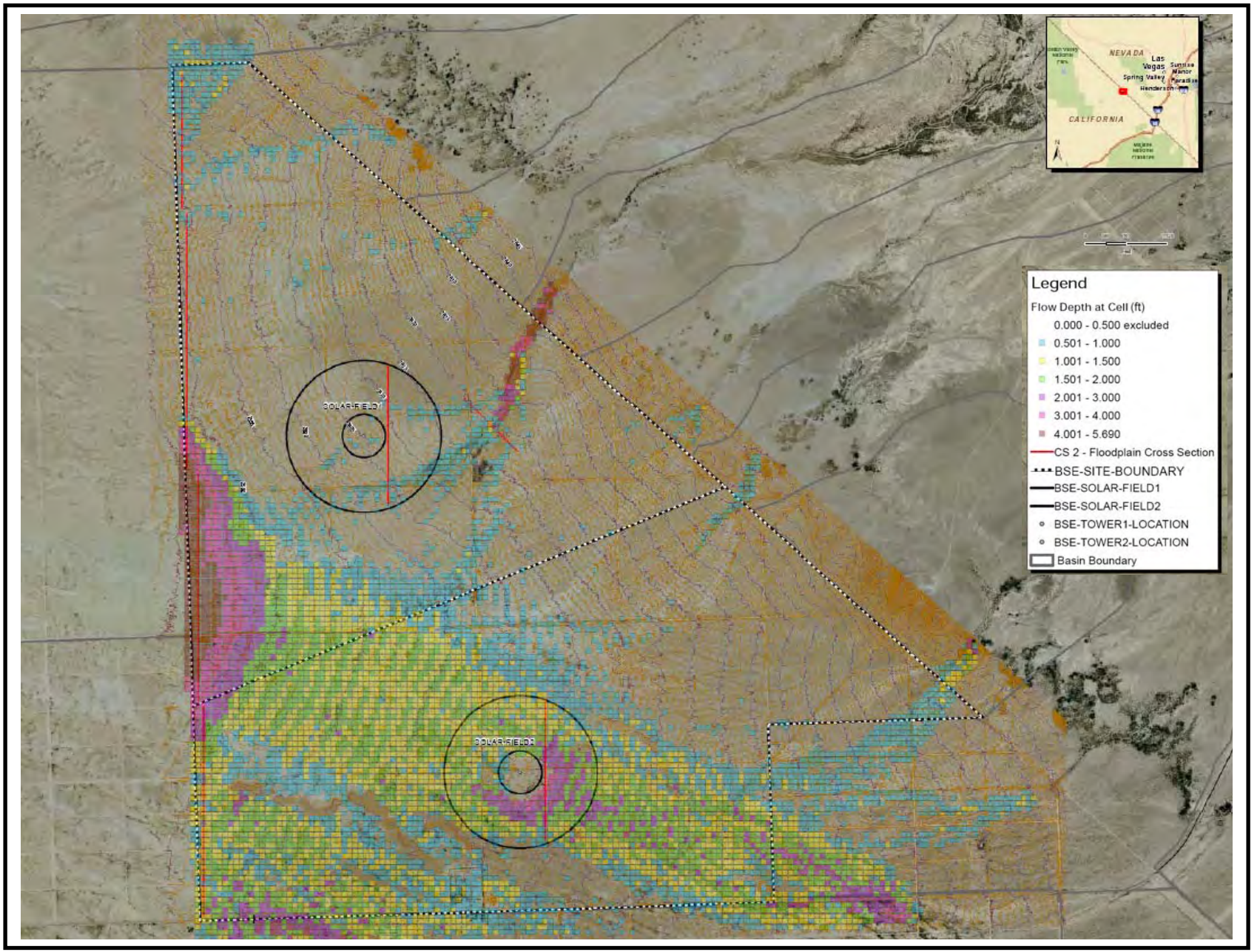
5, 10, 25, & 100-YEAR STORM EVENT INITIAL PONDING (3.80 FEET MAX DEPTH)

2-YEAR STORM EVENT INITIAL PONDING (2.79 FEET MAX DEPTH)

SOURCE: 5/11/2012, VTN Consulting and BrightSource Energy

SOILS & SURFACE WATER - FIGURE 10

Hidden Hills Solar Electric Generating System (HHSEGS) – Post-construction Depth Map (100 year – 24 hour Rain Event)



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: 5/25/2011, VTN Consulting and BrightSource Energy

SOILS & SURFACE WATER - FIGURE 11

Hidden Hills Solar Electric Generating System (HHSEGS) -
Example of Tortoise Fence Blocked with Debris

Above: Matted Vegetation.
This is an example of the vegetation mat that formed on the tortoise fencing. The fencing was installed parallel to the ground slope.

Right: Bowed Tortoise Fence.
The trapped sediment and debris caused the tortoise fence to bow out. The stream channel slopes down towards the right.

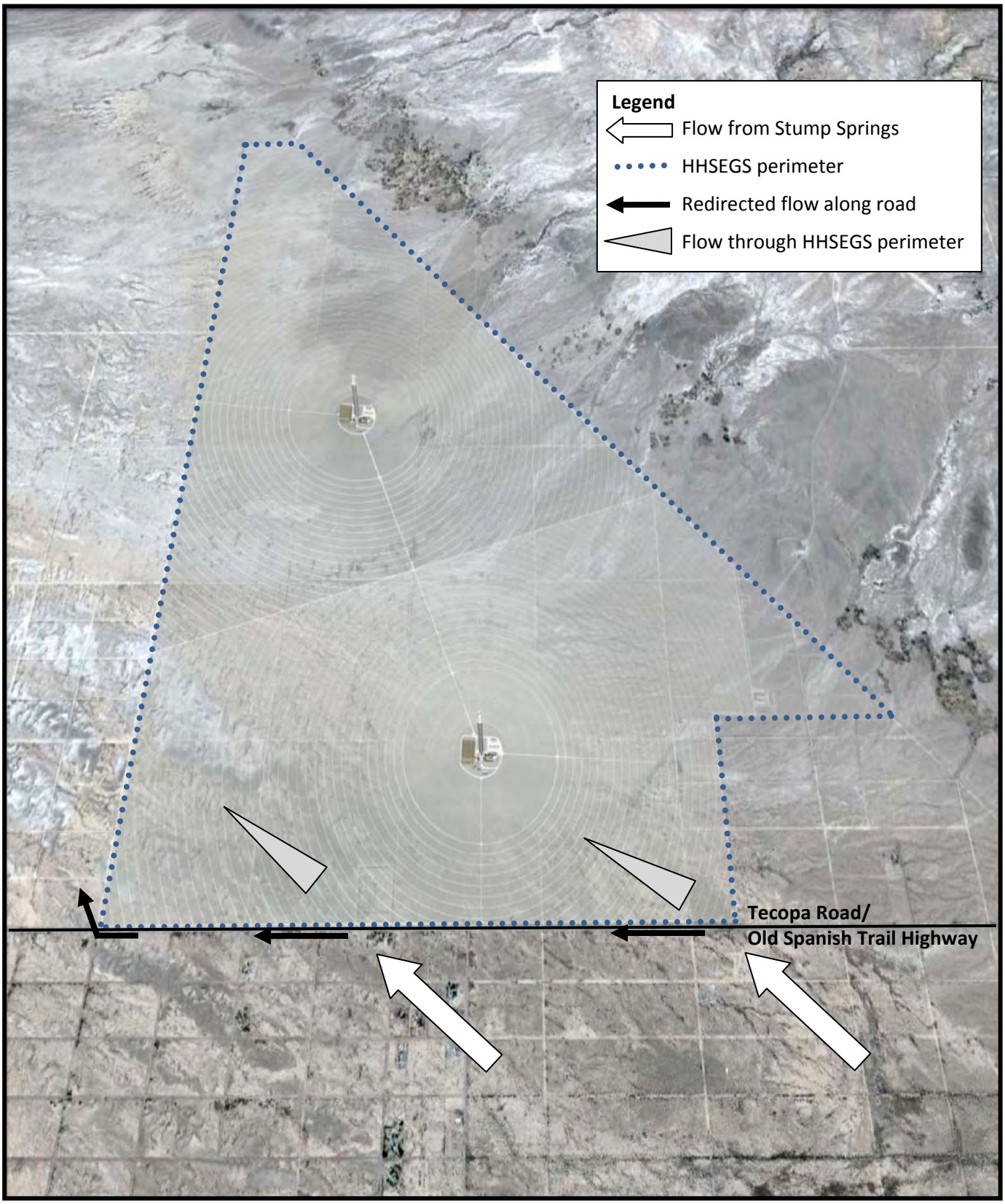
Ivanpah SEGS Construction Site

SOURCE: August 2011, California Energy Commission

SOILS & SURFACE WATER - FIGURE 12

Hidden Hills Solar Electric Generating System (HHSEGS) –

Post-Construction Storm Water Flow Patterns at Tecopa Road/Old Spanish Trail Highway

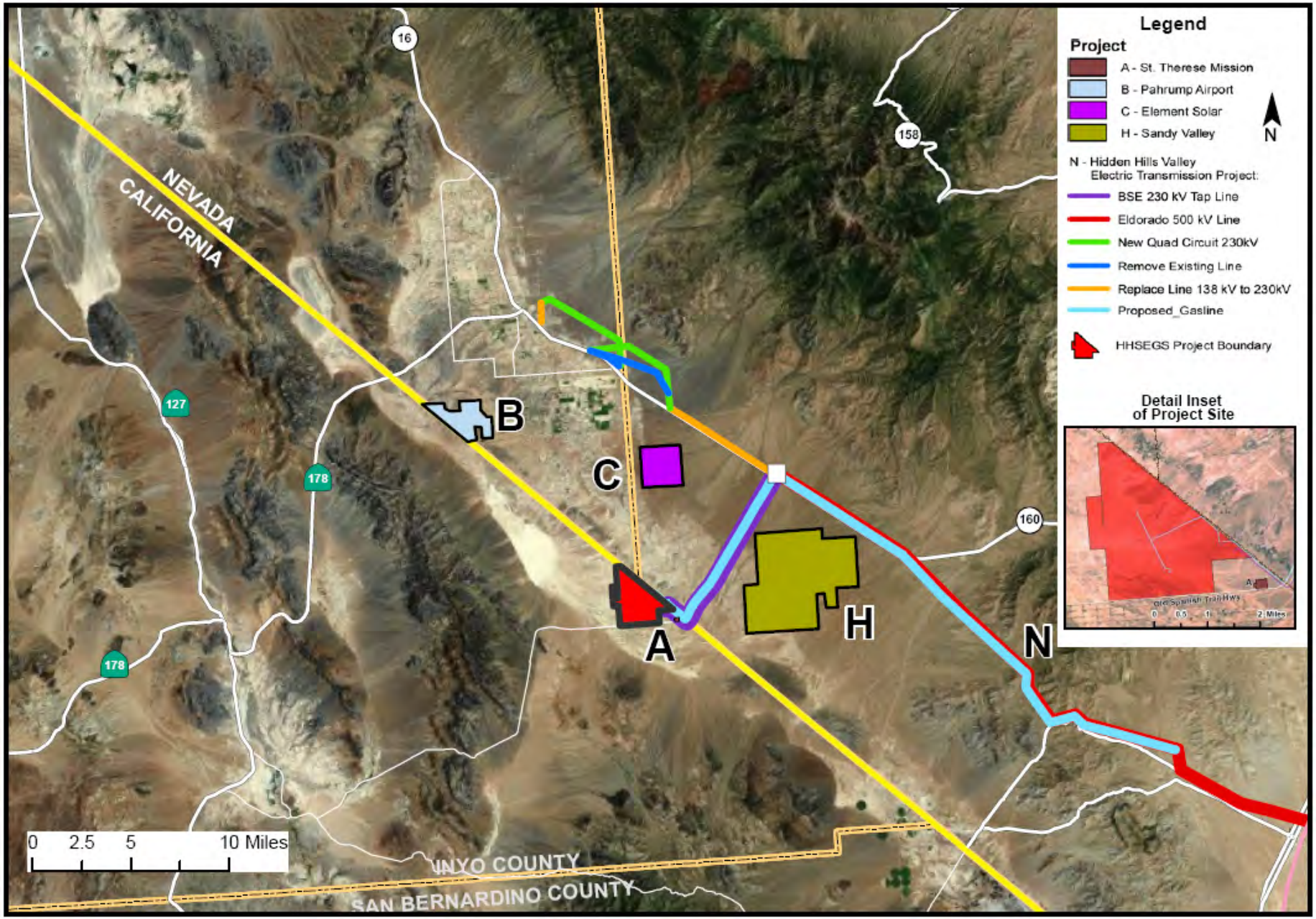


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: August 2011, BrightSource Energy and CH2MHill

SOILS & SURFACE WATER - FIGURE 13

Hidden Hills Solar Electric Generating System (HHSEGS) – Cumulative Impacts Map



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: BLM Southern Nevada District – Renewable Energy in Southern Nevada, BLM California – Renewable Energy Priority Projects

TRAFFIC AND TRANSPORTATION

Testimony of Candace M. Hill; John D. Hope; Gregg Irvin, PhD.

SUMMARY OF CONCLUSIONS

This section of the Final Staff Assessment (FSA) analyzes the potential effects on traffic and transportation that would occur from the construction and operation of the proposed Hidden Hills Solar Electric Generating System Project (referred to as HHSEGS or proposed project). California Energy Commission staff has analyzed the traffic-related information provided in the Application for Certification (AFC) and acquired from other sources to determine the potential for the Hidden Hills Solar Electric Generating System Project to have significant adverse traffic and transportation-related impacts. Staff has also assessed the availability of mitigation measures that could reduce or eliminate the significance of these impacts.

On October 1, 2012, Hidden Hills Solar I, LLC and Hidden Hills Solar II, LLC submitted an Updated Workforce Analysis identifying new commute assumptions; a new peak month; an increase of the peak construction workforce and an increase in the construction workforce traffic that would utilize State Route 127 within both Inyo County and San Bernardino County, California. Staff has incorporated the revised data and proposes revised conditions of certification.

As currently proposed, construction and operation of the Hidden Hills Solar Electric Generating System Project has the potential to cause significant impacts to ground traffic and aviation. Energy Commission staff proposes Conditions of Certification **TRANS-1** through **TRANS-8** to reduce these impacts to less than significant and to ensure that the proposed project would comply with all applicable laws, ordinances, regulations, and standards pertaining to traffic and transportation. Staff concludes that with implementation of proposed Conditions of Certification **TRANS-1** through **TRANS-8**, the proposed project would not cause significant impacts to traffic and transportation. Staff concludes that glint and glare effects from a traffic and transportation perspective would be less than significant with implementation of staff's proposed Condition of Certification **TRANS-8.**

INTRODUCTION

In compliance with the California Environmental Quality Act (CEQA) and Energy Commission requirements, this traffic and transportation analysis identifies the HHSEGS's potential impacts to the surrounding transportation systems and proposed conditions of certification that would avoid or lessen these impacts. It also addresses the project's consistency with applicable federal, state, and local transportation-related laws, ordinances, regulations, and standards (LORS).

The proposed project is located in Inyo County, California, along the California-Nevada border. The transmission and natural gas pipeline alignments would be located in the State of Nevada, primarily on federal land managed by the U.S. Bureau of Land Management (BLM), except for small segments of the transmission lines for both options in the vicinity of the Eldorado Substation, which would be located within Boulder

City, Nevada. Because the proposed facilities would be located on public land managed by BLM, the Valley Electric Association Hidden Hills Transmission Project (VEAHHTP) is considered a federal action requiring review under and compliance with the National Environmental Policy Act (NEPA).

A Draft Environmental Impact Statement (DEIS) of the transmission and natural gas pipeline alignments will be prepared by BLM. [1]Therefore, staff has not addressed the direct impacts of the project's transmission line and natural gas pipeline on transportation systems within the State of Nevada.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

Traffic and Transportation Table 1 provides a general description of adopted federal, state, and local LORS pertaining to traffic and transportation that apply to this project.

TRAFFIC AND TRANSPORTATION Table 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
Federal	
Code of Federal Regulations (CFR) Title 14, Aeronautics and Space, Part 77 – Objects Affecting Navigable Airspace 77.13	This regulation requires the project owner to notify the Federal Aviation Administration (FAA) of construction structures with a height greater than 200 feet from grade or greater than an imaginary surface extending outward and upward at a slope of 100 to 1 for a horizontal distance of 20,000 feet from the nearest point of the nearest runway of an airport with at least one runway more than 3,200 feet in length
Code of Federal Regulations (CFR) Title 49 Subtitle B, Parts 171-173, 177-178, 350-359, 397.9 and Appendices A-G	Addresses safety considerations for the transport of goods, materials and substances. Governs the transportation of hazardous materials including types of materials and marking of the transportation vehicles.
State	
California Vehicle Code, sections 13369, 15275, 15278	Requires licensing of drivers and the classification of license for the operation of particular types of vehicles. A commercial driver's license is required to operate commercial vehicles. An endorsement issued by the Department of Motor Vehicles (DMV) is required to drive any commercial vehicle identified in section 15278.
California Vehicle Code, sections 31303-31309	Requires transportation of hazardous materials to be on the state or interstate that offers the shortest overall transit time possible.
California Vehicle Code, sections 31600-31620	Regulates the transportation of explosive materials.
California Vehicle Code, sections 32100-32109	Requires shippers of inhalation hazards in bulk packaging to comply with rigorous equipment standards, inspection requirements, and route restrictions.
California Vehicle Code, sections 34000-34100	Establishes special requirements for vehicles having a cargo tank and for hazardous waste transport vehicles and containers, as defined in section 25167.4 of the Health and Safety Code.
California Vehicle Code, section 35550-35551	Provides weight guidelines and restrictions vehicles traveling on freeways and highways.

[1] On October 11, 2011, BLM published a Notice of Intent to prepare an Environmental Impact Statement (EIS) for the proposed Valley Electric Association Hidden Hills Transmission Project (NVN-089669), Clark and Nye Counties, Nevada in the *Federal Register – Volume 76, Number 196.*

Applicable Law	Description
California Vehicle Code, section 35780	Requires a single-trip transportation permit to transport oversized or excessive loads over state highways.
California Health and Safety Code, section 25160	Addresses the safe transport of hazardous materials.
Nevada Administrative Code – Hazardous Materials, Chapter 459, section 459.9785	Lists prerequisites to transportation of hazardous materials for which federal safety permit is required.
Nevada Administrative Code – Hazardous Materials, Chapter 459, section 459.986	Requires Inspection of vehicles; verification of drivers' qualifications.
Nevada Administrative Code-Traffic Laws, section 484.500	Requires a transportation permit for the operation of an oversized or overweight vehicle to travel a determined route with a designated load for a designated period.
Local	
Inyo County Regional Transportation Plan	The Inyo County Regional Transportation Plan, adopted April 22, 2009 by the Inyo County Local Transportation Commission, serves as the planning blueprint to guide transportation investments in the County involving local, state, and federal funding over the next twenty years.
Inyo County Regional Transportation Plan: Goal 2: A Transportation system which is safe, efficient and comfortable which meets the needs of people and goods and enhances the lifestyle of the county's residents.	Objective 2.1: Maintain and Improve Roadway Level of Service – Maintain or improve existing Level of Service on roadways within the county. Policy 2.2.1: Proper access – Provide proper access to residential, commercial and industrial areas.
Inyo County Regional Transportation Plan: Goal 3: Maintain adequate capacity on State Routes (SR's) and Local Routes in and Surrounding Inyo County and the City of Bishop.	Objective 3.3: Improve County routes. Policy 3.3.1: Support roadway improvements to optimize public safety – Improve county roads through specific safety improvements and maintenance.
Inyo County General Plan Circulation Element – Section 7	The Circulation Element, approved by the Inyo County Board of Supervisors on December 11, 2001, addresses the movement of people, products and materials using a variety of conveyances, from roads to railroads, bicycle paths to transmission lines. The Circulation Element presents goals, policies and implementation measures for roadways and highways; scenic highways; public transportation; bicycles and trails; railroads; aviation; canals, pipelines and transmission cables; parking and information technology/telecommuting.
Section 7.2.4 Roadways and Highways - Policy RH-1.4 Level of Service.	Maintain a minimum of Level of Service (LOS) "C" on all roadways in the County of Inyo. For highways within the County of Inyo, LOS "C" should be maintained except where roadways expansion or reconfigurations will adversely impact the small community character and economic viability of designated Central Business Districts.
Section 7.2.4 Roadways and Highways Policy RH-1.5 Proper Access.	Provide proper access to residential, commercial and industrial uses.
Section 7.2.4 Roadways and Highways Policy RH-1.6 Minimize Environmental Impacts.	Ensure that all transportation projects minimize adverse effects on the environment of the County.

Applicable Law	Description
County of San Bernardino General Plan – Section IV - Circulation and Infrastructure Element – Desert Region Goals and Policies of the Circulation and Infrastructure Element - Goal D/CI 1 – Ensure a safe and effective transportation system that provides adequate traffic movement while preserving the rural desert character of the region.	Policy D/CI 1.14 – The County should implement a traffic evaluation and monitoring program as follows: a. The following evaluation and monitoring program/criteria may be used to determine changes in the traffic level of service and the potential changes that may be caused by development within the project area. The program/criteria outlines below may also be used as guidelines for evaluating traffic changes and the level of service on project area roads: v. Unsignalized intersection mitigation may be required if the unsignalized intersection level of service, as defined in the 1985 Highway Capacity Manual, decreases one level of service to LOS B on the major, nonstopped street. Mitigation may also be required if the level of service on the minor, stopped street decreases two levels of service or drops below LOS C in accordance with the 1985 Highway Manual.

PROJECT DESCRIPTION

HHSEGS would comprise of two solar fields and associated facilities: the northern solar plant (Solar Plant 1) and the southern solar plant (Solar Plant 2). Each solar plant would generate 270 megawatts (MW) gross (250 MW net), for a total net output of 500 MW. Solar Plant 1 would occupy approximately 1,483 acres (2.3 square miles), and Solar Plant 2 would occupy approximately 1,510 acres (2.4 square miles). Refer to Figure 2.2-R1- Power Block Plot Plan (CH2 2012d).

A 103-acre common area would be established on the southeastern corner of the site to accommodate an administration building; warehouse; maintenance complex; an onsite 138kV switchyard and a natural gas metering station; asphalt-paved visitor and employee parking; landscape areas; temporary construction parking; construction trailers; a tire cleaning station and other construction support facilities (HHSG 2011a Figure 2.1-3 Site Plan of Common Area).

A 180-acre temporary construction laydown area would be located on the west side of the site and would be utilized for equipment laydown; construction parking; construction trailers; a tire cleaning station; heliostat assembly buildings and other construction support facilities.

Transmission Lines

The HHSEGS would interconnect to the Valley Electric Association (VEA) system[2]. The interconnection would require an approximately ten mile long generation tie-line (gen-tie line) from the HHSEGS site to the proposed Crazy Eyes Tap Substation[3], where the project would interconnect to the VEA electric grid. The gen-tie line would originate at

[2] In January 2013, VEA will become a participating transmission owner (PTO) and will turn operational control of its facilities over to the California Independent System Operator.

[3] In the HHSEGS Application for Certification (AFC), this substation was referred to as the Tap Substation.

the HHSEG's onsite switchyard, cross the state line, avoiding the mesquite vegetation to the south, and continue east for approximately 1.5 miles until reaching Tecopa Road.[4] At Tecopa Road, the route would head northwest paralleling Tecopa Road until it reaches the Crazy Eyes Tap Substation, which would be located immediately east of the Tecopa Road/State Route 160 intersection. The Crazy Eyes Tap Substation would interconnect to the existing VEA Pahrump-Bob Tap 230kV line.

Natural Gas Pipeline

A 12-inch diameter natural gas pipeline would be required for the HHSEGS project. Kern River Gas Transmission Company (KRGT) proposes to construct the pipeline from the HHSEGS meter station, to be located in the HHSEGS Common Area, extending 32.4 miles to KRGT's existing mainline system north of Goodsprings in Clark County, Nevada.

SETTING

The proposed HHSEGS would be located on approximately 3,277[5] acres of privately-owned land, leased in unincorporated southeastern Inyo County. The project site is triangular in shape and is bounded by the paved Old Spanish Trail Highway to the south, unpaved Quartz Street to the west, the California-Nevada border to the east, and an unpaved road along the northern border. Refer to Vicinity Map, Figure 2.1-1 (HHSG 2011a).

The project area in the vicinity of the HHSEGS site is sparsely populated. The following communities are within close proximity to the project site:

- The Town of Pahrump, Nevada, is located approximately 8 miles north (with a driving distance of approximately 28 miles via Old Spanish Trail Highway and State of Nevada Route 160) of the project site;
- The community of Sandy Valley, Nevada is approximately 19 miles to the southeast;
- The community of Tecopa, California is approximately 21 miles southwest;
- The city of Las Vegas, Nevada, is approximately 45 miles east of the project site; and
- The city of Los Angeles, California is approximately 180 miles southwest.

The project site and the surrounding private lands are characterized by a grid pattern of unpaved roads that were established when the area was subdivided in the 1960s for residential development. **Traffic and Transportation Figure 6** depicts the grid pattern of roads within the project area. Although the residential development was not constructed, the grid pattern roadways remain. This grid pattern also extends into the area of developed private land to the south of the project site and Old Spanish Trail

[4] The road is also referenced as Old Spanish Trail Highway. Both names – Tecopa Road and Old Spanish Trail Highway are generally used interchangeably.

[5] This number consists of Solar Plant 1 (1,483 acres); Solar Plant 2 (1,510 acres); Administration/Warehouse (4.8 acres); Substation (3.0 acres); Gas Metering Station (0.7 acre); Remaining construction area (94.5 acres) and the construction laydown area (180 acres).

Highway. Inyo County, in previous correspondence regarding County land use and planning issues (INYO 2012c) and the Preliminary Staff Assessment (PSA) comments (INYO 2012j) has stated to accommodate HHSEGS, the roads north of Old Spanish Trail Highway that crisscross the proposed project site would have to be abandoned.

Regional vehicular access to the project site would be provided by: Interstate 15 within the State of California and the State of Nevada; State Route 127 within the State of California[6] and State Route 160 within the State of Nevada[7]. **Traffic and Transportation Figure 1** depicts the regional street network surrounding the project site.

Primary access to the project site would be from the Old Spanish Trail Highway to the project entrance road on the east side of the project. Secondary access would also be from Old Spanish Trail Highway along the west side of HHSEGS, then along the paved road between the two solar plants. The internal roadway and utility corridors for each heliostat field and its power block would contain a 20-foot-wide paved or hardscape access roads from the entrance of the solar plant site to the power block, and then around the power block. **Traffic and Transportation Figure 2** depicts the access roads and internal roadways.

Within the heliostat fields, 20-foot wide "drive zones"[8] would be located concentrically around the power block to provide access to the heliostat mirrors for maintenance and cleaning. The drive zones would be located approximately 152 feet apart and would be grubbed to remove vegetation and smoothed. A 12-foot-wide unpaved path would be constructed on the inside perimeter of the project boundary fence for use by HHSEGS personnel to monitor and maintain perimeter security and tortoise exclusion fencing. These paths would also be grubbed, bladed, and smoothed to facilitate safe use with minimal grading where necessary to cross washes.

CRITICAL ROADS AND FREEWAYS

The transportation network within the project area consists primarily of local roadways that are generally rural in nature with limited access and state-maintained freeways.

Travel in Inyo County is primarily by automobile due to the rural nature of the local communities, low development densities, and limited options for using alternative modes of travel. The roadway network serving Inyo County is comprised of

[6] State Route 127 traverses through San Bernardino and Inyo County, State of California.

[7] State Route 160 traverses through Clark County and Nye County, State of Nevada.

[8] The AFC Project Description Section describes that within the heliostat fields, 20-foot wide "drive zones" would be located concentrically around the power block to provide access to the heliostat mirrors for maintenance and cleaning. The Soils & Surface Water Section of this FSA, however, states these concentric drive zones would be 10-foot wide roads based on the Applicant's Post-Construction Hydrologic and Hydraulic Analysis and the Preliminary Draft Construction Drainage, Erosion and Sedimentation Control Plan/Stormwater Pollution Prevention Plan – Appendix 5.15A – Civil Overall Site Plan – C-1000. Refer to the Soils & Surface Water section for additional information. However, whether these "drive zones" are 10 feet wide or 20 feet wide does not affect the proposed Findings of Fact for this Traffic and Transportation analysis.

approximately 3,520 miles of streets, roads, and highways. Many existing county roads and city streets have extremely light use, and many roads receive only minimal or emergency maintenance because of funding constraints (ICRTP 2009).

The construction workforce travel that would occur within San Bernardino County would also be primarily by automobile due to the sheer size of the County[9]. The roadway network serving San Bernardino County is comprised of approximately 10,000 miles of roads falling within oversight of three governmental agencies responsible for the construction and maintenance of the roadway infrastructure. The California Department of Transportation (Caltrans) is responsible for maintaining approximately 1,240 miles of roadway throughout the County. This total includes six federal (Interstate) freeways, two federal (U.S.) highways, and 18 state highways. The San Bernardino County Department of Public Works is responsible for maintaining approximately 2,830 miles of both paved and unpaved roadways primarily located in unincorporated areas of the County. These facilities range in classification from major arterial highways to local streets. The remaining 5,930 miles of roadways within San Bernardino County fall under the jurisdiction of the numerous incorporated municipalities located across the County (CSB 2007).

Existing Regional and Local Transportation Facilities

Traffic and Transportation Figures 1 and 3 shows the regional transportation setting and the local transportation features as described in the Application for Certification (AFC) and the Updated Workforce Analysis (UWA). The following information about critical roadways is based on the Traffic and Transportation section of the AFC (HHSG 2011a); UWA (CH2 2012jj) as well as traffic data from the California Department of Transportation (Caltrans); Inyo County Public Works Department; County of San Bernardino Department of Public Works and the State of Nevada Department of Transportation (NDOT).

Interstate 15

Interstate 15 (I-15) is located to the southeast of HHSEGS and crosses into the State of Nevada (from San Bernardino County) approximately 37 miles southeast of the project site.

I-15 is a north-south highway that extends more than 1,470 miles through the states of California, Nevada, Arizona, Utah, Idaho and Montana. This highway's southern terminus is in San Diego, California. The northern terminus is in Sweetgrass, Montana at the international border between the United States and Canada, where it becomes Alberta Highway 4. I-15 is predominately an eight-lane freeway at the south end in San Diego. Between Escondido (San Diego County) and I-40 in Barstow (San Bernardino County) a distance of 156 miles, I-15 is a six to eight lane freeway. North from Barstow I-15 is primarily a rural four-lane freeway that continues into the State of Nevada.

The majority of the I-15 through Nevada is a six lane freeway from Primm to the I-215 Beltway around Las Vegas. Between the Southern Beltway (I-215) and the I-15/US 93

[9] San Bernardino County is the largest County in the United States with a land area of 20,106 square miles and is divided into three planning areas – Valley Planning Region; Mountain Planning Region and Desert Planning Region (CSB 2007).

(Spaghetti Bowl) interchange at the north end of the Las Vegas urban area, I-15 becomes four lanes. The freeway continues to the northeast towards Arizona (I-15 CSMP 2011). According to the California Department of Transportation (Caltrans) 2008 average annual daily traffic (AADT)[10] counts, I-15 at the Nevada State line[11] carried approximately 37,000 vehicles. According to the Nevada Department of Transportation (NDOT) 2008 average annual daily counts I-15 at the north bound on-ramp of the Blue Diamond Interchange "Exit 33" carried approximately 20,000[12] vehicles. **Traffic and Transportation Figure 4** depicts the street network ADT.

State Route 160

State Route 160 (SR 160) is located approximately 10 miles east of the project site and connects to HHSEGS via the Old Spanish Trail Highway. Due to the limited number of interchanges off SR 160 in the vicinity of HHSEGS, access to the project site is provided only from the SR 160/Old Spanish Trail Highway intersection, which can be accessed by both eastbound and westbound traffic. SR 160 is an east-west highway that connects the southern Las Vegas Valley to U.S. Route 95 northwest of Las Vegas via the Pahrump Valley.

The highway is known as Blue Diamond Road within the Las Vegas area and the Pahrump Valley Highway for the remainder of the route. Near the project site, SR-160 is a divided highway with two lanes in each direction, shoulders, and a Class II bike lane.

The intersection at SR 160/Old Spanish Trail Highway is a T-intersection[13], with a stop-sign on Old Spanish Trail Highway. A separate westbound left turn lane is provided on SR 160. According to the 2008 Nevada Department of Transportation traffic counts, SR 160 carried approximately 8,900[14] vehicles west of the Old Spanish Trail Highway turnoff and approximately 40,000[15] vehicles at .3 miles north of Dean Martin Road. **Traffic and Transportation Figure 4** depicts the street network ADT.

[10]The California Department of Transportation (Caltrans), Traffic and Vehicle Data Systems Unit, defines AADT as "Annual average daily traffic is the total volume for the year divided by 365 days. The traffic count year is from October 1st through September 30th. Very few locations in California are actually counted continuously. Traffic Counting is generally performed by electronic counting instruments moved from locations throughout the State in a program of continuous traffic count sampling. The resulting counts are adjusted to an estimate of annual average daily traffic by compensating for seasonal influence, weekly variation and other variables which may be present. Annual ADT is necessary for presenting a statewide picture of traffic flow, evaluating traffic trends, computing accident rates, planning and designing highways and other purposes."

[11] The California Department of Transportation (Caltrans) Postmile 186.238.

[12] The Nevada Department of Transportation Traffic Count Stations – Station Number 0030040.

[13] A juncture where a minor road connects to a larger road and forms the shape of the letter T.

[14] The State of Nevada Department of Transportation Traffic Count Stations – Station Number 0033180.

[15] The State of Nevada Department of Transportation Traffic Count Stations – Station Number 0030044.

State Route 127[16]

State Route 127 (SR 127), also known as Death Valley Road, is a paved two-lane conventional highway[17] that traverses southeast Inyo County. The route is part of the Interregional Road System (IRRS) connecting southern California to Nevada and other rural highways. SR 127 is the closest major facility to the project site that connects to I-15 to the south of HHSEGS. SR 127 is classified as a Class II Highway[18], originates in San Bernardino County at Interstate 15 in Baker, San Bernardino County and terminates at the California/Nevada border where it converts to Nevada State Route 373 (CDOT 2011).

SR 127 is 91.03 miles and divided into four segments. **Traffic and Transportation Figure 8** depicts the four segments. Segment 1 (41.61 miles) begins at the interchange of I-15 at the 127/15 Separation Bridge[19] in the Community of Baker (San Bernardino County) and ends at the San Bernardino County line. In the Community of Baker speed limits range from 25 mph to 45 mph. From north of Baker, the speed limit is 55 mph. Segment 2 (16.43 miles) begins on the San Bernardino/Inyo County Line and ends at SR 178 West, the Jubilee Pass entrance to the Death Valley National Park (DVNP). Speed limits range from 35 mph in the Community of Shoshone to 65 mph outside of Shoshone. This Segment provides access to SR 178 East, also known as the Charles Brown Highway.

Segment 3 (25.72 miles) begins at SR 178 West, the Jubilee Pass entrance to DVNP and ends at its junction with SR 190, Death Valley Junction. Speed limits range from 35 mph to 65 mph. Segment 4 (7.27 miles) begins at the junction with SR 190, Death Valley Junction and ends at the California/Nevada State Line. Speed limits range from 55 mph to 65 mph. The unpaved shoulders vary in width from 0 to ten feet the length of SR 127 (CDOT 2011). SR 127 intersects Old Spanish Trail Highway approximately 50 miles north of I-15 and continues along the eastern edge of Death Valley and eventually terminates at the California /Nevada border, where State Route 373 begins. (HHSG 2011a, Page 5.12-10).

[16] State Route 127 is codified in the California Streets and Highways Code, Division 1, Chapter 2, Article 3, Section 427 “Route 127 is from Route 15 near Baker to the Nevada state line via the vicinity of Death Valley Junction.”

[17] The California Department of Transportation (Caltrans), State Route 127 Transportation Concept Report (published October 2011) defines conventional highway as “A highway without controlled access. Grade separations at intersections and access control may be used when justified.”

[18] The Highway Capacity Manual 2010 defines Class II as “Class II two-lane highways where motorists do not necessarily expect to travel at high speeds. Two-lane highways functioning as access routes to Class I facilities, serving as scenic or recreational routes (and not as primary arterials), or passing through rugged terrain (where high-speed operations would be impossible) are assigned to Class II. Class II facilities most often serve relatively short trips, the beginning or ending portions of longer trips, or trips for which sightseeing plays a significant role.”

[19] Bridge number 54.0610 built in 1965; Postmile L000.01; Structure Type: Steel and stringer/Multi-beam or Girder; Bridge Length 74.1 meters (243 feet); Width: 10.4 meters (34.12 feet); Permit Rating: Purple permit capacity (CDOT 2012).

According to the California Department of Transportation (Caltrans) 2008 average annual daily traffic (AADT) counts[20], SR 127 carried approximately 780 vehicles south of the SR-127/Old Spanish Trail Highway intersection.

Old Spanish Trail Highway[21]/Tecopa Road

Old Spanish Trail Highway, also referenced as Tecopa Road, is a paved two-lane north south road approximately 39 miles long connecting SR 127 in California (Inyo County) to State Route 160 in the State of Nevada. Primary access to the project site would be from Old Spanish Trail Highway to the project entrance road on the east side of the project. The majority of the project traffic would travel through the Old Spanish Trail Highway/SR 160 intersection located in the State of Nevada to access the regional road network. The existing paved width for this roadway is approximately 22 feet (INYO 2012b).The posted speed limit is 55 mph and the roadway lacks bicycle or pedestrian lanes.

According to the Inyo County Public Works Department 2007 average daily traffic counts (ADT), Old Spanish Trail Highway[22] carried an average of approximately 258 vehicles traveling west and 275 vehicles traveling east a day in 2007.

Baker Boulevard

Baker Boulevard[23] is a paved two-lane, major collector road located in the Community of Baker, in San Bernardino County. The road is accessed by the northbound and southbound traffic from the I-15 Death Valley/Kelbaker Road Interchange[24]. The road runs parallel to I-15 and is approximately 2.6 miles long. Baker Boulevard intersects SR 127 approximately 1,600 feet from the northbound offramp and approximately 305 feet from the southbound offramp. The intersection of SR 127/Baker Boulevard is controlled by a four way stop sign.

According to the County of San Bernardino Department of Public Works 2012 Average Daily Counts (ADT) Baker Boulevard carried an average of 5,541 vehicles west of SR 127 and 7,829 vehicles east of SR 127 (CSB 2012).

Level of Service

When evaluating the project-related impacts on the local transportation system, staff bases its analysis on Level of Service (LOS) determinations. Level of service is a

[20] The California Department of Transportation (Caltrans) Postmile 6.510.

[21] The Old Spanish Trail Highway is not the same infrastructure as the Old Spanish Trail. As discussed in the Cultural Resources Section "The Old Spanish Trail Recognition Act of 2002 (Act) defines the trail as "an approximately 2,700 mile long trail extending from Santa Fe, New Mexico, to Los Angeles, California, that served as a major trade route between 1829 and 1848…including the Armijo Route, Northern Route, North Branch, and Mojave Road" and refers to maps in the 'Old Spanish Trail National Historic Trail Feasibility Study', dated July 2001, (16 USC 1241). The Old Spanish Trail-Mormon Road, as documented by the Act, is located on the south side and just outside of the project site."

[22] The location of the traffic count was approximately .2 miles west of the State of Nevada line.

[23] The County of San Bernardino, Department of Public Works, identifies Baker Boulevard as Road Number 150500.

[24] Exit Number 246 as assigned by the Department of Transportation (Caltrans), California Numbered Exit Uniform System (Cal-NExUS).

generally accepted measure used by traffic engineers, planners, and decision-makers to describe and quantify the congestion level on a particular roadway or intersection in terms of speed, travel time, and delay.

The Highway Capacity Manual 2010, includes six levels of service for roadways or intersections ranging from LOS A - the best operating conditions - to LOS F - the worst, most congested operating conditions.

To quantify the existing baseline traffic conditions, the study area state highways, roadways, and intersections were analyzed in the AFC to determine their operating conditions. Based on the traffic volumes, the turning movement counts, and the existing number of lanes at each intersection, the LOS) have been determined for each intersection.

LOS is a qualitative measure describing operational conditions within a traffic stream. It is used to describe and quantify the congestion level on a particular roadway or intersection and generally describes these conditions in terms of such factors as speed or vehicle movement. **Traffic and Transportation Table 2** summarizes intersections LOS criteria based on seconds of delay.

Traffic and Transportation Table 2
Level of Service Criteria for Intersections

Level of Service	Control Delay (seconds/vehicles)	Description
A	≤10	Free flow; insignificant delays
B	>10 and <15	Stable operation; minimal delays
C	>15 and <25	Stable operation; acceptable delays
D	>25 and <35	Approaching unstable flow; queues develop rapidly but no excessive delays
E	>35 and <50	Unstable operation; significant delays
F	>50	Forced flow; jammed conditions

Source: Transportation Research Board, 2010, Highway Capacity Manual

Current Roadway Segment Conditions - Level of Service

Level of service standards for the roadways in the vicinity of the HHSEGS project are established by and under the jurisdiction of the County of Inyo; County of San Bernardino and the California Department of Transportation. Staff used the County of Inyo and County of San Bernardino LOS standards to evaluate potential HHSEGS generated traffic impacts. The following is a list of the applicable California Department of Transportation, Inyo County and San Bernardino County LOS standards.

The LOS for the State of Nevada I-15 segment and SR 160 are established by the State of Nevada. Information regarding the LOS for Clark and Nye counties has also been included.

In the State of California, volumes of traffic are measured in terms of peak hour estimates for actual vehicles and annual average daily traffic (AADT) for both lanes of travel (i.e., ahead and back). The State of Nevada published AADT numbers do not differentiate between travel directions, or do they record specific numbers for peak travel times.

State of California

California Department of Transportation-The State Route 127 Transportation Concept Report[25] (TCR) is a long range planning document that describes the current characteristics of the SR 127 transportation corridor and establishes a twenty-year planning concept. The TCR defines the California Department of Transportation (Caltrans) goals for the development of the corridor in terms of facility type and Level of Service (LOS), while broadly identifying the improvements needed to reach those goals.

The TCR covers the 91.03 miles of SR 127 addressed in the four segments. **Traffic and Transportation Figure 8** depicts the four segments. The AADT varies along the route from 255 to 1,050 vehicles. Truck traffic and recreational vehicles make up approximately 12 percent of AADT. The Concept LOS for SR 127 for all four segments is LOS C. The SR 127/Old Spanish Trail Highway intersection falls within Segment 2 which is currently operating at LOS A. Segments 1, 3 and 4 are also currently operating at LOS A (CDOT 2011).

Inyo County - The Inyo County General Plan - Circulation Element Policy RH-1.4, Level of Service, requires a minimum of "Level of Service (LOS)[26] C" be maintained on all roadways in the County of Inyo. For highways within the County of Inyo, LOS "C" should be maintained except where roadways expansion or reconfigurations will adversely impact the small community character and economic viability of designated Central Business Districts.

San Bernardino County – Where Baker Boulevard, a County roadway, intersects SR 127, the County of San Bernardino accepts the Department of Transportation (Caltrans) criteria, which is a delay of no more than 45 seconds (LOS E)(CEC 2012ll).

State of Nevada

Nevada Department of Transportation (NDOT) - The minimum LOS for SR 160 is LOS C (CEC 2012v).

Clark County – The Clark County Transportation Element[27] is intended to provide information to the public on future transportation needs in the context of projected growth and development. The transportation goals and policies are grouped into six subject areas: Public Process; Connecting Land Use; Access and Safety; Protecting the Environment; Designing the Transportation System; Implementing the Transportation System.

[25] Published October 2011 by California Department of Transportation (Caltrans) District 9, System Planning.

[26] Inyo County defines Level of Service (LOS) as "A method to describe how well a roadway is operating. Based on a roadway's volume to capacity (V/C) ratio, a letter designation is assigned that represents the traffic flow conditions. The letter designations A through F represent progressively declining conditions, with A indicating excellent maneuverability and stable speeds and F indicating a breakdown of flow and unstable, erratic speeds".

[27] Adopted by the Clark County Board of County Commissioners on July 16, 2003; Last Amendment December 3, 2008.

Policy T-5.3 of the *Designing* the *Transportation System Goal* requires "Level of Service (LOS) D should be the design objective for non-residential local, collector and arterial streets. LOS C should be the design objective for residential local, collector and arterial streets. The design year to be used by all developers should be the build-out year of the development's final phase" (CCTE 2008).

Nye County – The Streets and Highways Capital Improvement Plan[28] (CIP) FY 2006-2015 evaluates the existing transportation infrastructure and provides planning for Nye County residents to satisfy the local and regional mobility needs. The plan addresses both the improvement of existing streets as well as the construction of new roadways designed to accommodate future traffic from existing and proposed development.

The majority of the existing roadways consist of two lane rural streets. The existing capacity of the identified arterial roadways slated for improvements operate below capacity, at LOS A, B and C. In addition, no roadway improvements were identified in and around HHSEGS project area (SHCIP 2005).

Traffic and Transportation Table 3 includes information regarding the existing LOS for the potentially affected intersections in the project area. The AFC and PSA analyzed the SR 160/Old Spanish Trail Highway intersection located within the State of Nevada as it was assumed approximately 95 percent of the project traffic (100% truck-trips and 95% automobiles) would use this intersection to access HHSEGS.

The UWA, however, has identified two additional potentially affected intersections located within the State of California: SR 127/Old Spanish Trail Highway located in Inyo County and SR 127/Baker Boulevard located in San Bernardino County. **Traffic and Transportation Figure 3** depicts SR 160/Old Spanish Trail Highway and the two additional intersections of SR 127/Old Spanish Trail Highway and SR 127/Baker Boulevard.

LOS A represents free-flowing traffic; whereas LOS F represents slow-moving or stalled traffic (overcapacity operation). The SR 160/Old Spanish Trail Highway intersection (State of Nevada) currently operates at LOS A; the SR 127/Old Spanish Trail Highway intersection (Inyo County, California) currently operates at LOS A (LOS B for the PM peak hour westbound right) and SR 127/Baker Boulevard (San Bernardino County) currently operate at LOS A (LOS B for the PM peak hour).

[28] Approved by the Pahrump Regional Planning District July 20, 2005.

Traffic and Transportation Table 3
Existing Intersection Level of Service
State of Nevada and State of California

		Existing Conditions			
Intersection	**Approach/Movement**	**AM Peak Hour**		**PM Peak Hour**	
SR 160/Old Spanish Trail Highway (State of Nevada)	Northbound left/right	9.3[1]	A	9.7[1]	A
	Westbound left	8.1[1]	A	7.9[1]	A
SR 127/Old Spanish Trail Highway (State of California, Inyo County)	Southbound left	7.4[2]	A	7.4[2]	A
	Westbound left	9.4[2]	A	9.4[2]	A
	Westbound right	8.8[2]	A	8.8[2]	B
SR 127/Baker Boulevard (State of California, San Bernardino County)	Eastbound	7.6[3]	A	10.2[3]	B
	Westbound	8.4[3]	A	10.7[3]	B
	Northbound	8.2[2]	A	12.0[2]	B
	Southbound	8.2[2]	A	10.1	B

*Source: Hidden Hills Solar Electric Generating System Application for Certification, Table 5.12-3; Updated Workforce Analysis Table 5.12-3R1 and Technical Memorandum Table 2 (*CH2 2012rr).

1 - The intersection level of service (LOS) was calculated using the Highway Capacity Software (HCS+ McTrans, version 5.21). Since the focus of the analysis was on unsignalized intersections, the LOS was determined using seconds of delay (CEC 2012n).
2 - The intersection level of service (LOS) was calculated using the Highway Capacity Software (HCS+ McTrans, version 5.5).
*3 - The intersection level of service (LOS) was calculated using Synchro (Version 8.0)(*CH2 2012rr).

PUBLIC TRANSPORTATION

Public transportation consists of bus service, bicycle and pedestrian facilities, airports and rail service. Information about these forms of public transportation follows.

Bus Service

The Eastern Sierra Transit Authority (ESTA) provides public transit service for Inyo and Mono Counties. ESTA began operating transit services on July 1, 2007, assuming control of all the services, staff and capital formerly known as Inyo Mono Transit. The ESTA provides four types of mass transit services to the region: Fixed Routes, Seasonal, Dial-a-Ride and Vanpool.

The nearest transit line to the project site is the Tecopa-Pahrump Fixed Route[29] which provides services to the Tecopa Senior Center, Shoshone Medical Center and the Pahrump Walmart. The Tecopa-Pahrump bus operates the first Thursday after the 3rd calendar day of the month and two weeks later (ESTA 2012).

Nation-wide bus service is not provided in Inyo County. Greyhound discontinued bus service in 2001 which resulted in Inyo and Mono counties forming the Carson Ridgecrest Eastern Sierra Transit (CREST) bus service. CREST provides service from Lancaster, California to Reno, Nevada. Nation-wide bus service is provided by Greyhound at the terminus of the CREST bus line.

Bicycle and Pedestrian Facilities

The Inyo County Collaborative Bikeways Plan (Plan) [30] is the bicycle transportation plan for Inyo County, the city of Bishop and the Bishop Paiute Tribe. The Plan's goal is developing a safe, convenient and effective bikeway system that promotes bicycle travel as a viable transportation mode and connects to work, schools, residential and recreation areas.

Due to the remoteness of the area there are no designated bicycle lanes in the area (other than SR 160) or adjacent to HHSEGS. Bicycles on rural highways and roads travel on paved shoulders where they are present, sufficiently wide, unobstructed by vegetation and of good pavement quality. On low-volume rural roads without paved shoulders, bicyclist travel one or more feet from the pavement edge depending on pavement quality (ICCBP 2008).

The Plan has identified upgrades of eight bicycle facilities within the Tecopa area (Appendix 5A). However, the HHSEGS site is located outside of these proposed upgrades; therefore, no bicycle facilities are planned for the study area.

In addition, due to the remoteness of the area, pedestrian facilities, such as sidewalks and walkways do not exist in the area or adjacent to HHSEGS.

Airports

The closest commercial operational airport to HHSEGS is the McCarran International Airport in Las Vegas, Nevada approximately 45 miles to the east. The closest proposed commercial airport to HHSEGS would be the Pahrump Valley General Aviation Airport located approximately 10 miles northwest in Nye County, Nevada. The airport would primarily serve small aircraft less than 12,500 pounds, with wingspans of 49 feet or less (HHSG 2011a). The Town of Pahrump (Town) has requested Federal Aviation Administration (FAA) assistance to establish a public use, general aviation airport in the Town of Pahrump to serve the Town and the surrounding Pahrump Valley in Nye County, Nevada.

[29] Fixed routes are town to town and in-town routes with fixed schedules and fixed stops.

[30] The Inyo County Collaborate Bikeways Plan was approved by the Inyo County Board of Supervisors on November 18, 2008; on November 19, 2008 by the Inyo County Local Transportation Commission; the City of Bishop on November 24, 2008 and the Bishop Paiute Tribe on December 4, 2008.

Pahrump has received Airport Improvement Program grant funds to assist in the cost of preparing an Environmental Impact Statement (EIS) for the proposed project, which would be constructed on Bureau of Land Management (BLM) owned property. The Town is in the process of establishing a cost recovery account with BLM for their participation in the EIS. Once that account is established, the FAA and the BLM anticipate entering into a Memorandum of Understanding for preparation of the EIS for the proposed airport. The EIS process is expected to take several years. After completion of the EIS the FAA and the BLM could proceed to take federal agency actions regarding the proposed airport project.

Military Airports

There are two nearby United State Air Force Bases: Nellis Air Force Base and Edwards Air Force Base. An Obstacle Evaluation Study (August 16, 2010), was prepared for the HHSEGS project to identify obstacle clearance surfaces established by the Federal Aviation Administration (FAA) that would limit the height or location of proposed solar towers within the defined study area (HHSG 2011a). As a part of this study, the Department of Defense (DOD) was contacted for their review and input to determine whether there would be an impact from the solar power tower development with regard to military mission operations.

The response from the DOD stated that the proposed project would not have any military mission impacts and the towers are not under the military training routes (CEC 2012l).

Freight and Passenger Rail

There is no freight or passenger rail service in the County of Inyo. The Union Pacific Railroad provides a mainline freight service from southern California to Mojave in Kern County. At Mojave, several spur lines branch from the main line. The Searless branch heads east from Mojave, then a spurline branches off at Searless (near Trona) heading north and terminating in Lone Pine (ICRTP 2009).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION METHODS AND THRESHOLDS FOR DETERMINING SIGNIFICANCE

Significance criteria used in this document for evaluating environmental impacts are based on the CEQA Guidelines, the CEQA Environmental Checklist for Transportation/Traffic, and applicable LORS used by other governmental agencies. Specifically, staff analyzed whether the proposed project would result in the following:

1. Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume-to-capacity ratio on roads, or congestion at intersections);

2. Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and

relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit;

3. Conflict with an applicable congestion management program, including, but not limited to, level of service standards (LOS) and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways;

4. Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);

5. Result in inadequate emergency access;

6. Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities;

7. Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risk;

8. Produce a thermal plume in an area where flight paths are expected to occur below 1,000 feet from the ground[31]; or

9. Have individual environmental effects which, when considered with other impacts from the same project or in conjunction with impacts from other closely related past, present, and reasonably foreseeable future projects, are considerable, compound, or increase other environmental impacts.

DIRECT/INDIRECT IMPACTS AND MITIGATION

The direct and indirect impacts of the proposed HHSEGS on traffic and transportation system are discussed in this section and based on an analysis comparing pre-HHSEGS and post-HHSEGS conditions. Staff evaluated the HHSEGS's impacts for two separate future scenarios: the peak construction period (when construction activity and employment would be maximized) and the first year of full operation.

Study Location

The below roadway segments, located within the State of Nevada and the State of California, were selected for evaluation because they provide the most direct route to the project site and would most likely be affected by project traffic during project construction and operation.

Roadway Segments:

- The intersection of State Route 160/Old Spanish Trail Highway located in the State of Nevada.

[31] The FAA recommends that pilots avoid overflight of plume-generating industrial sites below 1,000 feet AGL (FAA 2006).

- The intersection of State Route 127/Old Spanish Trail Highway located in the State of California (Inyo County).
- The intersection of SR 127/Baker Boulevard located in the State of California (San Bernardino County).

Construction Period Impacts and Mitigation

Staff analyzed the proposed HHSEGS's potential traffic impacts by evaluating state route segments, roadway segments, and intersections in the vicinity of the project site. Staff compared existing traffic volumes and levels-of-service (LOS) to traffic volumes and LOS projected after addition of HHSEGS construction workforce and truck traffic.

The analysis of HHSEGS construction impacts focuses on the peak construction period, which would generate the most vehicle trips and result in the worst-case scenario for traffic and transportation impacts.

Construction Workforce Traffic

A large regional workforce would commute daily from locations relatively near the project site and would supply the majority of construction labor. To reach the HHSEGS site, construction traffic would use I-15, SR-160, SR-127 and the Old Spanish Trail Highway.

The Application for Certification, Traffic and Transportation Section and the Preliminary Staff Assessment analyzed the following approximate percentage of construction trips by route:

- 95 percent of the project trips, (100% truck trips and 95% automobiles), would use a route from the east or west within the State of Nevada via SR-160, then south on Old Spanish Trail Highway and then east to the project site; and
- 5 percent of the project trips, automobiles only, would use a route from the north or south within the State of California via SR-127 in Inyo County, then to Old Spanish Trail Highway and then to the project site.

Subsequent to the PSA, the applicant submitted an Updated Workforce Analysis (UWA) on October 1, 2012 (CH2 2012jj). These updated workforce assumptions were based primarily on new workforce numbers associated with the draft Project Labor Agreement, as well as experience acquired from the development of the Ivanpah Solar Electric Generating System project. The UWA contains the following assumptions:

- 100 percent of the California workforce (that returns home) would drive their own vehicles between home (in the State of California) and their hotel at the start of their work week;
- 70 percent of the workforce is assumed to be from California and 30 percent of the workforce is assumed to be from Nevada;
- The State of California workforce (dayshift) would carpool from their hotels Tuesday through Thursday, when travelling between their place of lodging and the site at a rate of 1.5 people per car;

- 50 percent of the State of California workforce would return home on Friday afternoon, directly from the site, because it is the end of their 5-day work week;
- 40 percent of the State of California workforce would return home on Saturday afternoon after they complete an additional Saturday shift;
- 90 percent of the State of California swing shift workforce would drive directly to the work site on Monday in their own vehicles and 10 percent would remain over the weekend and would commute between the work site and their hotel;
- 80 percent of the State of California dayshift workforce would arrive at their hotel on Sunday evening and 20 percent would commute from home directly to the site on Monday morning;
- From their place of lodging (State of California workers) or their residences (State of Nevada workers) to the work site, day shift ridership would average 1.2 persons per vehicle (on an average basis, vehicle use was calculated at 100 workers/1.2 workers per vehicle= 83 vehicles per 100 workers);
- As the day shift workforce approaches 1,000 workers, 15-passenger vans would be used to increase the day shift ridership to 1.5 persons per vehicle for California workers (during the peak months of construction, vehicle use was calculated at 100 workers/1.5 workers per vehicle = 67 vehicles per 100 workers);
- The ridership for State of Nevada workers would remain at 1.2 persons per vehicle throughout the project construction period; and,
- The California and Nevada swing shift carpool rate would average 1.2 persons per vehicle regardless of the size of the swing shift workforce.

Work-week durations were also updated for both day shift and swing shift:

- 50 percent of the workforce was assumed to work a 5-day, 10-hour-per-day work week (Monday through Friday for day shift; Monday night through Saturday morning for swing shift).
  Of those workers:
  - The California workforce was assumed to drive their cars to the work site on Friday and leave to return home following their shift.
  - The Nevada workforce was assumed to carpool averaging 1.2 persons per vehicle.
- 40 percent of the workforce would stay and work an additional 10-hour shift on Saturday, returning home at the end of their shift.
- 10 percent of the State of California workforce would stay over the weekend.
- 100 percent of truck traffic would still use a route from the east or west within the State of Nevada via SR 160, then south on Old Spanish Trail Highway and east to the project site.

All phases of construction for HHSEGS (from perimeter fencing, site preparation, grading and commercial operation) would be completed over an approximately 29-month period, from the second quarter of 2013 to the fourth quarter of 2015. The common area facilities would be constructed during construction of Solar Plant 1. The

construction workforce would peak during Month 19 with approximately 2,293 workers (1,682 dayshift and 611 swing shift). By month 17, 1,879 workers are projected - 82 percent of the peak month. Overall, there is a 5-month period, Months 17 through 21, when the number of workers would be within approximately 20 percent of the peak. In addition, a peak of approximately 66 workers would be required to construct the gas and transmission line which would occur during month 16. However, the construction of these facilities would not coincide with the peak of the plant site construction employment.

The weekly project construction schedule is anticipated to be two, 10-hour shifts; a Monday through Friday Day Shift (5:00 am to 3:30 pm), and a Monday night to Saturday morning Swing Shift (6:00 pm to 4:30 am). During the summer season, the daily work hours would be adjusted earlier (in half hour increments) in order to take advantage of the cooler temperatures and promote worker safety.

The potential traffic impacts have been analyzed for the day shift (5:00 am to 3:30 pm) during the peak construction month. Although the employee trips would occur outside of typical peak hours (generally 7:00 am to 9:00 am and 4:00 pm to 6:00 pm), this shift represents the greatest number of employees arriving and departing the site at one time (1,682 employees). Given the remote location of the project site, the high cost of gas, and the type of construction being conducted, the UWA estimates that the baseline carpool rate for the State of Nevada workforce would be 1.2 percent and for the State of California it would be 1.5 percent.

Based on the UWA assumptions, HHSEGS would generate a total of 4,000 daily construction related trips (3,820 daily automobile trips and 180 truck trips) during the peak construction month. Of the 3,820 daily automobile trips, 1,411 (1,401 automobile and 10 truck) trips would occur during the morning peak hour and 1,411 (1,401 automobile and 10 truck) trips would occur during the afternoon peak hour.

The total project trip generation, which is now delineated by a Monday, Tuesday-Thursday and Friday commute, including the construction truck traffic, during the peak construction month is summarized in **Traffic and Transportation Table 4**. The peak construction workforce trips per shift for Month 19 are summarized in **Traffic and Transportation Table 5.**

The peak construction workforce trips for the day shift and swing shift are summarized in **Traffic and Transportation Table 6** and the peak construction workforce trips depicting the workforce and carpool rate is summarized in **Traffic and Transportation Table 7.**

Traffic and Transportation Table 4
Peak Construction Trip Generation (Month 19)

	Daily Trips*				Peak Hour Trips		
	Monday	Tuesday-Thursday	Friday		Monday	Tuesday-Thursday	Friday
Automobiles	3,714	3,430	3,820		1,284	1,206	1,401
Trucks**	180	180	180		10	10	10
Total	3,894	3,610	4,000		1,294	1,216	1,411

Source: Hidden Hills Solar Electric Generating System Updated Workforce Analysis Table 5.12-4R1.

*Daily trips include combined trips generated by dayshift and swing shift.

** Assumes truck trips are spread equally throughout the day from 6:00 a.m. to 6:00 p.m.

Traffic and Transportation Table 5
Peak Construction Workforce (Month 19)

Project Site Workforce	Day Shift (5:00am to 3:30pm)	Swing Shift (6:00pm to 4:30am)	TOTAL
Craft	1,192	511	1,703
Non-Craft	490	100	590
Total Workforce	1,682	611	2,293

Source: Hidden Hills Solar Electric Generating System Updated Workforce Analysis Table 5.12-5R1

Traffic and Transportation Table 6
Peak Construction Workforce Trips (Month 19)

	Day Shift		Swing Shift		Combined
	One-Way Trips	Daily Trips	One-Way Trips	Daily Trips	Daily Trips
Monday	1,284	2,568	573	1,146	3,714
Tuesday-Thursday	1,206	2,412	509	1,018	3,430
Friday	1,401	2,802	509	1,018	3,820

Source: Hidden Hills Solar Electric Generating System, Updated Workforce Analysis Table TT-1.

Traffic and Transportation Table 7
Peak Construction Workforce Trips (Month 19, Day Shift)

Workforce/Carpool Rate	State of California	State of Nevada	Total
State of California/State of Nevada Workforce Split	70%	30%	100%
Dayshift Construction Workforce	1,177	505	1,682
Baseline Carpool Rate (people per vehicle)	1.5	1.2	
Monday Commute • Carpools	628[B,B1]	421[A, A1]	1,049
• Single Occupant Vehicles	235[B]		235
• Total Vehicles	863	421	1,284
• Trips In/Out[E]	1,726	842	2,568
Weekday Commute (Tuesday-Thursday) • Carpools	785[C, C1]	421[A, A1]	1,206
• Trips In/Out[E]	1,570	842	2,412
Friday Commute • Carpools	392[D, D1]	421[A,A1]	813
• Single Occupant Vehicles	588[D]		588
• Total Vehicles	980	421	1,401
• Trips In/Out[E]	1,960	842	2,802

Source: Hidden Hills Solar Electric Generating System Updated Workforce Analysis – CH2 2012jj, Table TT-2

A. The Nevada workforce would carpool at a rate of 1.2 people per car, Monday through Friday.

B. On Monday, 80 percent of the California workforce would carpool at a rate of 1.5 people per car and 20 percent would drive alone. Not all of the 80 percent would be "carpools," but the overall average would be 1.5 people per car for this group, so the line is described as "Carpools."

C. The California workforce would carpool at a rate of 1.5 people per car, Tuesday through Thursday.

D. On Friday, 50 percent of the California workforce would carpool at a rate of 1.5 people per car and 50 percent would drive alone.

E. Assumes one incoming trip per vehicle during AM peak and one outgoing trip per vehicle during PM peak.

A1 – (505)(Dayshift Construction Workforce)/(1.2) = 421 carpools.

B1 - (0.80)(1,177)=941.6 carpooling workers/1.5 carpooling workers/vehicle = 628 carpools.

C1 – (1,177)/(1.5 workers/vehicle) = 785 carpools.

D1 – (1,177)/(0.50) = 588.5 carpooling workers = (588.5)/(1.5 workers per vehicle) = 392 carpools.

Based on the UWA, regional street network, current travel patterns, lodging locations, and anticipated employee origins (70 percent of the workforce is assumed to be from California, and 30 percent of the workforce is assumed to be from Nevada), it is anticipated that HHSEGS construction traffic (for the dayshift) would be distributed as shown in **Traffic and Transportation Table 8** and **Traffic and Transportation Table 9**. The tables combine both the State of California and State of Nevada workforce and also depict the carpool rates and commute pattern assumptions. As shown below, separate distributions were conducted for the Monday commute, Tuesday through Thursday (weekday commute) and for the Friday commute.

Traffic and Transportation Table 8
State of California and State of Nevada
AM Peak Hour Project Trip Distribution- Month 19 Day Shift

			Monday		Weekday		Friday	
Road	**Direction**	**Origin/Destination**	**Trips**	**Percent**	**Trips**	**Percent**	**Trips**	**Percent**
State Route 160	Northwest	Pahrump, Nevada	210	17%	241	20%	280	20%
Old Spanish Trail Highway	South	Tecopa, Shoshone, I-15 - California	286	22%	63	5%	79	6%
State Route 160	East	Las Vegas, Nevada	788	61%	902	75%	1,042	74%
Total			1,284	100%	1,206	100%	1,401	100%

Source: Hidden Hills Solar Electric Generating System Updated Workforce Analysis Table 5.12-7AR1

Traffic and Transportation Table 9
State of California and State of Nevada
PM Peak Hour Project Trip Distribution – Month 19 Day Shift

			Monday		Weekday		Friday	
Road	**Direction**	**Origin/Destination**	**Trips**	**Percent**	**Trips**	**Percent**	**Trips**	**Percent**
State Route 160	Northwest	Pahrump, Nevada	257	20%	241	20%	163	12%
Old Spanish Trail Highway	South	Tecopa, Shoshone, I-15 – California	69	5%	63	5%	619	44%
State Route 160	East	Las Vegas, Nevada	958	75%	902	75%	619	44%
Total			1,284	100%	1,206	100%	1,401	100%

Source: Hidden Hills Solar Electric Generating System Updated Workforce Analysis Table 5.12-7BR1

Refer to **Traffic and Transportation Figure 5** for the AM project trip distribution percentages and **Traffic and Transportation Figure 9** for the PM project trip distribution percentages. **Traffic and Transportation Table 10** and **Traffic and Transportation Table 11** depicts the existing intersection LOS conditions plus HHSEGS for SR 160/ Old Spanish Trail Highway; SR 127/Old Spanish Trail Highway and SR 127/Baker Boulevard.

Traffic and Transportation Table 10
State of Nevada and State of California
Comparison of State Route 160/Old Spanish Trail Highway; State Route 127/Old Spanish Trail Highway and State Route 127/Baker Boulevard Intersections
Existing Conditions Plus HHSEGS LOS
AM Peak Hour – Day Shift

				Existing Conditions With HHSEGS AM Peak					
		Existing AM Peak		Monday		Tuesday-Thursday		Friday	
Intersection	**Approach/Movement**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**
SR 160/Old Spanish Trail Highway (State of Nevada)	Northbound left/right	9.3	A	9.9	A	10.0	A	100+	F
	Westbound left	8.1	A	24.3	C	60.6	F	100+	F
SR 127/Old Spanish Trail Highway (State of California, Inyo County)	Southbound left	7.4	A	7.9	A	N/A[1]	N/A[1]	N/A[1]	N/A[1]
	Westbound left	9.4	A	9.4	A	N/A[1]	N/A[1]	N/A[1]	N/A[1]
	Westbound right	8.8	A	10.1	B	N/A[1]	N/A[1]	N/A[1]	N/A[1]
SR 127/Baker Boulevard (State of California, San Bernardino County)	Eastbound	7.6	A	8.7	A	N/A[2]	N/A[2]	N/A[2]	N/A[2]
	Westbound	8.4	A	9.6	A	N/A[2]	N/A[2]	N/A[2]	N/A
	Northbound	8.2	A	12.9	B	N/A[2]	N/A[2]	N/A[2]	N/A[2]
	Southbound	8.2	A	8.7	A	N/A[2]	N/A[2]	N/A[2]	N/A[2]

*Source: Hidden Hills Solar Electric Generating System Application for Certification, Table 5.12-8 and and Hidden Hills Solar I, LLC and Hidden Hills Solar II, LLC Preliminary Staff Assessment Comments (CH2 2012ee); Updated Workforce Analysis Table 5.12-8AR1 and Technical Memorandum Table 2 (*CH2 2012rr).

1 - Not Applicable – The intersection was not analyzed for Weekday/Friday morning peak hour because there would not be any project trips added to the intersection during this period.

2 – Not Applicable – Turning movement counts were collected on two Mondays (October 22, 2012 and October 29, 2012) from 5:00a.m. – 8:00a.m.

The Traffic and Transportation Section of the PSA stated the SR 160/ Old Spanish Trail Highway would operate at LOS A during the morning peak hour, and LOS F during the afternoon peak hour under the existing plus project conditions. During the AM peak period, the LOS changes primarily on the eastbound left-turn from SR 160 to Old Spanish Trail Highway. During the PM peak period, the turning movement issues are for the northbound movements—both left- and right turns (HHSG 2011a, page 5.12-19). LOS F is not an acceptable level of service on State of Nevada highways.

As a result of the updated workforce traffic, additional potential traffic impacts have been identified for the SR 160/Old Spanish Trail Highway intersection during the morning peak hour (impacts were previously identified for the afternoon peak hour only).

Traffic and Transportation Table 11
State of Nevada and State of California
Comparison of State Route 160/Old Spanish Trail Highway; State Route 127/Old Spanish Trail Highway and State Route 127/Baker Boulevard Intersections
Existing Conditions Plus HHSEGS LOS
PM Peak Hour – Day Shift

				Existing Conditions with HHSEGS PM Peak					
		Existing PM Peak		Monday		Tuesday-Thursday		Friday	
Intersection	**Approach/Movement**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**
SR 160/Old Spanish Trail Highway (State of Nevada)	Northbound left/right	9.7	A	100+	F	100+	F	100+	F
	Westbound left	7.9	A	7.9	A	7.9	A	7.9	A
SR 127/Old Spanish Trail Highway (State of California, Inyo County)	Southbound left	7.4	A	N/A[1]	N/A[1]	N/A[1]	N/A[1]	7.4	A
	Westbound left	9.4	A	N/A[1]	N/A[1]	N/A[1]	N/A[1]	19.9	C
	Westbound right	8.8	A	N/A[1]	N/A[1]	N/A[1]	N/A[1]	8.8	A
SR 127/Baker Boulevard (State of California, San Bernardino County)	Eastbound	10.2	B	N/A[2]	N/A[2]	N/A[2]	N/A[2]	14.4	B
	Westbound	10.7	B	N/A[2]	N/A[2]	N/A[2]	N/A[2]	14.5	B
	Northbound	12.0	B	N/A[2]	N/A[2]	N/A[2]	N/A[2]	16.0	C
	Southbound	10.1	B	N/A[2]	N/A[2]	N/A[2]	N/A[2]	67.2	F

*Source: Hidden Hills Solar Electric Generating System Application for Certification, Table 5.12-8 and and Hidden Hills Solar I, LLC and Hidden Hills Solar II, LLC Preliminary Staff Assessment Comments (CH2 2012ee); Updated Workforce Analysis Table 5.12-8BR and Technical Memorandum Table 2 (*CH2 2012qq).

1 - Not Applicable – The intersection was not analyzed for Monday/Weekday afternoon peak hour because there would not be any project trips added to the intersection during this period.

2 – Not Applicable – Turning movement counts were collected on two Fridays (November 2, 2012 and November 9, 2012) from 4:00p.m. –7:00p.m.

Refer to **Traffic and Transportation Figure 10** for the existing conditions plus HHSEGS AM peak hour volumes and **Traffic and Transportation Figure 11** for the existing conditions plus HHSEGS PM peak hour volume for SR 160/Old Spanish Trail Highway.

Refer to **Traffic and Transportation Figure 12** for the existing peak hour intersection volumes and **Traffic and Transportation Figure 13** for the existing conditions plus HHSEGS AM/PM peak hour intersection volumes for SR 127/Baker Boulevard.

Refer to **Traffic and Transportation Figure 14** for the existing conditions plus HHSEGS Monday AM peak hour intersection volume and **Traffic and Transportation Figure 15** existing conditions plus HHSEGS Friday PM peak hour volume for SR 127/Old Spanish Trail Highway.

As shown in **Traffic and Transportation Table 10** and **Traffic and Transportation Table 11**, the SR 160/Old Spanish Trail Highway would operate at LOS F during the AM Tuesday through Friday commute and LOS F during the PM peak hour for the Monday through Friday commute under the existing plus project conditions. Up to 95 percent of the project construction traffic is estimated to travel through the SR 160/Old Spanish Trail Highway intersection during peak hours. During the AM peak period, the LOS changes primarily on the westbound left-turn from SR 160 to Old Spanish Trial Highway. During the PM peak period, the turning movement issues are for the northbound movements (both left- and right-turns) as discussed in the PSA. LOS F is not an acceptable level of service on State of Nevada highways.

The SR 127/Old Spanish Trail Highway intersection (Inyo County) would operate at LOS C or better during the Monday, Tuesday through Thursday and Friday commute under the existing plus project conditions. LOS C is an acceptable level of service on Old Spanish Trail Highway and SR 127.

Also, potential impacts have been identified for the SR 127/Baker Boulevard intersection (San Bernardino County) during the Monday morning peak hour and the Friday afternoon peak hour based on the updated project trip distribution pattern.

Based on a review of the peak hour roadway volumes on SR 127 and Baker Boulevard, the SR 127/Baker Boulevard intersection is estimated to be operating at or near capacity during peak hours. HHSEGS is projected to add 235 northbound vehicles to the intersection on Monday morning and 588 southbound vehicles[32] to the intersection on Friday afternoon. It is likely that the project-related trips that would be added to this

[32] It is assumed 100 percent of the California workforce that returns home would drive their own vehicles and use Old Spanish Trail Highway to SR 127 to I-15 for the Friday commute. The California day shift during the peak month is estimated to be 1,177 workers (this number represents the 70% assumed to come from California – 70% of 1,682 (peak dayshift)- (1,177)(.50) = 588 vehicles.

intersection would further degrade the intersection operations. The SR 127/Baker Boulevard intersection would operate at LOS B or better during the Monday AM commute under the existing plus project conditions and LOS F during the Friday PM commute. LOS F is not an acceptable level of service at this intersection.

The change in LOS at the SR 160/Old Spanish Trail Highway intersection is consistent with the proposed construction traffic patterns as it is anticipated that the majority of the project construction traffic is estimated to travel through the SR 160/Old Spanish Trail Highway intersection. Seconds of delay would increase from 9.7 seconds to 100 plus. As a result of this increase, vehicles could become stacked on Old Spanish Trail Highway as drivers merge onto SR 160.

To reduce traffic impacts on Old Spanish Trail Highway and the SR 127/Baker Boulevard intersection staff recommends Condition of Certification **TRANS-5,** which would require development and implementation of a Traffic Control Plan (TCP) to reduce construction traffic impacts to LOS; ensure sufficient parking and emergency access to the site.

The applicant's proposed mitigation measures as listed below, are generally the same as contained in the AFC and the Preliminary Staff Assessment (PSA). However, with the increase in the workforce traffic and new assumptions for dayshift workers, workforce traffic would result in additional impacts to the SR 160/Old Spanish Trail Highway intersection during the morning peak hour (impacts were previously identified for the afternoon peak hour only). In addition, the identification of increased traffic volumes to the SR 127/Baker Boulevard intersection during the Monday morning peak hour and Friday afternoon peak hour, additional mitigation is proposed beyond what was listed in the AFC and PSA.

Traffic Monitoring Program

Traffic operations at the study intersections (SR 160/Old Spanish Trail Highway; SR 127/Old Spanish Trail Highway, and SR 127/Baker Boulevard) would be visually monitored by the applicant's representative once per week, during the morning and afternoon peak hour during peak construction months. It is recommended that the monitoring begin in Month 12 when 1,176 workers are projected (approximately 51 percent of the peak) and continue through the end of Month 24 when 1,293 workers are projected (approximately 56 percent of the peak). Because the construction workforce would increase gradually over the 29-month construction period, with a peak workforce occurring during Month 19, traffic conditions would be observed as the workforce increases over time, and adjustments would be made as needed.

Carpooling

Rideshare Program

If the traffic monitoring program identifies LOS D, E or F conditions specific measures would be implemented to reduce the number of trips to the site. This analysis already includes an assumption that 15-passenger vans would be used to achieve a baseline carpool rate of 1.5 for the California workforce. However, given the high cost of gas and the remote location of the site, there are opportunities to increase the occupancy (number of people per vehicle). Improvements should target a carpool rate of 2.5 people

per car to maintain LOS D at the SR 160/Old Spanish Trail Highway intersection (consistent with the Clark County, Nevada thresholds).
Two steps are included in this mitigation measure:

- **Rideshare Program.** As part of the rideshare program, employees would be encouraged to take advantage of the existing Club Ride Program sponsored by the Regional Transportation Commission of Southern Nevada. Club Ride offers a free ridematching service that matches individuals who live and work in proximity to one another and have a similar work schedule. The program also assists in forming vanpools when demand is met.
- **Employer Sponsored Van Program.** As a supplement to the voluntary rideshare program, participation in a mandatory van program (using additional 15-passenger vans beyond the 15-passenger vans when the day shift workforce reaches 1,000 employees) may be needed to obtain the 2.5 occupancy rate for carpools. Because employees will be grouped in several hotels in their lodging areas (Pahrump and Las Vegas area), the vans could pick up and drop off employees at their hotels, significantly reducing the number of vehicles travelling to the site.

Staggered Work Shifts

If LOS E or F conditions occur at the intersections even with ridesharing and passenger vans, and temporary traffic control is not implemented, additional work shifts may need to be staggered so workers not using the rideshare program would arrive and leave the site over a longer period of time thereby reducing the potential for queues at the intersections.

Surface Restoration

An increase in traffic flow or an increase in heavy equipment on the surrounding roads may degrade the quality of the road surfaces and increase maintenance costs. Roads are designed to handle the weights of a number of vehicles for a specific period (the design life). A road's design life may diminish with increased traffic and heavy travel loads over time, resulting in a worn down road surface. In general, any construction activities that could affect existing surfaces or roadway components shall be mitigated by restoring the facility to its original condition.

Traffic Control Plan

Where project construction would require the use of traffic control (signage, flaggers, lead vehicles, etc.), a detailed traffic control plan will be prepared prior to the start of construction for review by the Compliance Project Manager (CPM), Caltrans, NDOT, Inyo County, San Bernardino County, Clark County and Nye County, and prepared in accordance with the Manual of Uniform Traffic Control Devices (MUTCD) and the California Supplement of the MUTCD. Project ingress and egress routes will be designated, and project-related vehicle traffic outside these routes would not be allowed. Nearby intersections would be evaluated to determine whether large trucks could complete turning maneuvers through the intersections.

Staff agrees with the applicant's proposed, carpooling, traffic monitoring program, staggered work shifts, surface restoration and traffic control plan. Staff recommends these proposed traffic control measures be included in Condition of Certification

TRANS-5 which would require development and implementation of a traffic control plan and Condition of Certification **TRANS-3** which would require restoration of public roads.

Construction Truck Traffic

Construction equipment deliveries and construction-related truck traffic would contribute additional trips during the construction period. The peak construction delivery periods would occur during Months 3 through 7 when materials for the concrete batch plant would be delivered for the solar tower foundations and towers. Monthly truck deliveries would peak at 717 trucks during Month 6. Peak daily truck deliveries have been estimated using delivery records from construction at Ivanpah SEGS. During the period October 2010 through April 2012, the highest number of daily truck deliveries at Ivanpah SEGS was 72. Adding a 25 percent contingency for HHSEGS would yield a maximum of 90 delivery trucks on a peak day.

The analysis of construction deliveries for the **Air Quality** assessment of this **FSA** used a more-conservative method to determine the peak daily number of delivery trucks, using a calculation based on truck volumes during the highest 12 consecutive months. The result was a conservative estimate of 384 deliveries per day, or 768 one-way truck trips per day. To be conservative and consistent with the Air Quality analysis, this larger value was used in the revised traffic analysis (CH2 2012ee).

It was assumed that the delivery truck trips would be spread evenly throughout the day, (ten trucks per day) beginning at 6:00 am and ending at 6:00 pm. Also, it was assumed that all inbound deliveries would occur in the first nine hours and all exiting delivery truck trips would occur in the last nine hours. The resulting estimate was 45 trips during the morning peak hour and 45 trips during the afternoon peak hour. **Traffic and Transportation Table 12** depicts the construction delivery schedule.

Traffic and Transportation Table 12
Monthly Construction Delivery Schedule (Number of Trucks/Trips by Month)

Month	Equipment and Materials	Heliostat Components	Total Truck Deliveries/Month	Monthly Trips (In/Out)
0	0	0	0	0
1	35	0	35	70
2	55	0	55	110
3	480	0	480	960
4	420	245	665	1330
5	407	245	652	1304
6	472	245	717	1434
7	438	245	683	1366
8	411	245	656	1312
9	112	245	357	714
10	120	246	366	732
11	148	246	394	788
12	141	246	387	774
13	137	246	383	766
14	165	246	411	822
15	171	246	417	834
16	155	245	400	800
17	137	245	382	764
18	132	245	377	754
19	108	245	353	706
20	104	245	349	698
21	96	245	341	682
22	70	0	70	140
23	55	0	55	110
24	43	0	43	86
25	36	0	36	72
26	28	0	28	56
27	28	0	28	56
28	10	0	10	20
29	0	0	0	0

Hidden Hills Solar Electric Generating System AFC Table 5.12-6 and Hidden Hills Solar I, LLC and Hidden Hills Solar II, LLC Preliminary Staff Assessment Comments (CH2 2012ee).

Construction truck traffic is proposed to use I-15 within both the State of California and the State of Nevada and SR 160 within the State of Nevada. Truck traffic would originate from southern California heading towards Las Vegas then west on SR 160 to Old Spanish Trail Highway.

Oversized or overweight trucks with unlicensed drivers could present significant hazards to the general public and/or damage roadways. To ensure that trucks comply with weight, size, and route limitations set by the Department of Transportation (Caltrans),

Nevada Department of Transportation, and Inyo County, and that drivers are properly licensed, staff has included Condition of Certification **TRANS-1** to require the project owner to obtain roadway permits for vehicle sizes and weights, driver licensing, and truck routes.

Total Construction Traffic

The HHSEGS is estimated to generate a maximum of 4,000 (3,820 automobile and 180 truck) trips during the peak month (19) with 1,411 trips occurring during the morning peak hour and 1,411 trips occurring during the afternoon peak hour.

The addition of a peak of 4,000 daily trips would have a significant impact on the structural integrity of the Old Spanish Trail Highway within both the State of Nevada and the State of California due to the current and future conditions of the roadway pavement. Old Spanish Trail Highway within Inyo County is approximately 22 feet wide, lacking both shoulders and designed drainage. According to Inyo County, the Old Spanish Trail Highway was paved around 1971, and is not constructed to current roadway standards and as a result, not built or designed for the proposed heavy construction traffic and the hauling of equipment and materials. A section of the Old Spanish Trail Highway, known as Emigrant Pass, is a winding section which hinders clear visibility of oncoming traffic. The portion of Old Spanish Trail Highway within the State of Nevada also lacks shoulders and is not designed for the proposed heavy construction traffic and the hauling of equipment and heavy materials.

Inyo County Public Works Department (ICPW) submitted a letter dated April 30, 2012 (INYO 2012h) regarding access and circulation issues. ICPW expressed concern of potential vehicular truck-related conflicts at Emigrant Pass; additional right-of-way for acceleration and deceleration lanes; sufficient entrance drives; appropriate signage and traffic control; internal circulation and an interpretive stop.

Based on AFC Table 5.12-7 - Project Trip Distribution (HHSG 2001a), truck traffic to and from the west is not expected as all truck traffic is proposed to utilize SR-160 within the State of Nevada to the project site. Therefore, based on this trip distribution; and the public safety concern of oversized trucks maneuvering through the narrow widths of the Old Spanish Trail Highway lacking shoulders or turnouts, staff recommends Condition of Certification **TRANS-4** which requires all truck traffic utilize SR160, then south on Old Spanish Trail Highway and east to the project site.

In order to accommodate the increased vehicle traffic, Inyo County has requested an additional right-of-way along Old Spanish Trail Highway which would provide for acceleration and deceleration lanes. Therefore, staff has recommended Condition of Certification **TRANS-2** to require the project owner dedicate a 24-feet right-of-way (ROW), and Condition of Certification **TRANS-3**, which requires that the project owner repair and restore all roads damaged during construction activities immediately after the damage has occurred.

As depicted in the PSA **Traffic and Transportation Table 6,** 5 percent of construction workers (43 trips) were to utilize Old Spanish Trail Highway/SR 127 to access I-15. Based on the UWA and depicted in **Traffic and Transportation Table 8 & 9**, 22 percent of construction workers (286 trips) in the AM hour and 44 percent of

construction workers (619 trips) in the PM hour are now proposed to utilize Old Spanish Trail Highway/SR 127 to access I-15 in Baker, California.

The increase of construction automobile traffic could have a significant impact on the structural integrity of the Old Spanish Trail Highway within the State of California due to the current and future conditions of the roadway pavement. Based on the UWA, the Inyo County Public Works Department anticipates that the increase in the number of vehicles using Old Spanish Trail Highway west of the project site would result in adverse impacts to road conditions during construction. The County believes those impacts would be best addressed by amending Condition of Certification **TRANS-3** to include an obligation by the applicant to repair workforce traffic road damage (1) during construction and (2) at the conclusion of construction based on a pre-construction survey of Old Spanish Trail Highway from the Nevada state line to the intersection with State Route 127 (CEC 2012kk).

Staff recommended in the PSA Condition of Certification **TRANS-3**, which requires that, the project owner repair and restores all roads damaged during construction activities. Based on the PSA comments, additional language for Condition of Certification **TRANS-3** had been proposed delineating the area to be documented from the western edge of the project site to the intersection of SR 160. Given the revised commute patterns, the area to be documented has been expanded to include Old Spanish Trail Highway from the intersection of SR 127 to the intersection of SR 160 (Nevada State Line).

In addition, in order to address the increased vehicle traffic on the Old Spanish Trail Highway located west of the HHSEGS, and the SR 127/Baker Boulevard intersection, staff recommends Condition of Certification **TRANS-5,** which would require development and implementation of a Traffic Control Plan (TCP) to reduce construction traffic impacts. An aspect of the TCP would be a work schedule and end-of-shift departure plan that would stagger Monday arrivals and Friday departures from the project site.

School and Recreation Traffic

The HHSEGS site is located within the Death Valley Unified School District (DVUSD). The DVUSD includes Death Valley National Park and all regions east of the National Park to the Nevada state line. DVUSD is the largest school district in California in terms of area served and one of the smallest in terms of enrollment. Students in grades 5-12 often travel an hour each way to and from school, while students K-4 have commutes up to 30 minutes each way. The District has four schools: Death Valley Elementary School located in the Cow Creek area of Death Valley National Park; Tecopa-Francis Elementary School located in Tecopa; Shoshone Elementary School located in Shoshone Village; and Death Valley Academy also located in Shoshone Village (DVUSD 2012).

The DVUSD has five existing school bus stops serving the Charelston View area (CEC 2012r). Of the five stops, only two are on Old Spanish Trail Highway: Ranchos Avenue at Old Spanish Trail Highway and Desert Trail Road at Old Spanish Trail Highway. Both stops are located east of Quartz Street (0.75 mile and 1.25 miles respectively), which is the proposed main construction entrance. **Traffic and Transportation Figure 2** depicts the access roads and internal roadways. Based on the HHSEGS beginning day shift

hour of 5:00 am and the swing shift hours (6:00 pm-4:30 am) construction traffic and the morning school busses (6:42 am for Desert Trail and 6:45 am for Rancho's Avenue) traffic should not intersect. Therefore, impacts to the two bus stops on Old Spanish Trail Highway would be less than significant.

However, based on the UWA, automobile construction traffic would utilize the Old Spanish Trail Highway at an increased rate. As a result, the HHSEGS ending day shift hour of 3:30 pm, there may be the potential for overlap of construction traffic with the afternoon bus stops (3:26 pm for Desert Trail and 3:28 pm for Rancho's Avenue). To reduce traffic impacts on Old Spanish Trail Highway, staff recommends Condition of Certification **TRANS-5,** which would require development and implementation of a traffic control plan to reduce construction traffic impacts.

The Dumont Dunes Off-Highway Vehicle (OHV) Area is a remote area for off-highway vehicle recreation located east of Highway 127, approximately 31 miles north of Baker, California. Most visitors ride motorcycles or ATVs, sand rails, or tour the area in vehicles with four-wheel-drive (BLM 2012). Inyo County stated individuals from the State of Nevada utilize the Old Spanish Trail Highway to SR-127 then head south to Dumont Dunes driving recreational vehicles. Based on the public safety concern of oversized trucks maneuvering through the narrow widths of the Old Spanish Trail Highway with oncoming recreational vehicles and no turnouts, staff recommends Condition of Certification **TRANS-4** which requires all truck traffic utilize SR-160.

Front Sight Firearms Training InstituteTraffic

The Front Sight Firearms Training Institute (FSFTI) is located northwest of HHSEGS on approximately 550 acres within Nye County, Nevada. The FSFTI provides firearms training seven days a week. Two or four day classes are available with hours starting at 6:30 am or 8:00 am and ending at 5:00 pm or 6:00 pm. NSFTI trains approximately 30,000 students a year in a 10 month year- the facility is closed July and August.

A private road was constructed by FSFTI in 2000 to provide access to their facility. The distance from SR 160 to the private road, accessed from the Old Spanish Trail Highway, is approximately three and half miles and the private road is approximately four miles long.

Approximately 98 percent of the students use SR 160 and 2 percent use SR 127; however, not every car is a single car occupant as students tend to carpool with friends or family. Food service is provided on site which minimizes vehicle trips off-site during the day. The road was constructed in 2000 and to date has not been impassable due to rainstorms (CEC 2012aa). Based on the day shift hours (5:00 am to 3:30 pm) construction traffic and FSFTI traffic should not intersect. However, based on starting swing shift hour of 6:00 pm and the students departing from the 6:00 pm class, there may be the potential for overlap of construction traffic with the departing class. To reduce traffic impacts on Old Spanish Trail Highway, staff recommends Condition of Certification **TRANS-5,** which would require development and implementation of a traffic control plan to reduce construction traffic impacts on Old Spanish Trail Highway.

Construction Workforce Parking and Laydown Area

HHSEGS construction would require vehicle parking and laydown areas for materials delivery and storage. The proposed temporary laydown and parking area would be 180 acres on an adjacent parcel that is contiguous to the project site. Primary access to the construction and laydown area access would be from Old Spanish Trail Highway. The Manufacturing Area Construction Phase Site Plan depicts approximately 18 acres (out of the 25 acres of the fenced area) within the 180 acre temporary laydown area would provide an area for the truck route to access the manufacturing building to accommodate project construction.

The other seven acres would contain 200 craft parking spaces; 80 staff parking spaces and office trailers. Outside of the fenced area, 80 visitor parking spaces would be provided. Additional construction laydown and parking areas would also be provided at Solar Plant 1 and Solar Plant 2. The Tower Unit 1 and 2 Site Plan (C-0020 and C-0030) depicts approximately six acres of construction laydown and 300 craft parking spaces (located on 2.5 acres) which provide a total of 800 parking spaces (HHSG 2011a, App 5.15A).

Approximately 155 acres of the laydown area (remaining from the 180 acres) would be available for additional parking. Although the precise number of parking spaces and the area required for internal roadways is unknown, using the applicant's conservative assumption of 10' x 20' of area for one parking space, as shown on the Manufacturing Area Construction Phase Site Plan, the applicant would provide 6,751,800 square feet (155 acres) which would accommodate 18,600[33] (parking spaces) vehicles. Therefore, the 180 acre laydown area would be adequate to provide vehicle parking for the construction workforce.

Construction Impacts Conclusion

With implementation of the conditions of certification discussed in this analysis, construction of the HHSEGS would result in less than significant impacts to the traffic and transportation system in the vicinity of the project, specifically, State Route 160/Old Spanish Trail Highway (State of Nevada); State Route 127/Old Spanish Trail Highway (State of California, Inyo County) and State Route 127/Baker Boulevard (State of California, San Bernardino County) intersections.

Operational Impacts and Mitigation

Workforce Traffic

The project would require 100 full-time employees during project operation. Both Solar Plant 1 and Solar Plant 2 would require 30 employees and the administration office, shop and warehouse facility would require 40 employees. The plant would be operated seven days a week.

The applicant anticipates that most of the operational workforce would come from Las Vegas in Clark County and parts of surrounding rural areas in Inyo County and some may come from Pahrump in Nye County. The applicant assumed that 75 percent would

[33] (155 acres)(300 parking spaces/2.5 (acres) = 18,600 parking spaces.

come from Clark County, Nevada; 20 percent from Nye County, Nevada and 5 percent would come from Inyo County (CH2 2012jj). United Association Local 525 also expects that the operations workforce would be mostly from Las Vegas, supposing that about 80 to 85 percent would come from Clark County (CEC 2012d). The applicant estimates operational workforce would commute from their existing residences instead of moving closer to the project site. Based on the comments from United Association Local 525, staff agrees that the applicant's assumptions are reasonable.

Socioeconomics Table 7 – Housing Supply Within Two-Hour Commute of the Project Site **and Socioeconomics Table 8** – Vacancy Status Within Two-Hour Commute of the Project Site depicts that there would be an adequate housing supply in the area to accommodate the project's operational workforce if employees wanted to move closer to the project site for ease of commuting. Thus, staff agrees with the applicant's assumptions about the operations workforce and does not expect employees to relocate to the immediate project area, given the robust regional workforce.

The operation employees would generate 100 vehicle daily trips (in/out). The 200 daily one-way vehicle trips is a minimal increase to traffic volumes in the area and would have a less than significant impact on overall traffic counts, congestion, and LOS along any of the state highways, roadways, and intersections employees would use to access the project site.

Parking

As indicated earlier, the HHSEGS would employ a total of 100 full time operations staff. The facility would operate and be staffed 24 hours a day, seven days a week. As shown in Figure 2.1-3 of the AFC, HHSEGS proposes 62 parking spaces (58 for non-disabled, 4 for disabled) in the common area. As shown in Figure 2.2-1R1, Power Block Plot Plan there are 26 proposed parking spaces at each power block (24 for non-disabled, 2 for disabled).

Truck Traffic and Hazardous Materials Delivery

Operation of the HHSEGS would result in transportation of hazardous materials. Staff has addressed this issue in the **Hazardous Materials Management** section of this FSA. As presented in that section, staff believes that during construction and operation of HHSEGS, minimal amounts, small shipment sizes and types of hazardous materials (paint, cleaners, solvents, gasoline, diesel fuel, motor oil, various lubricants, hydraulic fluid, sealants, paint thinner and welding gases in standard-sized cylinders) do not pose a significant risk of either spills or public impacts along any transportation route. Therefore, staff does not recommend a specific truck route.

However, delivery of toxic materials could still be hazardous to the public if a spill were to occur. Therefore, staff recommends Condition of Certification **TRANS-6** to ensure that the project owner contracts with a licensed hazardous materials and waste hauler company that complies with all applicable regulations and obtain the proper permits and/or licenses from the California Department of Transportation (Caltrans), Nevada Department of Transportation, and Inyo County.

In addition, Condition of Certification **HAZ-3** requires the development and implementation of a Safety Management Plan for delivery of liquid hazardous materials by tanker truck. The plan shall include procedures, protective equipment requirements and also include a section describing all measures to be implemented to prevent mixing of incompatible hazardous materials. This plan shall be applicable during construction, commissioning, and operation of the power plant. For more information on the hazardous materials proposed for use during project operation and applicable regulations, see the **Hazardous Materials Management** section of this **FSA**.

Emergency Access

Staff believes that both regional and local emergency access to the HHSEGS site is adequate. Regionally, emergency vehicles could access the site using the most direct route from State Route 160 to Old Spanish Trail Highway. Refer to **Traffic and Transportation Figure 2** which depicts the primary emergency access point to the site and the secondary emergency access emergency access with crash gate. On-site circulation of emergency vehicles would be subject to site plan review by the Southern Inyo County Fire Department per conditions of certification in the **Worker Safety and Fire Protection** section of this **FSA**.

Aviation Impacts

The two solar towers would be approximately 750 feet tall and pose an obstruction hazard to aircraft. Because of the tower height, the applicant was required to notify the Federal Aviation Administration (FAA) of construction pursuant to Code of Federal Regulations Title 14, Aeronautics and Space, Part 77. These regulations require FAA notification for any proposed structure over 200 feet in height above ground level (AGL), regardless of the distance from an airport.

The HHSEGS submitted Form 7460-1 and has obtained a Determination of No Hazard to Air Navigation for Solar Tower Unit 1 (Aeronautical Study No. 2011-AWP-1954-OE) and Solar Tower Unit 2 (Aeronautical Study No. 2011-AWP-1955-OE) (CH2 2011e).

In addition, construction equipment, such as cranes that will be used during construction that are 200 feet tall or taller will require the applicant to notify the Federal Aviation Administration (FAA) pursuant to Title 14 of the Code of Federal Regulations Part 77. These regulations establish standards for determining obstructions in navigational space and sets forth requirements for notification of construction. To promote air safety and the efficient use of the navigable airspace, aeronautical studies are conducted based on information provided from FAA Form 7460-1, Notice of Proposed Construction or Alteration. These regulations require notification of the FAA for any construction feature over 200 feet in height AGL regardless of the distance from an airport, or if a proposed project structure would penetrate the navigable airspace of an airport that has a runway longer than 3,200 feet within 20,000 feet of the project structure.

Therefore, staff recommends Condition of Certification **TRANS-7** which would require the project owner to notify the FAA if the construction cranes would be 200 feet tall or taller.

As a condition to the Determination of No Hazard for Solar Tower 1 and 2, the structures must be marked/lighted in accordance with FAA Advisory Circular 70/760-1 K Change 2, Obstruction Marking and Lighting. Therefore, staff recommends Condition of Certification **TRANS-7** which would require obstruction marking and lighting of structures such as the towers and construction cranes to alert pilots to their location.

Glint and Glare

The issue from a Traffic and Transportation perspective is would the HHSEGS produce sufficient glare and/or excessive perceived brightness to either ground traffic or aviation to compromise a driver's or pilot's ability to operate his/her vehicle or aircraft.

Glint is difficulty seeing in the presence of a transient bright light source and is generally considered to be intermittent. Glare is considered as difficulty seeing in the presence of bright light such as direct or reflected sunlight or artificial light such as car headlamps at night. In **Appendix TT1-Glint and Glare**, staff concludes that glint and/or glare from the heliostats experienced by pilots would be considered as a discomfort producing effect rather than as a disability producing effect.

The glare effects from the solar receiver steam generators (SRSGs) are unavoidable and would produce a distinct visual distraction effect. However, these glare effects are not considered as sufficient to be visually debilitating and therefore, would not cause a safety hazard from an operator control perspective, such as operating a vehicle or flying a plane.

Direct solar reflections from the heliostat mirrors would produce a pronounced discomfort glare effect on any ground-based or airborne observer. This condition, in which the sun is directly reflected into an observer's eyes, should be avoided whenever possible for all heliostat operational scenarios. To reduce impacts on the reflections from the heliostat mirrors, staff recommends Condition of Certification **TRANS-8** Heliostat Operations Positioning and Monitoring Plan, which reduces the potential for direct solar reflections from the heliostat mirrors to all observers (ground-based or airborne) to an absolute minimum. Refer to **Appendix TT1** -**Glint and Glare** for a full discussion of glint and glare and the proposed Condition of Certification **TRANS-8.**

Flooding Impacts

The Federal Emergency Management Agency (FEMA) issues Flood Insurance Rate Maps (FIRM) for use in administrating the National Flood Insurance Program and for floodplain management use by local agencies to reduce the impact of flooding. FEMA map panels 06027C-4625D and 06027C-4175D cover the entire project site and show that the project site crosses into the Zone A[34] boundary in two areas: one located at the north tip of the site and the other located at the southwest corner of the site. Please see the **Soils and Surface Water** section of this **FSA** for a more detailed discussion on flooding impacts associated with the construction and operation of HHSEGS; specially **Soils and Surface Water Figure 3**.

[34] Zone A is defined by FEMA as special flood hazard area subject to inundation by the 1% annual chance flood also known as the 100-year flood (the flood that has a 1% chance of being equaled or exceeded in any given year). Because detailed analyses are not performed for Zone A, no depths or base flood elevations are shown within these zones.

As previously discussed, the Old Spanish Trail Highway borders the project site's southern boundary and based on the Zone A boundary, this boundary implies that the Old Spanish Trial Highway could experience flooding caused by large storm events. A posted sign along Old Spanish Trail Highway near HHSEGS cautions motorists of potential flooding, and residents of Charleston View have indicated during a workshop and PSA comments that flooding of the roadway occurs[35].

The extent, depths, or locations of the flooding on the Old Spanish Trail Highway is not specifically documented because Inyo County does not keep specific storm-related data. However, Inyo County's Road Department has kept records regarding the number of days a flood event occurred, and whether road repairs were necessary in order to fix flood damage. (CEC 2012ii) The applicant's preconstruction hydrology study shows that the portion of Old Spanish Trail Highway located directly adjacent to the project site is expected to flood from flows traveling northwest across the roadway. However, the applicant did not account for the effects of the perimeter fencing and landscape features, which would impede flows which could cause flooding. Refer to **Soils and Surface Water Figure 12** – Post Construction Storm Water Flow Patterns at Old Spanish Trail Highway.

To address flooding on Old Spanish Trail Highway, Soils and Water staff proposes Condition of Certification **SOILS-6** (Perimeter Drainage Management Plan). The proposed condition of certification would require the project to increase the amount of flows crossing the perimeter which would, in turn, reduce the amount of flooding and redirected concentrated flow along the shoulder of Old Spanish Trail Highway. Refer to the **Soils and Surface Water** section of this FSA for additional discussion as it relates to flooding.

COMPLIANCE WITH LORS

Traffic and Transportation Table 13 provides an assessment of the HHSEGS's compliance with applicable laws, ordinances, and regulations (LORS) pertaining to traffic and transportation.

[35] The PSA Workshop (June 14, 2012 in Pahrump, Nevada) and Supplemental Comments & Analysis submitted by Intervenor Cindy MacDonald (MAC 2012c).

TRAFFIC AND TRANSPORTATION Table 13
Project Compliance with Adopted Traffic and Transportation LORS

Applicable Law	Description	Consistency
Federal		
Code of Federal Regulations (CFR) Title 14, Aeronautics and Space, Part 77 – Objects Affecting Navigable Airspace 77.13	This regulation requires the project owner to notify the Federal Aviation Administration (FAA) of construction structures with a height greater than 200 feet from grade or greater than an imaginary surface extending outward and upward at a slope of 100 to 1 from the nearest point of the nearest runway of an airport with at least one runway more than 3,200 feet in length.	The project would be consistent with this regulation with the inclusion of Conditions of Certification**TRANS-7.**
Code of Federal Regulations (CFR) Title 49 Subtitle B, Parts 171-173, 177-178, 350-359, 397.9 and Appendices A-G	Requires proper handling and storage of hazardous materials during transportation.	The project would be consistent with this regulation with the inclusion of Condition of Certification **TRANS-6.**
State		
California Vehicle Code, sections 13369, 15275, 15278	Requires licensing of drivers and the classification of license for the operation of particular types of vehicles. A commercial driver's license is required to operate commercial vehicles. An endorsement issued by the Department of Motor Vehicles (DMV) is required to drive any commercial vehicle identified in Section 15278.	The project would be consistent with this regulation with the inclusion of Condition of Certification**TRANS-1.**
California Vehicle Code, sections 31303-31309	Requires transportation of hazardous materials to be on the state or interstate route that offers the shortest overall transit time possible.	The project would be consistent with this regulation with the inclusion of Condition of Certification**TRANS-6.**
California Vehicle Code, Sections 31600-31620	Regulates the transportation of explosive materials.	The project would be consistent. The HHSEGS would not use explosive materials as defined in Section 12000 of the Health and Safety Code.
California Vehicle Code, sections 32100-32109	Requires shippers of inhalation hazards in bulk packaging comply with rigorous equipment standards, inspection requirements, and route restrictions.	The project would be consistent with this regulation with the inclusion of Condition of Certification **TRANS-6**.
California Vehicle Code, sections 34000-34100	Establishes special requirements for vehicles having a cargo tank and for hazardous waste transport vehicles and containers, as defined in Section 25167.4 of the Health and Safety Code.	The project would be consistent with this regulation with the inclusion of Condition of Certification **TRANS-6.**
California Vehicle Code, section 35550	Regulates weight guidelines and restrictions upon vehicles traveling on freeways and highways. A single axle load shall not exceed 20,000 pounds,	The project would be consistent with this regulation with the inclusion of Condition of Certification **TRANS-1**.

Applicable Law	Description	Consistency
	the load on any one wheel or wheels supporting one end of an axle is limited to 10,500 pounds.	
California Vehicle Code, section 35551	Defines the maximum overall gross weight as 80,000 pounds and mandates that the gross weight of each set of tandem axles not exceed 34,000 pounds.	The project would be consistent with this regulation with the inclusion of Condition of Certification **TRANS-1**.
California Vehicle Code, Section 35780	Requires a single-trip transportation permit to transport oversized or excessive loads over state highways.	The project would be consistent with this regulation with the inclusion of Condition of Certification **TRANS-1.**
California Health and Safety Code, section 25160	Addresses the safe transport of hazardous materials	The project would be consistent with this regulation with the inclusion of Conditions of Certifications **TRANS-1** and **TRANS-6.**
Nevada Administrative Code – Hazardous Materials, Chapter 459, section 459.9785	Lists prerequisites to transportation of hazardous materials for which federal safety permit is required.	The project would be consistent with this regulation with the inclusion of Condition of Certification **TRANS-6**.
Nevada Administrative Code – Hazardous Materials, Chapter, section 459.986	Requires Inspection of vehicles; verification of drivers' qualifications.	The project would be consistent with this regulation with the inclusion of Condition of Certification **TRANS-1**.
Nevada Administrative Code-Traffic Laws, section 484.500	Requires a transportation permit for the operation of an oversized or overweight vehicle to travel a determined route with a designated load for a designated period.	The project would be consistent with this regulation with the inclusion of Condition of Certification **TRANS-1**.
Local		
Inyo County Regional Transportation Plan: Goal 2: A Transportation system which is safe, efficient and comfortable which meets the needs of people and goods and enhances the lifestyle of the county's residents.	Objective 2.1: Maintain and Improve Roadway Level of Service – Maintain or improve existing Level of Service on roadways within the county. Policy 2.2.1: Proper access – Provide proper access to residential, commercial and industrial areas.	The project would be consistent with this policy with the inclusion of Condition of Certification **TRANS-2.**

Applicable Law	Description	Consistency
Inyo County Regional Transportation Plan: Goal 3: Maintain adequate capacity on State Routes (SR's) and Local Routes in and Surrounding Inyo County and the City of Bishop.	Objective 3.3: Improve County routes. Policy 3.3.1 : Support roadway improvements to optimize public safety – Improve county roads through specific safety improvements and maintenance.	The project would be consistent with this policy with the inclusion of Conditions of Certification **TRANS-2 and TRANS-3.**
Section 7.2.4 Roadways and Highways - Policy RH-1.4 Level of Service	Maintain a minimum of Level of Service (LOS) "C" on all roadways in the County of Inyo. For highways within the County of Inyo, LOS "C" should be maintained except where roadways expansion or reconfigurations will adversely impact the small community character and economic viability of designated Central Business Districts.	The project would be consistent with this policy with the inclusion of Condition of Certification **TRANS-2** and **TRANS-5.**
Section 7.2.4 Roadways and Highways Policy RH-1.5 Proper Access	Provide proper access to residential, commercial and industrial uses.	The project would be consistent with this policy with the inclusion of Condition of Certification **TRANS-2**.
Section 7.2.4 Roadways and Highways Policy RH-1.6 Minimize Environmental Impacts	Ensure that all transportation projects minimize adverse effects on the environment of the County.	The project would be consistent with this policy with the inclusion of Conditions of Certification **TRANS-1**, **TRANS-2, TRANS-3, TRANS-4 and TRANS-6 and TRANS-8.**
County of San Bernardino General Plan – Desert Region Goals and Policies of the Circulation and Infrastructure Element - Section IV- Goal D/CI 1 – Ensure a safe and effective transportation system that provides adequate traffic movement while preserving the rural desert character of the region.	Policy D/CI 1.14 – Ensure the County implements a traffic evaluation and monitoring program.	The project would be consistent with this regulation with the inclusion of Condition of Certification **TRANS-5.**

CUMULATIVE IMPACTS

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (Cal. Code Regs. tit 14,§15065(a)(3).

Traffic Impacts

Staff reviewed known past, current, and probable future projects in the vicinity of the proposed HHSEGS project. The location of the overall projects identified within California and Nevada with respect to HHSEGS is shown in **Traffic and Transportation Figure 7.**

Traffic and Transportation Table 14 lists the known projects from the master cumulative list that could have overlapping construction schedule with HHSEGS.

Traffic and Transportation Table 14
Cumulative Projects

ID #	Project Name	Project Description and Status	Peak Construction Workers	Operation Workers	Construction Begins	Construction Ends
	HHSEGS		**2,293**	**100**	**1st Qtr 2013**	**1st Qtr 2015**
A	St. Therese Mission – State of California	17.5 acre environmental park, memorial and internment center located at 881 E. Old Spanish Trail Highway, 1.5 miles west of HHSEGS. Project approved June 23, 2010 – Conditional Use Permit #2010-02.	6	Unknown	In Construction	2014
F	Silver State South Solar (NVN 089530,NV N 085801) – State of Nevada	350 MW Solar PV Project located on 2,900 BLM land; Record of Decision 10/12/10.	230-400	70-100	3rd Qtr 2012	4th Qtr 2014
G	Stateline Solar Farm – State of California	300 MW Solar PV	500	7-10	4th Qtr 2013	4th Qtr 2015
I	Searchlight Wind Energy – State of Nevada	200 MW wind energy facility on 18,949 acres of both BLM and private land.	250-300		2012	2013
J	Southern Owens Valley Solar Ranch – State of California	200 MW of PV on 3,100 acres in southern Owens Valley; Draft Environmental Impact Statement in preparation.	300	10	3rd Qtr 2012	3rd Qtr 2015
N	Hidden Hills Valley Electric Transmissi on (NVN	10 acre BSE Tap 230/500 kV Substation; Draft Environmental	66		4th Qtr 2012	1st Qtr 2015

	089669) – State of Nevada	Impact Statement pending.				
O	Calnev Pipeline Expansion – State of Nevada	16-inch diameter pipeline from an existing facility in Colton, California to an existing facility in Las Vegas, Nevada.	550-650	0	2012	2013/1014
	Total		**2,929-3,249**	**207-240**		

Source: US BLM 2012a, US BLM 2012b, US BLM 2012c, LADWP 2010

Traffic trips generated by the construction and/or operation of nearby projects could combine with traffic generated by HHSEGS to result in cumulative impacts to level of service (LOS) of nearby highways, intersections and roadways. Cumulative impacts would be a concern during construction of HHSEGS, but not during operations.

HHSEGS operations would generate a maximum of 200 daily vehicle trips, a minimal increase in traffic that would have a less than significant impact on overall traffic counts. Therefore, staff only evaluated cumulative impacts during HHSEGS construction.

Regional Impacts During Construction

Several proposed projects shown on **Traffic and Transportation Figure 7** have the potential to result in increased congestion on I-15 and SR-160 within the State of Nevada and only one project would utilize Old Spanish Trail Highway within both California and Nevada. These projects include St. Therese Mission, State Line Solar Farm, Silver State South Solar Project, CalNev Pipeline Expansion and Hidden Hills Valley Electric Transmission Project.

St. Therese Mission Project

The St. Therese Mission Project (Mission) would be constructed concurrently with the HHSEGS, and is the only identified cumulative project to also utilize Old Spanish Trail Highway. The Mission would average six construction employees .and it is anticipated approximately 1,200 visitors per month would visit the site or an average visitor count of 40 per day.

Silver State South Solar Project

The Silver State South Solar Project (SSSSP) would involve the development of a 350 MW solar energy facility on approximately 2,900 acres of BLM land. The site is located in a largely undeveloped area and, therefore, major transportation routes are limited. Traffic routes within the project site are limited to unpaved OHV roads, trails, and dry washes. I-15 would provide indirect access to SSSSP from the urban centers of Southern California, such as San Diego and the greater Los Angeles area from the south, and Salt Lake City and Las Vegas from the north. East Primm Boulevard provides east-west direct access from I-15, South Las Vegas Boulevard/Nevada State Route (SR) 604, and Desert Arena Drive.

State Line Solar Project

The State Line Solar Project proposes a 300-megawatt (MW) alternating current (AC) solar photovoltaic (PV) energy generating project. The PV generating facility (Solar Farm), the corridor for the Project's 220-kilovolt (kV) generation interconnection (gen-tie) transmission line, and the access road would be located on Federal lands managed by the U.S. Department of Interior, Bureau of Land Management (BLM).The Proposed Solar Farm would be approximately 2 miles south of the California-Nevada border and 0.5 mile west of I-15 in eastern San Bernardino County.

CalNev Pipeline Expansion

The Calnev Pipeline Expansion Project would involve the construction, operation, and maintenance of a new 16-inch-diameter pipeline and ancillary facilities from an existing facility in Colton, California to an existing facility in Las Vegas, Nevada. The new pipeline would extend approximately 233 miles from the existing North Colton Terminal in Colton, San Bernardino County, California to the Bracken Junction near the McCarran International Airport in Las Vegas, Nevada. The Calnev Project roughly parallels Interstate 15 (I-15) from Colton to just outside Las Vegas. During peak construction approximately 550-650 employees would be required. The DEIS stated that pipeline construction generally proceeds at rates ranging from several hundred feet to one mile per day and the activities could last from one week to 30 days. Based on the construction moves through an area quickly, traffic impacts would generally be localized, intermittent and short term.

BLM has proposed MM TRAN-1: Traffic Management Plan requiring the Applicant to develop a Traffic Management Plan for locations along the route where local agencies (e.g., traffic engineering, public works, etc.) identify construction activities that would adversely impact the existing transportation system. Where requested by public agencies, the use of flaggers, warning signs, lights, barricades, cones, etc. would be implemented according to standard guidelines required by the affected jurisdiction.

Valley Electric's Hidden Hills Transmission Project

Valley Electric Association (VEA) has requested a new right-of-way (ROW) authorization from the Bureau of Land Management (BLM) for the construction, operation, maintenance, and termination of transmission infrastructure improvements in Pahrump and Sandy valleys to Jean, Nevada, and terminating at Eldorado Substation near McCullough Pass. This project would provide the system improvements necessary to support the development and delivery of the 500 MW generated by HHSEGS into the VEA.

Cumulative Impacts Conclusion

The total peak construction workers for the identified projects would be approximately 1,622. The only project that would utilize SR 160, and would be heavily impacted by the HHSEGS construction, would be the St. Therese Mission which is currently under construction and has identified 40 daily commercial trips.

The remaining projects, would utilize various section of I-15 and unlikely to overlap with the HHSEGS peak construction month. Therefore, the HHSEGS would not combine

with any past, current, or probable future projects to result in significant cumulative impacts to ground traffic within the State of California or State of Nevada on the nearby traffic and transportation system.

NOTEWORTHY PUBLIC BENEFITS

While the development of the proposed project is intended to address the requirements of federal and state mandates to develop renewable energy, it would not yield any noteworthy public benefits related to traffic and transportation.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Traffic and Transportation comments were submitted by several individuals and organizations following the May 24, 2012 publication of the Preliminary Staff Assessment (PSA), including access and circulation concerns from Inyo County (INYO 2012h). Staff has addressed all comments, which can be reviewed in **Appendix 1 – PSA Response to Comments, Traffic and Transportation.**

CONCLUSIONS

Staff has analyzed the proposed HHSEGS's impacts to the nearby traffic and transportation system. With implementation of the proposed conditions of certification listed below, the HHSEGS would comply with all applicable LORS related to traffic and transportation and would result in less than significant impacts to the traffic and transportation system.

Staff concludes that with mitigation from recommended Conditions of Certification **TRANS-1**, **TRANS-2**, **TRANS-3**, **TRANS-4, TRANS-5**, **TRANS-6 , TRANS-7** and **TRANS-8**, the construction and operation of the Hidden Hills Solar Electric Generating System project would not result in significant traffic and transportation impacts, according to the California Environmental Quality Act (CEQA) Guidelines.

Socioeconomics Figure 1 and **Socioeconomics Table 2** do not identify the presence of an environmental justice community. Therefore, the population in the six-mile buffer does not constitute an environmental justice population as defined by *Environmental Justice: Guidance Under the National Environmental Policy Act* and would not trigger further scrutiny for purposes of an environmental justice analysis. For more details, please see the **Socioeconomics** section of the **FSA**.

PROPOSED FINDINGS OF FACT

Based on the evidence, staff proposes the following findings and concludes as follows:

1. Project construction would occur over 29 months.

2. Project construction and operation would add additional automobile and vehicle traffic to the roads in the project region.

3. Currently, the roads in the project region are operating at a Level of Service (LOS) C or above.

4. The additional amounts of traffic attributable to the project construction would decrease existing Levels of Service (LOS) on the region's roads and highways.

5. The Old Spanish Trail Highway in the vicinity of the project could be substantially damaged by project-related heavy truck traffic.

6. Traffic and transportation impacts resulting from HHSEGS during the construction phase would be significant.

7. Traffic and transportation impacts resulting from HHSEGS during the operation phase would be less than significant.

8. Based on the HHSEGS's distance from the nearest airport, the project would not have an impact to aviation safety.

9. Based on the HHSEGS's distance from the nearest rail and nationwide bus service, the project would not have an impact to these forms of transportation.

10. Project-related traffic impacts in combination with the effects of past, present and reasonable foreseeable projects in the Pahrump Valley would not be cumulatively considerable on the traffic and transportation systems in the State of California or State of Nevada.

11. With Conditions of Certification the HHSEGS would not result in significant direct, indirect or cumulative traffic and transportation impacts.

PROPOSED CONDITIONS OF CERTIFICATION

TRANS-1 Roadway Use Permits and Regulations

The project owner or its contractor(s) shall comply with limitations imposed by the Department of Transportation (Caltrans) District 8 and 11 and other relevant jurisdictions, including Nevada Department of Transportation (NDOT) and Inyo County, on vehicle sizes and weights, driver licensing, and truck routes. In addition, the project owner or its contractor(s) shall obtain necessary transportation permits from all relevant jurisdictions for roadway use.

Verification: In the Monthly Compliance Reports (MCRs), the project owner shall report permits received during that reporting period. In addition, the project owner shall retain copies of permits and supporting documentation on-site for Compliance Project Manager (CPM) inspection if requested.

TRANS-2 Right-of-Way

The project owner shall dedicate to the County of Inyo 24 feet of right-of-way along Old Spanish Trail Highway to ensure adequate turn lanes and acceleration/deceleration lanes for construction traffic. Prior to the peak daily

truck deliveries, the project owner shall have constructed the turn lanes and acceleration/deceleration lanes for construction traffic.

Verification: At least 90 days prior to start of site mobilization, the project owner shall provide evidence to the CPM that the dedication of right-of-way has been accepted and recorded by Inyo County; detailed construction plans that will identify improvements along Old Spanish Trail Highway and at the project entry points for review and comment by Inyo County and the CPM for review and approval. Prior to the peak daily truck deliveries (Month 6), the project owner shall have constructed the turn lanes and acceleration/deceleration lanes for construction traffic.

TRANS-3 Restoration of All Public Roads, Easements, and Rights-of-Way

The project owner shall coordinate with Inyo County to restore all public roads, easements, and rights-of-way that have been damaged due to project-related construction activities. This includes Old Spanish Trail Highway from the intersection of SR 127 to the intersection of SR 160. Restoration of significant damage which could cause hazards (such as potholes or deterioration of the pavement edges, damaged signage) must take place immediately after the damage has occurred. The restoration shall be completed in a timely manner to the road's original condition in compliance with the applicable jurisdiction's specifications.

Verification: Prior to the start of site mobilization, the project owner shall photograph or videotape all of the affected public roads, easements, right-of-way segment(s), and/or intersections. This includes all portions of Old Spanish Trail Highway from the intersection of SR 127 (Sate of California) to the intersection of SR 160 (State of Nevada). The project owner shall provide the photograph or videotape to the CPM and the affected jurisdictions (California Department of Transportation (Caltrans), Nevada Department of Transportation (NDOT), and Inyo County). The purpose of this notification is to request that these jurisdictions consider postponement of any planned public right-of-way repair or improvement activities in areas affected by project construction until construction is completed, and to coordinate any concurrent construction-related activities that cannot be postponed.

If damage to public roads, easements, or rights-of-way is identified by the project owner or the affected jurisdiction, the project owner shall immediately notify the CPM and the affected jurisdiction(s) to identify the section of the public right-of-way to be repaired. At that time, the project owner shall establish a schedule for completion and approval of the repairs. Following completion of any public right-of-way repairs, the project owner shall provide the CPM letters signed by the person authorized to accept the repairs in the affected jurisdiction(s) stating their satisfaction with the repairs.

TRANS-4 Truck Route

The project owner shall require all construction truck traffic use State Route 160 for all access to and from the project site. Throughout the construction and operation of the project, the project owner shall document, investigate, evaluate, and resolve all project truck related complaints. The project owner or authorized agent shall:

- Provide a spotter (an individual, such as a security guard, to monitor truck traffic) to ensure all construction truck traffic does not utilize Old Spanish Trail Highway via State Route 127;
- Use the Traffic Complaint Resolution Form (below), or a functionally equivalent procedure acceptable to the CPM, to document and respond to each traffic complaint of construction truck traffic using Old Spanish Trail Highway west of the project site;
- Attempt to contact the person(s) making the traffic complaint within 24 hours;
- Conduct an investigation to determine the transportation company in the complaint and;
- Submit a report documenting the complaint and actions taken.

  The report shall include: a complaint summary, including the final resolution and, if obtainable, a signed statement by the complainant stating that the truck route problem has been resolved to the complainant's satisfaction.

Verification: The project owner shall include this specific route in its contracts for truck deliveries and provide the CPM with a copy of the transmittal letter to the contractors specifying the truck route.

Within five days of receiving a truck route complaint, the project owner shall file a Traffic Complaint Resolution Form, shown below, with the CPM that documents the resolution of the complaint.

TRANS-5 Traffic Control Plan, Heavy Hauling Plan, and Parking/Staging Plan

The project owner shall prepare and implement a Traffic Control Plan (TCP) for the HHSEGS's construction and operations traffic. The TCP shall address the movement of workers, vehicles, and materials, including arrival and departure schedules and designated workforce and delivery routes.

The project owner shall consult with the Department of Transportation (Caltrans) District 8 Office; Department of Transportation (Caltrans) District 9 Office; Nevada Department of Transportation (NDOT); Inyo County; County of San Bernardino; Clark County and Nye County in the preparation and implementation of the Traffic Control Plan (TCP). The project owner shall submit the proposed TCP to Caltrans District 8, 9, NDOT, Inyo County; County of San Bernardino; Clark County and Nye County in sufficient time for review and comment, and to the CPM for review and approval prior to the proposed start of construction and implementation of the plan. The Traffic Control Plan (TCP) shall include:

- Provisions for redirection of construction traffic with a flag person as necessary to ensure traffic safety and minimize interruptions to non-construction related traffic flow;

- Placement of necessary signage, lighting, and traffic control devices at the project construction site and lay-down areas;
- A heavy-haul plan addressing the transport and delivery of heavy and oversized loads requiring permits from the California Department of Transportation (Caltrans), Nevada Department of Transportation (NDOT) other state or federal agencies, and/or the affected local jurisdictions;
- Location and details of construction along affected roadways at night, where permitted;
- Temporary closure of travel lanes or disruptions to street segments and intersections during construction activities;
- Traffic diversion plans (in coordination with the County of Inyo, Caltrans, NDOT; County of San Bernardino; Clark County and Nye County) to ensure access during temporary lane/road closures;
- Access to residential and/or commercial property located near construction work and truck traffic routes;
- Ensure access for emergency vehicles to the project site;
- Advance notification to residents, businesses, emergency providers, hospitals, school districts, such as the Death Valley Unified School District, and the Front Sight Firearms Training Institute that would be affected when roads may be partially or completely closed;
- Visual monitoring of the LOS at the study intersections (SR 160/Old Spanish Trail Highway; SR 127/Old Spanish Trail Highway, and SR 127/Baker Boulevard) by the project owner's representative shall occur once per week, during the morning and afternoon peak hour during peak construction months. Monitoring would begin in Month 12 when 1,176 workers are projected (approximately 51 percent of the peak) and continue through the end of Month 24 when 1,293 workers are projected (approximately 56 percent of the peak). The findings shall be reported monthly to the CPM in the monthly compliance report or as necessary;
- The following measures shall be implemented when the traffic monitoring identifies LOS E conditions at the intersection of SR 160/Old Spanish Trail Highway; LOS D conditions at SR 127/Old Spanish Trail Highway; LOS F conditions at SR 127/ Baker Boulevard:
    - A work schedule and end-of-shift departure plan that would stagger Monday arrivals and Friday departures from the project site;
    - Carpooling - Club Ride Program sponsored by the Regional Transportation Commission of Southern Nevada and;
    - Employer Sponsored Van Program designed to transport construction workers to the project site via a van or bus service. 15-passenger vans shall be used to achieve a baseline carpool rate of 1.5 people per car for the California workforce and the higher carpool rate of 2.5 people per car

when the day shift workforce reaches 1,000 employees shall be required.

- Identification of safety procedures for exiting and entering the site access gate;
- Parking/Staging Plan (PSP) for all phases of project construction and for project operation.

For any activity on public roads, the project owner shall apply for, receive and comply with all conditions of an encroachment permit from the affected jurisdiction.

Verification: At least 60 calendar days prior to the start of construction, the project owner shall submit the TCP to the applicable agencies for review and comment and to the CPM for review and approval. The project owner shall also provide the CPM with a copy of the transmittal letter to the agencies requesting review and comment and a copy of the encroachment permit issued by the affected agency for any activities on a public road.

At least 30 calendar days prior to the start of construction, the project owner shall provide copies of any comment letters received from the agencies, along with any changes to the proposed development plan, to the CPM for review and approval.

TRANS-6 Transportation of Hazardous Materials

The project owner shall contract with licensed hazardous material delivery and waste hauler companies in order to obtain the necessary permits and/or licenses from the California Highway Patrol, the California Department of Transportation (Caltrans), Nevada Department of Transportation, and any relevant local jurisdictions for the transportation of hazardous materials. The project owner shall ensure compliance with all applicable regulations and implementation of the proper procedures and the deliveries shall only use State Route 160 to the project site.

Verification: In the Monthly Compliance Reports (MCRs) during construction and the Annual Reports during operation, the owner shall provide copies of all permits/licenses obtained for the transportation of hazardous substances.

At least 30 calendar days prior to the start of construction, the project owner shall provide copies of any comment letters received from the agencies, along with any changes to the proposed development plan, to the CPM for review and approval.

TRANS-7 Federal Aviation Administration Notification of Construction Cranes and Obstruction Marking and Lighting

The project owner shall install obstruction marking and lighting on the two solar power towers and any construction cranes exceeding 200 feet in height consistent with FAA requirements, as expressed in the following documents:

- FAA Advisory Circular 70/7460-1K
- FAA Safety Alert for Operators (SAFO) 09007.

Permanent lighting consistent with all requirements shall be installed and activated within 5 days of completion of construction and prior to operation of the HHSEGS. Lighting shall be operational 24 hours a day, 7 days a week for the life of project operation. Upgrades to the required lighting configurations, types, location, or duration shall be implemented consistent with any changes to FAA obstruction marking and lighting requirements.

The project owner shall file a Form 7460-1 with the Federal Aviation Administration (FAA) regarding the use of 200 feet tall construction cranes.

Verification: At least 60 days prior to the start of construction, the project owner shall submit to the CPM for approval final design plans for the two solar towers that depict the required air traffic obstruction marking and lighting.

Within 5 days of completion of the solar power tower construction and prior to plant operation, the project owner shall install and activate permanent obstruction marking and lighting consistent with FAA requirements and shall inform the CPM in writing within 10 days of installation and activation. The lighting shall be inspected and approved by the CPM (or designated inspector) within 30 days of activation.

At least 90 days prior to ground disturbance, the project owner shall submit a copy of the FAA Determination of No Hazard to Navigable Airspace regarding the construction cranes to the CPM.

TRANS-8 Heliostat Operations Positioning and Monitoring Plan

The project owner shall prepare and implement a Heliostat Operations Positioning and Monitoring Plan (HPMP) that would avoid human health and safety hazards and accomplish the following:

- *Safe orientation as default orientation* – heliostats default to the safe orientation common to the whole field in all cases of malfunctions detected by the heliostat's controller, which ensures protection in most cases of malfunctions;
- *Safe path from any orientation to any other orientation* – when heliostats change their orientation, they choose a "path" which avoids reflected sunrays on all unintended areas (at least the tower and power block, and other designated sensitive areas). Safe path orientation includes normal repositioning operations as well as any contingency repositioning operations (such as during excessive high winds) which may required.
- *Normal operation* - all the sunlight is reflected either on the receiver or the "standby" areas – located near the receiver – so that no other location receives solar radiation.

Verification: At least 90 days prior to commercial operation of any of the two HHSEGS Solar Receiver Steam Generators, the project owner shall submit the Heliostat Positioning and Monitoring Plan to the CPM for review and approval. The project owner shall also submit the plan to the Federal Aviation Administration (FAA) for review and comment and forward any comments received to the CPM. The project owner shall not test or operate the project until the HPMP is approved by the CPM.

Traffic Complaint Resolution Form

Hidden Hills Solar Electric Generating System (11-AFC-2)
COMPLAINT LOG NUMBER _____ **Complainant's name and address:** **Phone number: _____**
Date complaint received: _____ **Time complaint received: _____**
Nature of truck route complaint:
Definition of problem after investigation by plant personnel: **Date complainant first contacted: _____**
Description of corrective measures taken: **Complainant's signature: _____ Date: _____**
Date first letter sent to complainant: _____ (copy attached) **Date final letter sent to complainant: _____ (copy attached)**
This information is certified to be correct: **Plant Manager's Signature: _____**

(Attach additional pages and supporting documentation, as required).

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Appendix TT 1
Glint and Glare Safety Impact Assessment
Hidden Hills Solar Electric Generating System
Gregg Irvin, Ph.D.

INTRODUCTION

The Hidden Hills Solar Electric Generating(System (HHSGS) would be located on Old Spanish Highway, near the community of Charleston View on approximately 3,277 acres (5.12 square miles) of privately owned land in Inyo County, California, adjacent to the Nevada border. The project site is approximately 18 miles south of Pahrump, Nevada, and approximately 45 miles west of Las Vegas, Nevada.

Each solar plant would use heliostats which are elevated mirrors guided by a tracking system mounted on a pylon to focus the sun's rays on a solar receiver steam generator (SRSG) atop a 750-foot tall solar power tower near the center of each solar field. In each solar plant, one Rankine-cycle steam turbine would receive steam from the SRSG (or solar boiler) to generate electricity. The solar field and power generation equipment would start each morning after sunrise and, unless augmented, would shut down when insolation[1] drops below the level required keeping the turbine online.

Each of the heliostat assemblies would be composed of two mirrors, each approximately 12 feet high by 8.5 feet wide with a total reflecting surface of 204.7 square feet. Each heliostat assembly would be mounted on a single pylon, along with a computer-programmed aiming control system that directs the motion of the heliostat to track the movement of the sun. The solar field for each solar plant would consist of approximately 85,000 heliostats.

Definition of Glint and Glare

Glare is considered as difficulty seeing in the presence of bright light such as direct or reflected sunlight or artificial light such as car headlamps at night. Glare is caused by a significant ratio of luminance between the task (that which is being looked at) and the glare source. Factors such as the angle between the task and the glare source and eye adaptation have significant impacts on the experience of glare. Glare can be generally divided into two types, discomfort glare and disability glare. Discomfort glare results in an instinctive desire to look away from a bright light source or difficulty in seeing a task. Disability glare renders the task impossible to view, such as when driving westward at sunset. Disability glare is often caused by the inter-reflection of light within the eyeball, a scattering effect, reducing the contrast between task and glare source to the point where the task cannot be resolved or distinguished.

Glint is difficulty seeing in the presence of a transient bright light source and is generally considered to be intermittent. A glint effect would be, for example, brief reflections of sky or sunlight from of the heliostats while driving by. A glare effect is more sustained, such as might be present from the sustained reflections from the tower SRSGs.

[1] Defined as "exposure to the sun's rays."

Both glint and glare effects are possible from both the redirection of sunlight by the heliostats and the reflection of solar energy off of the solar tower SRSGs. Because of the possible impact of this redirected sunlight on observers such as motorists on the adjacent highway or in aircraft overhead, these impacts are analyzed below.

METHODOLOGY AND THRESHOLDS FOR DETERMINING SIGNIFICANT IMPACTS OF GLINT AND GLARE

The Luminance of the Hidden Hills Environment

Perceived brightness depends on a variety of factors including the luminance of the global ambient, target size and the relationship between the luminance of the target and background. The global ambient luminance sets the state of visual adaptation and hence the spatial and temporal processing characteristics of the human visual system. Within this context perceived brightness depends critically on the luminance relationship and sizes of the target (SRGS) and background (sky). The irradiance of the sun is enormous, on the order of 80,000 Watts (W)/m^2. As such, the luminance of the sun is also enormous and is on the order of $1.6x10^9$ cd/m^2 (candelas per meter squared) on a clear day at noon.

Irradiance is a measure of the power incident on a surface, also called radiant flux density, and is expressed as Watts/cm^2. Irradiance characterize the total amount of radiation present, at all frequencies, and is the appropriate metric for the determination of retinal damage thresholds. The human visual system, however, is only sensitive to a narrow range of these frequencies described by the photopic luminous efficiency function ($V\lambda$). Luminance, on the other hand, is a photometric measure of the luminous intensity per unit area of light. Luminance indicates how much luminous power will be detected by an eye looking at source or surface from a particular angle of view. Luminance is thus an indicator of how bright the surface will appear. Luminance can be computed from an irradiance spectrum by using the photopic luminous efficiency function which describes the average visual sensitivity of the human eye to light of different wavelengths. It is a standard function established by the Commission Internationale de I'Eclairage (CIE) and is used to convert radiant energy into luminous (i.e., visible) energy.

The luminance of the sky varies considerably dependent on weather conditions and can range from 500 cd/m^2 to approximately 7,000 cd/m^2. Of the total light removed from the direct solar beam by scattering in the atmosphere (approximately 25%) about two-thirds ultimately reaches the earth as diffuse sky radiationEmpirical measurements were made at the Rio Mesa site of both the solar and sky spectral irradiance distributions on 18 April 2012 under clear full sun conditions. The Rio Mesa site is similar to the Hidden Hills site and the solar and sky measurements taken are considered as applicable to Hidden Hills. Measurements were accomplished with a calibrated Ocean Optics spectroradiometer with a 400 μm fiber optic for light collection. Since the sun subtends a smaller angle than the acceptance numerical aperture of the fiber the sun measurements, of necessity include both sun and sky spectra combined.
The sky measurements are accurate and provided consistent measurements. Measurements taken, at elevations commensurate with the viewing conditions in which the sky would constitute the visual background for tower SRSG, yielded average values for integrated radiance of 40.33 W/m^2-sr. When the standard human luminous efficiency function is applied to these spectral measurements the computed luminance values are 6,175 cd/m^2 ± 222 cd/m^2. **Figure 1** shows an example of the measured sky spectrum (normalized) over the range of human visual sensitivity (blue). Also shown is the CIE Vλ photopic luminous efficiency function (green) depicting relative visual sensitivity over the wavelength range of 360-830 nm.

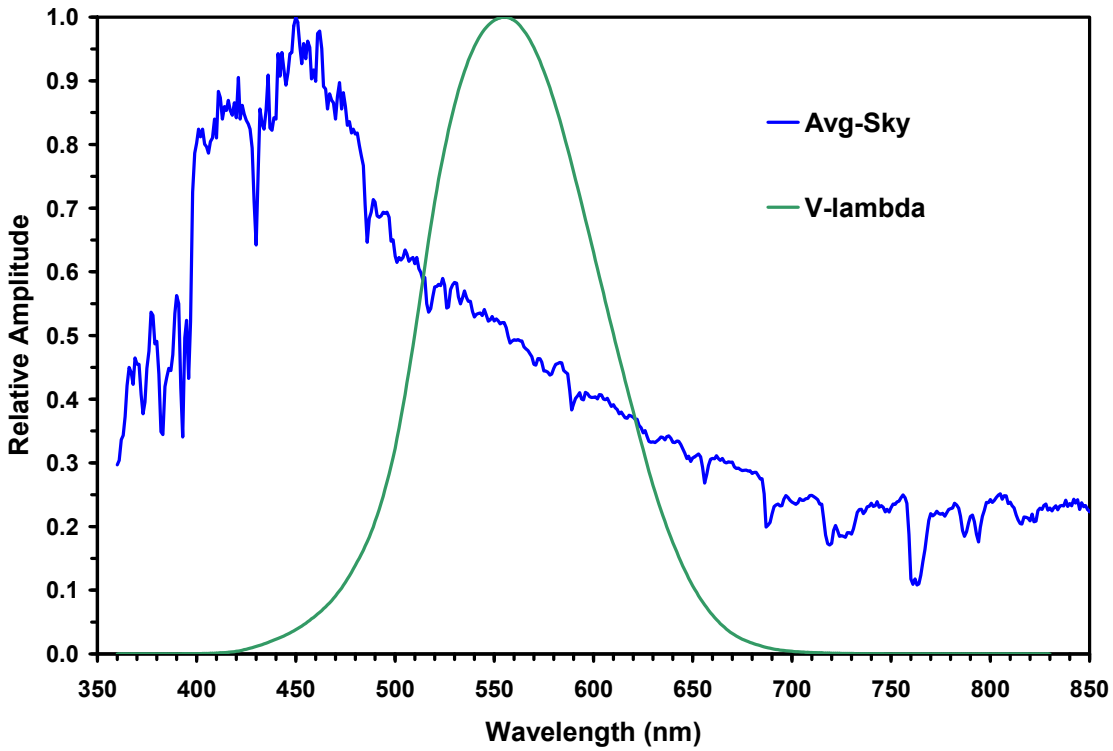


Figure 1 Normalized Sky spectral radiance (W/cm^2-sr) resulting in a luminance of 6,157 cd/m^2 (Dominant wavelength 478 nm, Purity 28.5).

Reference Solar Spectral Irradiance: Air Mass 1.5

The photovoltaic (PV) industry, in conjunction with the American Society for Testing and Materials (ASTM) (http://www.astm.org/) and government research and development laboratories developed and defines two, and only two, standard terrestrial solar spectral irradiance distributions. The two spectra define a standard direct normal spectral irradiance and a standard total (global, hemispherical, within 2-pi steradian field of view of the tilted plane) spectral irradiance. The direct normal spectrum is the direct component contributing to the total global (hemispherical) spectrum. The current Standard Reference Spectra are both incorporated into a single document, ASTM G-173-03. The applicant, BrightSource, uses the ASTM standards for their calculations of irradiance and luminance.

The ASTM G173 spectra represent terrestrial solar spectral irradiance on a surface of specified orientation under one and only one set of specified atmospheric conditions. These distributions of power (watts per square meter per nanometer of bandwidth) as a function of wavelength provide a single common reference for evaluating spectrally selective PV materials with respect to performance measured under varying natural and artificial sources of light with various spectral distributions. The conditions selected were considered to be a reasonable average for the 48 continuous states of the United States of America (U.S.A.) over a period of one year. The tilt angle selected is approximately the average latitude for the contiguous U.S.A. The spectral irradiance of ASTM G173-03 standard reference spectra for extraterrestrial (above the atmosphere), direct normal (sun), and global normal (sun plus sky) is shown in **Figure 2**. The upper panel shows the full spectrum from 280 nm to 4.0 microns. The lower panel shows the region relevant for human vision (360-830 nm).

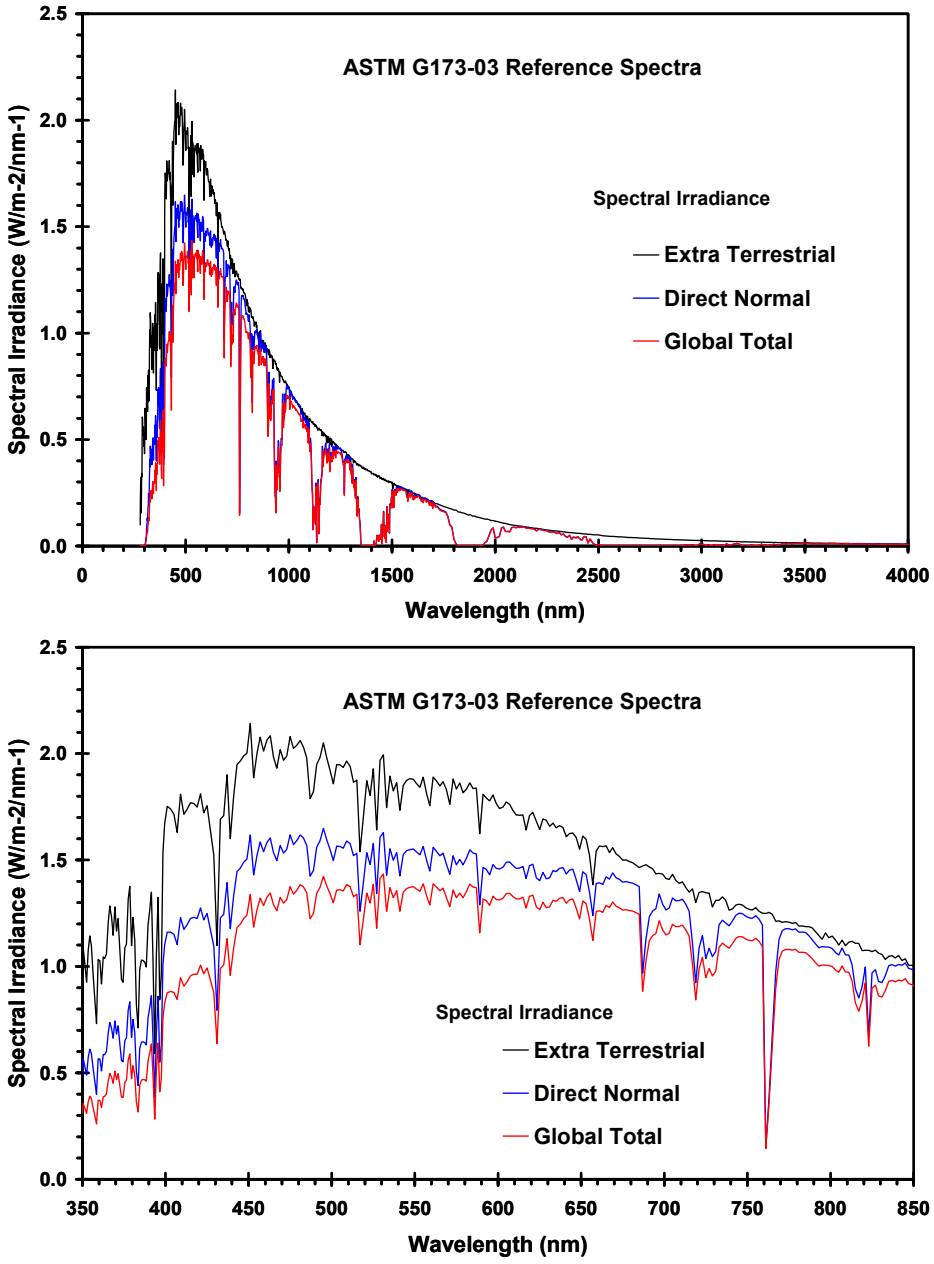


Figure 2 American Society for Testing and Materials G173-03 Reference Spectra.

Retinal Damage

The ability of light to cause injury to the retina has been shown both clinically and experimentally. Light can result in retinal damage through photothermal, photomechanical, and photochemical mechanisms (Irvin & Ramer, 1988). For the current project both photothermal and photochemical mechanisms are relevant.

Photothermal Retinal Damage

Photothermal retinal damage occurs when the eye is exposed to sufficient light energy to heat the retina to a point where damage occurs resulting in a permanent blind spot. Since the eye is an optical focusing system the energy at the retinal surface is

concentrated by as much as a factor of 100,000. The ocular impact on an observer, from the either the heliostats or the SRSGs is calculated as the retinal irradiance (Er). The calculation of Er takes under consideration the size of the light emitting object (SRSG or heliostat), the intensity in W/m^2 (irradiance) at the observer location, and the vulnerability of the human eye.

The level of exposure which is considered as the limit between safe and harmful is called Maximum Permissible Exposure (MPE) limit. The MPE which can be tolerated by the human eye is an industry standard and is defined by Sliney and Freasier & el. The MPE is defined for two exposure condition types: momentary exposure, correlated with the human blinking instinct, and continuous exposure.

- MPE for a momentary exposure (0.15 s) is 1 W/cm2 = 10,000 W/m2.
- MPE for continuous exposure is 0.1 W/cm2 = 1,000 W/m2.

Personnel and others within the plant boundaries will not be exposed to irradiance levels which exceed the MPE. The intensity of light emitted from the SRSG is lower (by three orders of magnitude) than that of the sun (20-70 W/m2 vs. 80,000 W/m2). BrightSource provided modeling in which the modest attenuation by air was not included, i.e., a worst case scenario. In this case the Er received by the retina varies proportionally with distance. Under these worst case conditions, the irradiance to which an observer at 250 meters from the SRSG is exposed is not greater than 50 W/m2, and this value decreases over distance (i.e., at 400 m it is less than 20 W/m2.)

Residents and motorists outside the plant boundaries will not be exposed to Er levels beyond the MPE. The nearest public right of way is Old Spanish Trail Highway (also called Tecopa Road) which is approximately 0.5 mile from the nearest SRSG at its closest point on the southern border of the solar facility. The nearest residential establishment is Charleston View along on the southern region of this same section of Old Spanish Trail Highway. At these distances the level of retinal irradiance exposure is less than 3 percent of the MPE for continuous exposure.

In normal operation, only the area of the SRSG will receive concentrations of solar radiation. Locations on the ground and areas surrounding the footprint of the plant will not receive solar radiation concentrations above that of direct sunlight. Therefore, in normal plant operation, there is no potential for any plant sourced solar radiation exposure hazard to motorists, residents or any member of the public outside the boundary of the project.

Further, project workers within the plant boundaries will not be exposed to Er levels beyond the MPE from either the SRSGs or heliostats. The maximum level of retinal irradiance exposure for project workers is less than 6 percent of the MPE for continuous exposure.

The heliostats are designed to reflect sunlight toward the SRSG at the top of the tower and for normal operation, the heliostats will orient themselves according to their position in the field, day of the year, and time of day, in order to reflect the sun rays either on the SRSG ("tracking" orientation) or on an area (standby ring) nearby (far enough from the tower and SRSG to free them from radiation but close enough to allow the heliostats to

quickly enter tracking mode, called "standby" orientation). In the standby position the heliostats reflect sunlight back into the sky where the distinct potential exists for the heliostat 'beam' to intercept aircraft.

The size of the site as defined according to the FAA regulations is the volume that encompasses the perimeter of the site and a height of 500 feet above the tower. This imaginary volumetric body is the control volume that the heliostat tracking system takes under consideration. In this volume the heliostats are programmed to concentrate flux in certain positions that will cause the flux leaving the imaginary control volume to scatter to a level that will cause no impact on aviation safety from a retinal damage perspective. The control system is designed so that solar flux will not exceed the momentary MPE (10 kW/m2) outside and above of this control volume.

Staff concludes that there is no risk for photothermal retinal damage. Further, as discussed immediately below in the Photochemical Retinal Damage section, project workers will also be provided with protective eyewear to mitigate the potential for photochemical damage. Although not necessary for photothermal damage the protective sunglasses will provide an additional margin of safety for workers within the solar field.

Photochemical Retinal Damage

Photochemical damage is associated with long-duration exposure times as well as lower-wavelength (higher-energy) light exposure. While retina pigment epithelium (RPE) and the neurosensory retina are protected from light-induced exposure by the absorption profile of the surrounding ocular structures (e.g., cornea, crystalline lens, macular pigments) and through retinal photoreceptor outer segment regeneration, photic injury is still possible due to photochemical retinal light toxicity mechanisms.

Photochemical injury is both dose-dependent and cumulative in nature. The cumulative time-dependent nature is that daily exposures can build up and can last many weeks. For example, it has been estimated that the half-life (1/e, when an exposure effect has decayed to approximately 37%) of the cumulative dose exposure effect is on the order of 30 days. This has significant implications for observers (e.g., workers over many weeks) that spend a significant amount of time in proximity to the high luminance environment of a solar field in the presence of the additional high terrestrial ambient of the desert environment.

As retinal injury can be caused by exposure to otherwise innocuous visible light, there appears to be some critical dose or threshold at which exposure becomes injurious. The safe exposure times for common ophthalmic instruments (e.g., fundal photography) has been reported in the literature and supports the concept of a critical threshold dose necessary for injury.

The potential for photochemical retinal damage to the public (both resident and motorists) and project workers given the cumulative exposure effects of the combined terrestrial ambient and solar field/ tower exposure levels has been addressed in Data Request 145.

Staff agrees that the potential for photochemical damage to the residential and motorist public is not significant. Residents and most motorists of the area known as Charleston View (population 36) along Old Spanish Trail Highway will be nearest the facility. Motorists utilizing Old Spanish Trail Highway will be no closer than 0.5 mile from the nearest SRSG. At these distances and because these individuals will not experience long duration exposure, there is no risk for photochemical damage. At these distances the level of retinal irradiance exposure is less than 2 percent of the MPE for continuous exposure. Nearby the only sizeable developed residential area is the community of Pahrump (population 36,441), located approximately 18 miles to the north.

When evaluating the implications of these effects on the viewer of the tower or the heliostats, it must be noted that the effect is directly related to the ambient and background light conditions. The HHSEGS is located in a bright desert environment thereby increasing the potential chance for photochemical retinal damage. The cumulative daily exposure to workers to the ambient environment combined with the additional potential cumulative effects of heliostat and SRSG exposure puts project workers at risk for photochemical retinal damage. This is due to the cumulative effect discussed above. Thus, to ensure the safety of the workers and others within the project boundaries, personnel protection equipment (PPE), in the form of protective glasses will be provided. Protective glasses have been developed for workers engaged in intense solar field work, tower work, and intense close viewing of the SRSG.

There is precedence for the issuance of special safety glasses, for example they have been issued to the operators at Solar Energy Development Center (SEDC), and the Coalinga and Ivanpah solar thermal plants. The potential photochemical retinal hazards are calculated according to IEC 62471 standard (same as CIE S 009: 2002), titled: "*Photobiological Safety of Lamps and Lamp Systems*", where the spectral values were taken from "ASTM G173-03 Reference Spectra Derived from SMARTS v. 2.9.2 (AM1.5)" and are the same as the "ISO 9845-1-1992." BrightSource has developed appropriate PPE in the form of specialty safety glasses (sunglasses) based on these standards for the workers engaged in intense solar field work, tower work, and intense close viewing of the SRSG.

Therefore, Worker Safety staff recommends Condition of Certification **Worker Safety 1** (Project Construction Safety and Health Program) and **Worker Safety-2** (Project Operations and Maintenance Safety and Health Program) which are designed to insure that workers in the solar field receive and wear the appropriate personal protective equipment including protective sunglasses.

Glint and Glare from the Heliostats

The applicant has demonstrated through modeling that heliostat retinal irradiance and beam intensity (under worst case conditions) is eye safe. The heliostats are designed to reflect sunlight toward the SRSG at the top of the tower and are programmed such that reflectivity would never be directed toward ground level viewers located outside of the project site.

Locations on the ground, areas surrounding the footprint of the plant, and the surrounding airspace, will not receive solar radiation concentrations above that of direct sunlight. Significant precautionary measures have been applied to the planned heliostat

control algorithms and Condition of Certification **TRANS-8** (Heliostat Operations Positioning and Monitoring Plan (HPMP)). This safe operation of the heliostats, according to the applicant, will be achieved with the following design and precautions:

- *Safe orientation as default orientation* – heliostats default to the safe orientation common to the whole field in all cases of malfunctions detected by the heliostat's controller, which ensures protection in most cases of malfunctions;
- *Safe path from any orientation to any other orientation* – when heliostats change their orientation, they choose a "path" which avoids reflected sunrays on all unintended areas (at least the tower and power block, and other designated sensitive areas).
- *Normal operation* - all the sunlight is reflected either on the receiver or the "standby" areas – located near the receiver – so that no other location receives solar radiation.

The HPMP and resulting control algorithms will accommodate any known sensitive receptors or receptor locations, such as a road or residence to the list of forbidden areas within each heliostat's controller. This way, each heliostat individually will avoid aiming reflected sunrays at the sensitive area to ensure that there will be no concentration of solar radiation on it. With these procedures appropriately implemented, the potential for glint and glare from solar radiation exposure by the reflected luminance for normal and emergency operation modes to motorists and residents should be maximally mitigated.

An additional glint and glare concern is for aircraft. Since the heliostats point skyward in their standby positions there is the distinct (if not inevitable) possibility for brief and intermittent direct exposure of the reflected sun from the heliostats to aircraft. The effect, however, for such exposures will diminish as a function of distance from the heliostat field. The heliostat mirrors although planar (flat) are tensioned in their pylon mountings when installed to produce a slight concavity. This produces a slight focusing effect to improve the amount of solar energy received at the SRGS from each heliostat.

According to the applicant, there are incremental design focal lengths at the planned HHSEGS site based on the range of the heliostat to the tower SRSG. When in the standby position this focal point will be slightly above the SRSG (since the heliostat is slightly elevated relative to the SRSG aiming point) and will diverge beyond the standby ring. Thus, an aircraft passing through one or more heliostat ‘beams’ at altitude above or near the heliostat field will receive a divergent beam. As such the appearance would not be that of a direct solar reflection such as is commonly witnessed from a specular (mirror-like) solar reflection off a lake or pond. Rather, the reflection would tend to be more diffuse and less bright, and become more and more diffuse and dimmer as a function of increasing distance/ altitude.

Thus, glint and/or glare from the heliostats experienced by pilots would be considered as a discomfort producing effect rather than as a disability producing effect. In the rare event of a flight path that received successive heliostat exposures in rapid succession over an extended period of time the pilot may experience this as significantly discomforting.

Glint and glare from the SRSGs

During operations the tower SRSGs will produce a sustained bright source of reflected light from the heliostats. Since the SRSGs are 'circular' (wrapping around the tower 360 degrees) and near the tower peak they will be highly visible from most vantage points and for many miles. There is no doubt that the tower SRSGs will result in a most prominent and sustained visual signature. The issue from a Traffic and Transportation perspective is will the SRSGs produce sufficient glare and/or excessive perceived brightness to result in disability glare and/or compromised operator performance. This is an essential question since there are essentially no realistic mitigating procedures for the tower SRSG luminance levels.

Perceived brightness, as well as glint and glare effects, depends on a variety of factors including the luminance of the global ambient, target size and the relationship between the luminance of the target and background. The global ambient luminance sets the state of visual adaptation and hence the spatial and temporal processing characteristics of the human visual system. Within this context perceived brightness depends critically on the luminance relationship and sizes of the target (SRGS) and background (sky). The irradiance of the sun is enormous, on the order of 80,000 W/m^2. As such, the luminance of the sun is also enormous and is on the order of 1.6x109 cd/m2 (clear sky at noon).

Calculations by the applicant as well as field spectroradiometric measurements conducted by staff have provided realistic and nominal values for the luminance of the SRSGs and the sky background during plant operations. During power generating operations the levels of retinal irradiance that will be created by the tower SRSGs have been calculated to be 68 W/m^2 in views from the north, and 53 W/m^2 in views from the south. These correspond to maximum luminance values for the SRSGs of 230,000 cd/m^2 and 424,000 cd/m^2, respectively.

The north view value is 2,941 times less than that of the sun. The background sky within which the tower will be viewed will vary according to atmospheric and weather conditions but on a clear sunny day will be on the order of 6,175 cd/m^2. As such the SRSGs will be 37 times more luminous (230,000/6,175) than the background. Even in the high state of light adaptation produced by the daytime environment this will appear quite bright to observers. However, the SRGS are still a factor of approximately 7,000 times less luminous that the sun.

What do these values translate to in terms of perceived brightness? In the field of human visual psychophysics Stevens' Power Law[1] is used to describe the relationship between the magnitude of a physical stimulus and its perceived intensity or strength. The general form of the law is

$$P(I) \equiv cI^a$$

where I is the magnitude of the physical stimulus P, P(I) is the psychophysical function relating to the subjective magnitude of the sensation evoked by the stimulus, 'a' is an exponent that depends on the type of stimulation and 'c' is a proportionality constant that depends on the type of stimulation and the units used. Although Stevens' Power Law is based on psychophysical judgments of perceived stimulus magnitude it has been

shown to be generally valid for a variety of sensory domains including vibration, lightness, smell, taste, warmth, cold, pain, pressure, brightness, viscosity, duration, etc.

For perceived brightness under daylight observation conditions the brightness exponent is generally considered to be 1/3. This is a compressive function. For example, if a 25 W light bulb is exchanged for a 100 W light bulb, the perceived brightness should increase by a factor of 1.59 or 59 percent. The exponent of 1/3 for perceived brightness is valid over a wide range of stimulus conditions. This exponent provides a best estimate for perceived brightness given the general observation conditions in the solar field and the general vicinity. **Figure 3** shows the predicted relative perceived brightness for the sun, SRSGs and background sky. The constant, 'c' in Stevens' psychometric equation was set to 1.0 to produce a perceived brightness value of 10 for a 1,000 cd/m^2 stimulus. Under these conditions and observer would rate the brightness magnitude of the background sky as 18, the brightness of the SRSGs as 61, and the brightness of the sun as 1,170. Thus, perceptually, although the SRSG is 37 times more luminous than the background sky, the perceived brightness is only 3.3 times as great (61/18). Further, the sun would be perceived as 19 times brighter than the SRSGs (1,170/61) and 64 times brighter than the sky (1,170/18).

	Luminance (cd/m2)	Relative Brightness
Sun	1,600,000,000	1,170
Tower SRSG	230,000	61
Sky	6,175	18

Figure 3. Perceptual brightness as a function of the luminance of the sun, tower SRSGs and the background sky based on Stevens' Power Law with a brightness exponent of 1/3 and a constant of 1.0.

Thus, the brightness of the SRSGs experienced by all observers would be on the order of at least a factor of four times greater than that of the background sky. This level of brightness is certainly prominent and may be distracting or discomforting but is not considered as debilitating or producing a disability glare. Additionally, these values for relative brightness are only estimates and are considered as nominal for viewing distances on the order of 1000-2000 meters where the visual size of the SRSGs are reduced to less than 0.5 degree. For greater ranges perceived brightness will remain relatively constant out to a critical size approaching the limits of visual acuity and only be reduced by atmospherics. For greater ranges perceived brightness will obey Steven's power law. For closer ranges within the solar field perceived brightness could increase substantially as the visual size of the SRSG's increases.

At a viewing distance of 2.8 miles the tower receivers will have a visual subtense equal to that of the Sun, i.e., 1/2 deg or 30 min arc. At 8.5 miles, the receivers will have a visual subtense of 1/6 deg, 10 min arc. At this visual size perceived brightness will begin to transition from being constant to being log linear according to Stevens' power law.

The distance at which brightness will be proportional to distance (log linear) will be at a visual subtense of approximately 5 min arc (1/12 deg) as size begins to transition to the

limits of visual acuity. This condition is met at a viewing distance of 16.9 miles. In between the 2.8 miles and 16.9 miles viewing distances the visual subtense of the receiver is changing from 30 min arc to 5 min arc, a change in area of 36 times. As such perceived brightness will be decreasing because of the changing size. It will transition between a constant and log linear. A stimulus on the order of 230,000 cd/m2 (61 times more luminous than the nominal desert sky at that location) will be significantly visually disruptive and be significant in perceived brightness for angular sizes of 10 min arc and greater. For the SRSGs, this translates to a viewing distance of 8.5 miles or less. Thus, the threshold viewing distance at which the tower receivers (under nominal power generation conditions) are considered as producing a visual glare which is both significant in perceived brightness and significant in visual disruption is 8.5 miles.

It should be noted that glare is generally considered as a scattering effect in the eye, although any optical interface can also add to perceived glare, such as glasses, automotive windshields and aircraft canopies. Scattering in the human eye increases as a function of age^2. Glare related scatter effects remain nearly constant as a function of age until 40-45 years when scatter rises exponentially and triples by the age of 60. As such any glare effects produced by the SRSGs may be more pronounced in the aging population.

CONCLUSIONS

Staff concludes that the glare effects from the tower solar receiver steam generators (SRSGs) receivers are significant and unavoidable. The brightness of the SRSG would be clearly visible and prominent. The relatively high level of brightness and the resulting glare effects from the SRSGs would produce a distinct visual distraction effect and be significant in perceived brightness and discomfort/disruption glare effects for a nominal viewing distance of 8.5 miles. However, these glare effects are not considered as sufficient to be visually debilitating in producing disability glare and thus would not cause a safety hazard from a ground-based or airborne (e.g., driving a vehicle, flying a plane) operator control perspective.

TRAFFIC & TRANSPORTATION

List of Comment Letters

		Traffic & Transportation Comments?
1	Inyo County	X
2	Bureau of Land Management	
3	National Park Service	
4	The Nature Conservancy	
5	Amargosa Conservancy	
6	Basin & Range Watch	
7	Pahrump Paiute Tribe	
8	Richard Arnold, Pahrump Piahute Tribe	
9	Big Pine Tribe of Owens Valley	
10	Intervenor Cindy MacDonald	X
11	Intervenor Center for Biological Diversity	
12	Intervenor, Old Spanish Trail Association	
13	Applicant, BrightSource Energy, Inc.	X

Comment #	DATE	COMMENT TOPIC	RESPONSE
1	**July 17, 2012**	**Inyo County**	
1.6		**Old Spanish Trail Highwy and Enforcement:** The County is concerned that the Condition of Certification **TRANS-4 (Truck Route)** does not contain a process by which the project owner or contractor(s) would be fined if truck traffic used Old Spanish Trail Highway and State Route 127 to access the project site or to reimburse the County for costs to repair the roadway.	The California Energy Commission through the Warren-Alquist Act Section 25534 (b) provides a process for civil penalties for non-compliance with Conditions of Certification. In addition, staff has added language to Condition of Certification **TRANS-4- Truck Route** requiring a spotter at the project site to ensure that truck traffic entering the project site are not using the Old Spanish Trail Highway via State Route 127.

1.61		**Revised Condition of Certification (COC):** The County requests a revision to COC **TRANS-2** (**Right-of-Way**) to include new language: The configuration of driveways into the HHSEGS site do not allow for rights-of way for traffic transitions within the limits of the HHSEGS site. The drive locations shall be reconfigured to accommodate traffic transitions within the limits of the property boundaries or additional right-of-way beyond the HHSEGS site shall be acquired and dedicated to Inyo County along the Old Spanish Trail Highway. Also add language to the Verification to state the right-of-way must be accepted by Inyo County.	Refer to Condition of Certification **TRANS-2** for revised language, which addresses new right-of-way language.
1.62		**New Condition of Certification:** The County requests a new Condition of Certification TRANS-2A: (**Pavement Preparation/Widening**) as follows: Prior to any ground disturbance, other improvements, or other obstruction of traffic within any public road, the project owner shall apply for and receive an encroachment permit from Inyo County for the construction and completion of construction of an asphalt concrete overlay on Old Spanish Trail Highway and pavement widening including transitions to accommodate the turning movements along Old Spanish Trail Highway into and out of the HHSEGS site. Verification language: Prior to the start of onsite construction, the project owner shall provide evidence to the CPM that the construction of asphalt concrete overlay and turn lanes into and out of the HHSEGS site have been accepted by Inyo County.	The new requested Condition of Certification TRANS-2A was not incorporated as the " construction of an asphalt concrete overlay on Old Spanish Trail Highway " prior to any ground disturbance does not meet CEQA Guidelines Section 15370 - Definition of Mitigation. However, CEC has recommended COC **TRANS-3** (**Restoration of All Public Roads, Easements, and Rights-of-Way**) rectifying the impact by repairing, rehabilitating, or restoring the impacted environment which would be Old Spanish Trail Highway.

1.63		**Revise Verification COC TRANS - 3** to: Prior to the start of site mobilization, the project owner shall photograph or videotape all of the affected public roads, easements, right-of way segment(s), and/or intersections (including the portion of the Old Spanish Trail located to the west of project). The project owner shall provide the photographs or videotape to the CPM and the affected jurisdictions (California Department of Transportation (Caltrans), Nevada Department of Transportation (NDOT), and Inyo County). The purpose of this notification is to request that these jurisdictions consider postponement of any planned public right-of-way repair or improvement activities in areas affected by project construction until construction is completed, and to coordinate any concurrent construction-related activities that cannot be postponed. If damage to public roads, easements, or rights-of-way is identified by the project owner or the affected jurisdiction ~~occurs during construction,~~ the project owner shall immediately notify the CPM and the affected jurisdiction(s) to identify the section of the public right-of-way to be repaired. At that time, the project owner shall apply for, receive and comply with all conditions of an encroachment permit from the affected jurisdiction and establish a schedule for completion and approval of the repairs. Following completion of any public right-of-way repairs, the project owner shall provide the CPM letters signed by the person authorized to accept the repairs in the affected jurisdiction(s) stating their satisfaction with the repairs. If, in the opinion of the affected jurisdiction(s), the project owner is not timely in completing the required repairs, the jurisdiction(s) can, at its discretion, complete the repairs with its own staff or contract with an independent contractor to complete the repairs at the expense of the project owner. The project owner will reimburse the affected agency(ies) for the expense of the repairs.	Refer to Condition of Certification **TRANS-3** for revised language.

1.64		**Revise COC TRANS-4 (Truck Route)** as follows: The project owner shall require all construction truck traffic use State Route 160 for all access to and from the project site. Throughout the construction and operation of the project, the project owner shall document, that all trucks access the project site using Nevada State Route 160 and shall investigate, evaluate and ~~attempt to~~ resolve all project truck-related complaints. The project owner or authorized agent shall: Use the Traffic Complaint Resolution Form (below), or a functionally equivalent procedure acceptable to the CPM, to document and respond to each traffic complaint; Attempt to contact the person(s) making the traffic complaint within 24 hours; Conduct an investigation to determine the transportation company in the complaint and; Submit a report documenting the complaint and actions taken. The report shall include: a complaint summary, including the final resolution and, if obtainable, a signed statement by the complainant stating that the truck route problem has been resolved to the complainant's satisfaction. The project owner will pay a $10,000 penalty to Inyo County for each truck that accesses the site using the portion of the Old Spanish Trail Highway to the west of the project. This penalty shall be in addition to the restoration of any damage to the portion of the Old Spanish Trail to the west of project caused and addressed in accordance with **TRANS-3**.	Refer to COC **TRANS-4** for revised language. The California Energy Commission through the Warren-Alquist Act Section 25534 (b) provides a process for civil penalties for non-compliance with Conditions of Certification.
1.65		**Revise COC TRANS-5 (Traffic Control Plan, Heavy Hauling Plan and Parking/Staging Plan)**: Add a new sentence after the last bullet that states" For any activity on public roads, the project owner shall apply for, receive and comply with all conditions of an encroachment permit from the affected jurisdiction. Verification: At least 60 calendar days prior to the start of construction, the project owner shall submit the TCP to the applicable agencies for review and comment and to the CPM for review and approval. The project owner shall also provide the CPM with a copy of the transmittal letter to the agencies requesting review and comment, and a copy of the encroachment permit issued by the affected agency for any activities on a public road.	Refer to Condition of Certification **TRANS-5** for revised language.

Comment #	DATE	COMMENT TOPIC	RESPONSE
10	**July 21, 2012**	**Intervenor Cindy MacDonald -- p. 15-1**	
10.1		Requests the location of the waiting area for delivery trucks if they arrive at the project site outside of prescribed times.	Refer to Construction Workforce Parking and Laydown Area for discussion of 180 acres on an adjacent parcel that is contigious to the project site. Access to the construction and laydown area would be from the Old Spanish Trail Highway.
10.2		Requests new mitigation measures for HHSEGS for waiting delivery trucks to turn off their engines if they must wait longer than three minutes for site entry in order to control air emissions and 5:00 am noise pollution to Charleston View residents located five acres away from the Old Spanish Trail Highway/Tecopa Road.	Refer to Air Quality Section - Condition of Certfication **AQ-SC5(j)** and Noise and Vibration Condition of Certification **NOISE-6** - Construction Restrictions.
10.3		Potential additional vehicle impacts on Old Spanish Trail Highway/Tecopa Road from the students at the Front Site Firearms Training Institute located within the State of Nevada have not been addressed. The comment referenced an article in the Pahrump Valley Chamber of Commerce Magazine (23rd Edition, 2012) that stated the Front Site Firearms Training Institute trained nearly 25,000 students in 2011.	A discussion of traffic generated by Front Sight Firearms Training Institute has been included in the Traffic and Transportation FSA Section.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
13	**July 23, 2012**	**Applicant, BrightSource Energy, Inc. -- p. 241**	
13.1		General Comment: PSA thorough, objective and accurate analysis on Traffic and Transportation issues but several proposed Traffic and Transportation Conditions of Certification are more stringent than the conditions placed on similarly situated projects licensed by the Commission.	Comment noted regarding the PSA analysis. The proposed conditions of certification for HHSEGS have been incorporated from other approved projects associated with construction truck and vehicle traffic impacts.

13.2		General Comment: Request the access road south of the project site be referenced as Tecopa Road rather than Old Spanish Trail Highway to avoid confusion with the Old Spanish Trail Historic Trail.	The Old Spanish Trail Highway nomenclature has been retained in the Traffic and Transportation Section as it is used by the Department of Transportation (Caltrans), Traffic Data Branch, Traffic and Vehicle Data Systems Unit for traffic counts ; Caltrans - District 9 stated in thier commets to the Updated Workforce Analysis the road is named Old Spanish Trail Highway; Inyo County references Old Spanish Trail Highway and Old Spanish Trail Highway is depicited on the United States Geological Survey (USGS) topographic maps. New language has been included to explain the difference between Old Spanish Trail Highway and Old Spanish Historic Trail.
13.3		General Comment: Request deletion of Conditon of Certification **TRANS-1** - (**Roadway Use Permits and Regulations**). This condition has not been imposed on other similarly situated renewable energy projects and would be burdensome, costly and unenforceable. It has not been shown that the Commission has the authority to impose a condition regarding the permits for vehicles that travel roads in California and Nevada. The Commission has jurisdiction over power plant "sites and related facilities." This condition would be a significantly burdensome and unnessary expansion of the Commission's jurisdiction.	CEC Staff disagrees with the deletion of this Condition of Certification. Of the 11 approved solar thermal projects since 2008, this Condition has been imposed on six Traffic and Transportation projects. Specifically, Palen; Genesis ; Blythe ; Calico ; Palmdale and Rice.
13.4		General Comment: Requests revision to Condition of Certification **TRANS-2 -** Rather than 24 feet of right-of-way along Old Spanish Trail Highway the condition should be revised to specify that the project owner shall provide the necessary right-of-way for acceleration and	Refer to Condition of Certification **TRANS-2** for revised language which addresses right-of-way requirements.
13.5		General Comment: Request revision to the Socioeconomics language to be consistent with the language in the Socioeconomics section.	Staff Agrees- Text has been revised.

13.6		General Comment: Requests a revision to Condition of Certification **TRANS-3** -(**Restoration of All Public Roads, Easements, and Rights-of-Ways**). The condition is different and more stringent than the standard condition that has been applied to similarly situated projects. This condition requires the project owner to restore all public roads that have been damaged due to project related construction activities to "original condition or better in compliance with the applicable jurisdiction's specifications." The verification language differs from the standard condition and raises a number of potential ambiguities in the manner in which it would be applied. To avoid any possible confusion, we urge the Commission to apply the standard condition and verification language.	CEC Staff has revised the language - the phrase or better has been deleted. The COC language was strengthened to address deteriorating roadways during construction of projects.
13.7		General Comment: Requests a revision to Condition of Certificatio**n TRANS 4 (Truck Route).** The condition states that "The project owner shall require all construction truck traffic use State Route 160 to the project site." We recommend that the condition be revised to specify that all construction truck traffic originating from outside of Inyo County shall not use Tecopa Road from east of the project site. We expect that there will be some construction trucks that may originate from within Inyo County and we would not want to have a condition that would inadvertently preclude service or deliveries from Inyo County businesses.	Refer to Condition of Certification **TRANS-4** for revised language.
13.8		General Comment: Requests deletion of COC **TRANS-6 (Transportation of Hazardous Materials**). As with **TRANS-1** the requirement to contract with licensed hazardous material delivery companies is established by law and is the responsibility of the transporter, not the customer, and is unnecessary, burdensome and inconsistent with previous CEC projects.	CEC Staff disagrees with the deletion of this COC. Of the 11 approved solar thermal projects since 2008, this COC has been imposed on five Traffic and Transportation projects. Specifically, Palen; Genesis ; Blythe ; Calico and Palmdale.

13.9		Specific Comment: Page 4.11-9, Level of Service, 3rd and 4th paragraphs: The levels of service (LOS) was calculated using seconds of delay not a volume/capacity (V/C) ratio. Therefore, revise the 2nd paragraph as follows: Based on the traffic volumes, the turning movement counts, and the existing number of lanes at each intersection, the ~~volume/capacity (V/C) ratios and levels of service~~ (LOS) have been determined for each intersection. Traffic and Transportation Table 2 summarizes the intersection ~~roadway~~ LOS criteria based on seconds of delay~~for associated V/C ratios~~.	Staff Agrees - Text revised.
13.10		Specific Comment: Page 4.11-9, Table 2, Level of Service Criteria for Roadways and Intersections: Delete "~~Roadways and~~" in the table title since the definitions are only for roadways. A separate table for roadways and LOS may be warranted.	Staff Agrees - Text revised.
13.11		Specific Comment: Page 4.11-9, Table 2, Level of Service Criteria for Roadways and Intersections, 2nd column, Control Delay (seconds/vehicles): The control delay listed in this column is for intersections.	Staff Agrees - Text revised.
13.12		Specific Comment: Page 4.11-12, Bicycle and Pedestrian Facilities, 2nd paragraph, 1st sentence (note the font in the heading is inconsistent): A Class II bike lane is provided on either side of SR 160. Thus, please revise the first sentence as follows: Due to the remoteness of the area there are no designated bicycle lanes in the area (other than SR 160) or adjacent to HHSEGS.	Staff Agrees - Language Added
13.13		Specific Comment: Page 4.11-14, Item 8: Applicant suggests that this item be deleted because it is not an applicable threshold of significance under CEQA.	Comment Noted - Staff has retained this item as CEC also utilizes LORS used by other Governmental Agencies and in this case FAA.

13.14		Specific Comment: Page 4.11-15, Construction Period Impacts and Mitigation, 1st paragraph, 1st sentence: Only one intersection was analyzed. Suggest the following change: Staff analyzed the proposed HHSEGS's potential traffic impacts by evaluating state route segments, roadway segments, and the intersections of SR 160 and Tecopa Road in the vicinity of the project site.	Staff Agreed and added the requested language. However, language has since been revised based on the October 1, 2012 Updated Workforce Analysis .
13.15		Specific Comment: Page 4.11-15, Construction Workforce Traffic, first two paragraphs: The analysis has been revised to be consistent with revised impacts from using construction truck traffic levels used in the air quality construction impact assessment. Suggest the following changes be made: insert the phrase at the project site between the words workforce and would; revise the number of peak constructon workers from 634 per month to 641; revise the percentage of peak workforce from 82 percent to 86 percent; insert the phrase a peak between the words In addition and approximately; revise the number of workers to construct the gas and transmission lines from 42 to 66; Delete the phrase and linear compliance support.	Staff Agreed and added the requested language. However, language has since been revised based on the October 1, 2012 Updated Workforce Analysis .
13.16		Specific Comment: Page 4.11-16, 4th paragraph: Please revise as follows: revise the total number of daily auto trips from 1,910 to 1,912 and revise the number 860 for morning and afternoon peak hour trips to 863.	Staff Agreed and added the requested language. However, language has since been revised based on the October 1, 2012 Updated Workforce Analysis .
13.17		Specific Comment:Page 4.11-16 and 17, Revise Table 4 - Daily Trips for Automobiles from 1,910 to 1,912; Trucks from 834 to 768; total from 2,744 to 2,680; Automobiles in from 860 to 863; Trucks in from 47 to 43; Automobiles out from 860 to 863; Trucks out from 47 to ; Total out from 907 to 906; add new language in the footnote : Assumes peak of 384 truck deliveries are spread equally throughout the day from 6:00a.m to 6:00p.m. with a 3-hour lag for unloading. Revise Table 5: Morning shift Non-Craft from 38 to 41; Morning Shift Total Workforce from 930 to 933	Staff Agreed and added the requested language. However, language has since been revised based on the October 1, 2012 Updated Workforce Analysis .

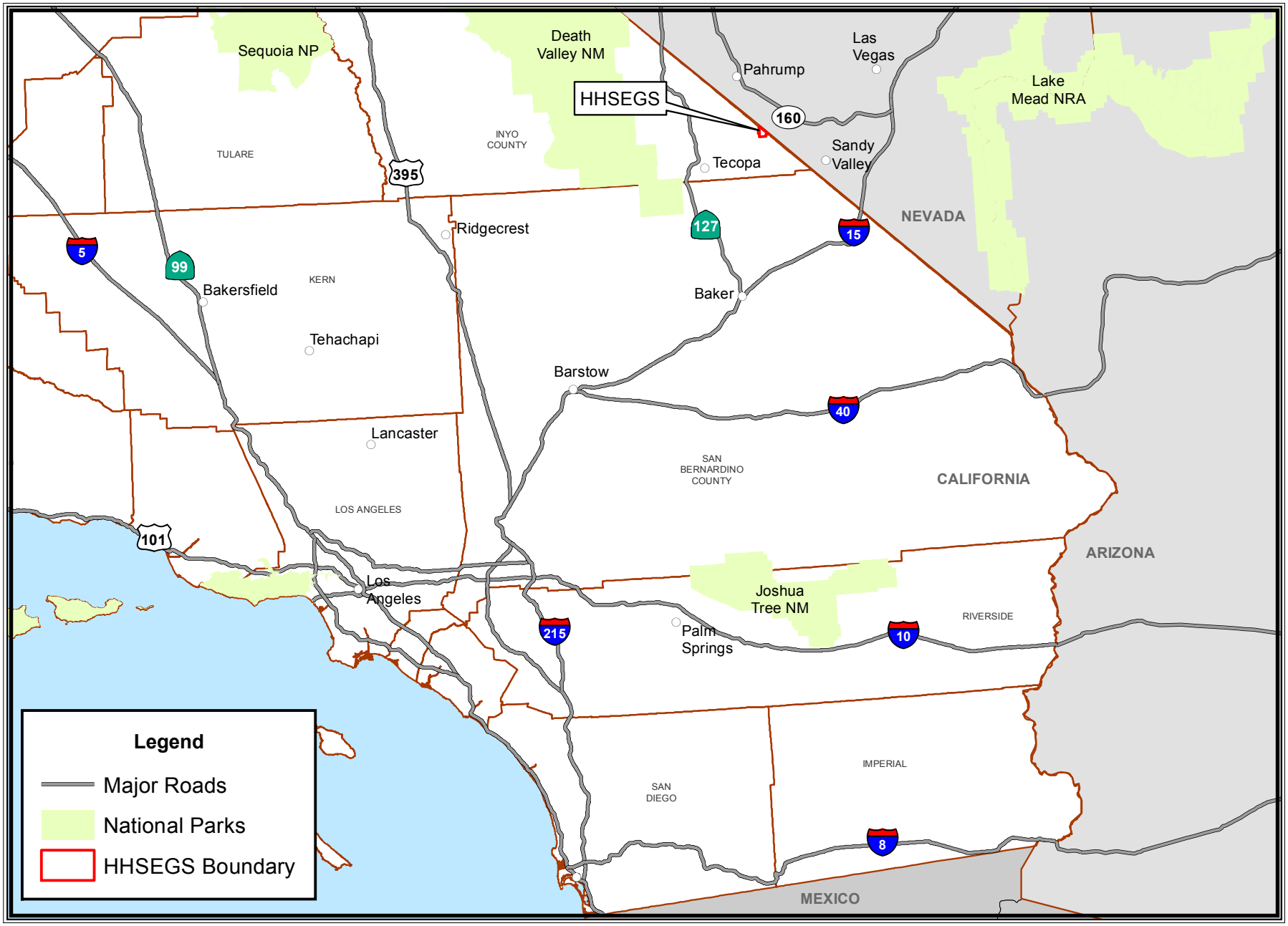
13.18		Specific Comment: Page 4.11-17, 1st paragraph following Table 5 - Revise peak trip generation numbers from ~~860~~ to 933;	Staff Agreed and added the requested language. However, language has since been revised based on the October 1, 2012 Updated Workforce Analysis .
13.19		Specific Comment: Page 4.11-18- Revise Tables 6 and 7 text to: Please note that in Table 7, LOS was recalculated with revised trips. LOS changed slightly during AM peak hour. LOS remained the same during PM peak hour.	Staff Agreed and added the requested language. However, language has since been revised based on the October 1, 2012 Updated Workforce Analysis .
13.20		Specific Comment: Pages 4.1-20 through 4.1-22, Construction Truck Traffic: Table 8 represents trucks per month, instead of trucks per day. The peak number of trucks in 1 day is estimated to be 90 trucks. However, to be consistent with the Air Quality analysis, a peak of 384 truck deliveries (768 truck trips) per day was used in the following revised analysis. As a result of our revised analysis, please change this section to read as follows. Also, it is unrealistic to think that trucking companies would turn their trucks and cargo over to unlicensed drivers. This is cautiousness beyond reality and COC **TRANS 1** should be deleted. Please add the following language: Monthly truck deliveries would peak at 717 trucks during Month 5. Peak daily truck deliveries has been estimated using delivery records from construction at Ivanpah SEGS. During the period October 2010 through April 2012, the highest number of daily truck deliveries at Ivanpah SEGS was 72. Adding a 25 percent contingency for HHSEGS would yield a maximum of 90 delivery trucks on a peak day. The analysis of construction deliveries for the Air Quality assessment used a more-conservative method to determine the peak daily number of delivery trucks, using a calculation based on truck volumes during the highest 12 consecutive months. The result was a conservative estimate of 384 deliveries per day, or 768 one-way truck trips per day. To be conservative and consistent with the Air Quality analysis, this much larger value was used in the revised traffic analysis.	Staff Agrees- Numbers revised based on the PSA comments and the October 1, 2012 Updated Workforce Analysis.

13.21		Specific Comment: Page 4.1-22 and 4.11-23 Construction Truck Traffic- Requests new text and numbers based on the applicant's revised analysis.	Staff Agreed and added the revised numbers and language. However, language and numbers has since been revised based on the October 1, 2012 Updated Workforce Analysis .
13.22		Specific Comment: Page 4.11 24, Workforce Traffic, 5th paragraph: Please clarify the last paragraph as follows: The operation employees would generate 240 vehicle daily trips (in/out).	Staff Agrees - Text revised.
13.23		Specific Comment: Page 4.11 25, Truck Traffic and Hazardous Materials Delivery, 3rd paragraph, 1st sentence: This sentence is incorrect. The Safety Management Plan required pursuant to Condition HAZ 3 pertains to the off loading of hazardous materials on the HHSEGS site. It does not pertain to the delivery of hazardous materials while in transit to the site.	Text revised to be consistent with Hazardous Materials Management Section of the FSA.
13.24		Specific Comment: Page 4.11 -27, Compliance with LORS, Table 8: This table should be numbered Table 9. Also, in the row "Section 7.2.4 Roadways and Highways – Policy RH 1.4 Level of Service." Please clarify whether the "Description" is intended for permanent development or just during temporary construction.	Staff Agrees - Table number revised; LOS C is the minimum LOS on all roadways in the County of Inyo for both permanent development and construction.
13.25		Specific Comment: Page 4.11 30, Traffic Impacts, Table 9: This table needs to be renumbered as Table 10.	Staff Agreed and renumbered. However, the Table has since been revised based on the October 1, 2012 Updated Workforce Analysis .

13.26		Specific Comment: Pages 4.11 32 and 33, Hidden Hills Transmission Project, 1st paragraph: Please start a new subsection called “Summary” after the first sentence. This paragraph reads like the Hidden Hills Transmission Project would require 1,622 workers.	Staff Agrees - Heading added for clarification.
13.27		Specific Comment: Page 4.11 33, Noteworthy Public Benefits: Requests the following be included: These improvements could include: Re engineering and repaving Tecopa Road from SR 160 to the project site and adding a right turn pocket at Tecopa Road and SR 160. Increased LOS of improved areas after construction is completed. Adding deceleration lanes to Tecopa Road at the project would improve the roadway along the project frontage with enhanced traffic patterns.	Comment Noted- Staff did not include these as Noteworthy Public Benefits as but for HHSEGS the improved infrasctructure would not be warranted.
13.28		Specific Comment: Page 4.11 33, Conclusions, 2nd and 3rd paragraphs: The information about Socioeconomics is incorrect. There are no Census blocks within the 6 mile radius that have minority populations greater than 50 percent. See also Page 4.9 5 of the Socioeconomics section of the PSA, under the heading, “Minority Populations.”	Staff Agrees - Statement corrected.

TRAFFIC AND TRANSPORTATION - FIGURE 1

Hidden Hills Solar Electric Generating System (HHSEGS) - Regional Street Network



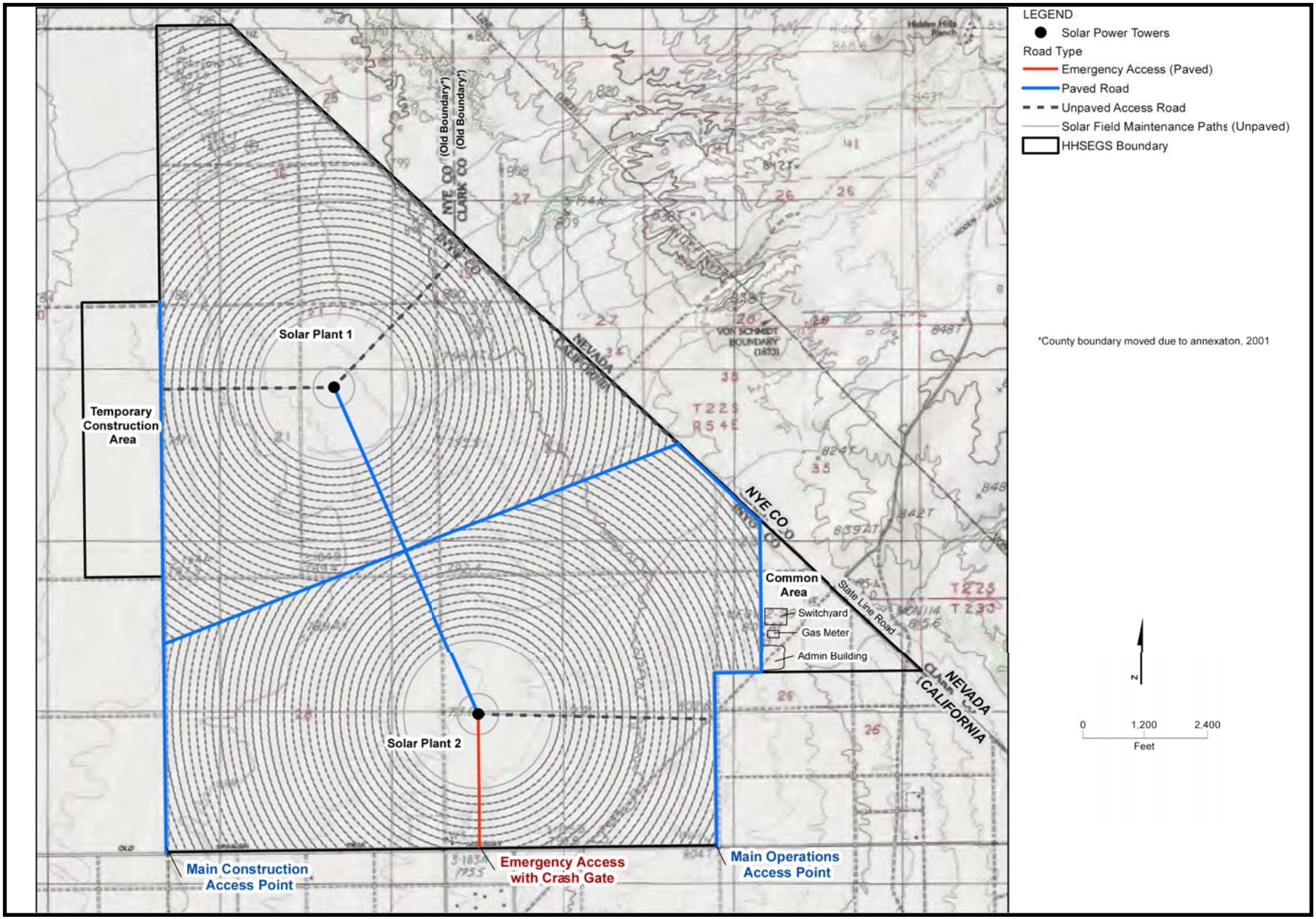
TRAFFIC AND TRANSPORTATION

CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL, MultiNet

TRAFFIC AND TRANSPORTATION - FIGURE 2

Hidden Hills Solar Electric Generating System (HHSEGS) - Access Roads and Paved Internal Roadways



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL \ DR

TRAFFIC AND TRANSPORTATION - FIGURE 3

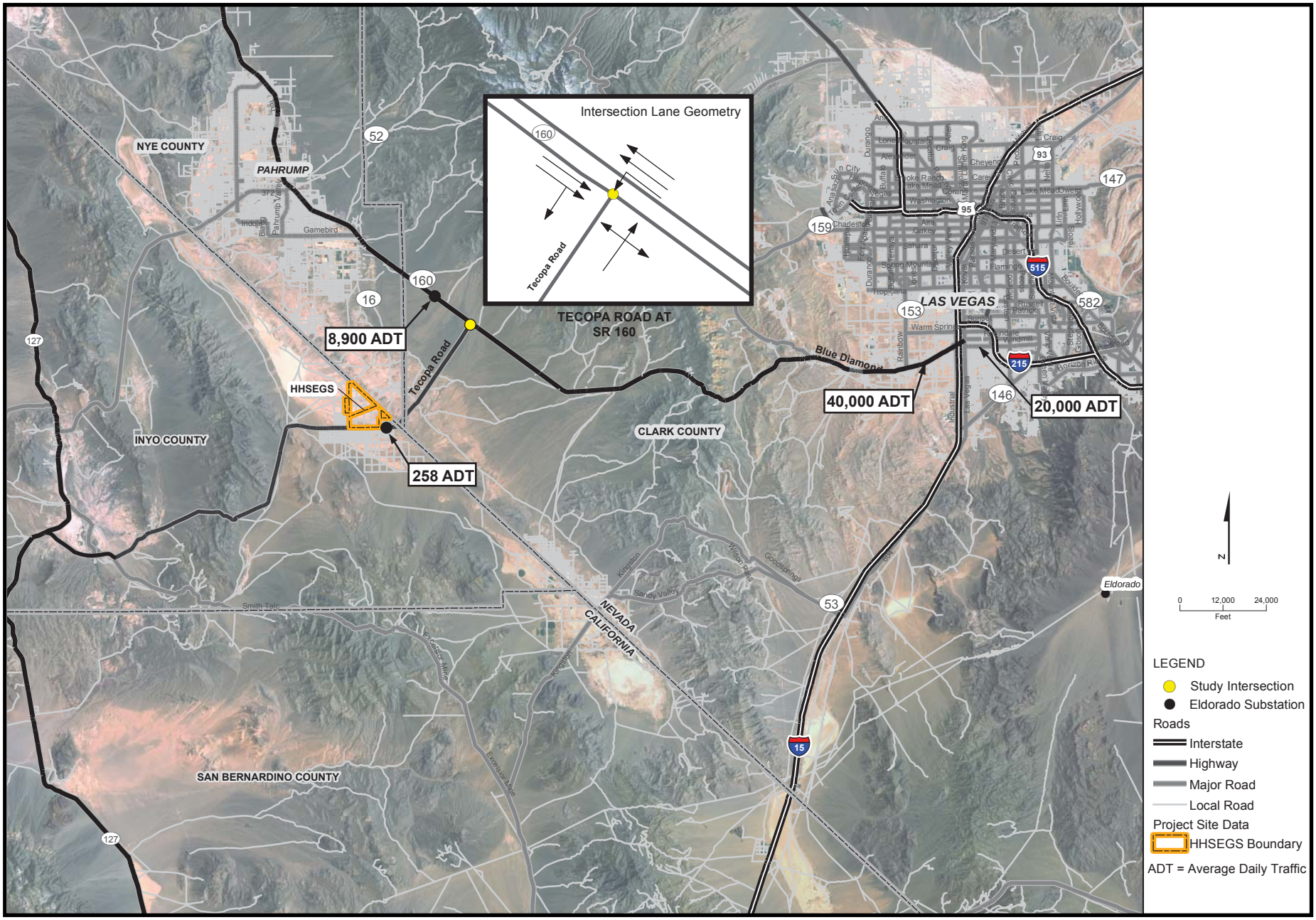
Hidden Hills Solar Electric Generating System (HHSEGS) - Local Street Network

CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL, Open Street Map

TRAFFIC AND TRANSPORTATION - FIGURE 4

Hidden Hills Solar Electric Generating System (HHSEGS) - Local Street Network ADT



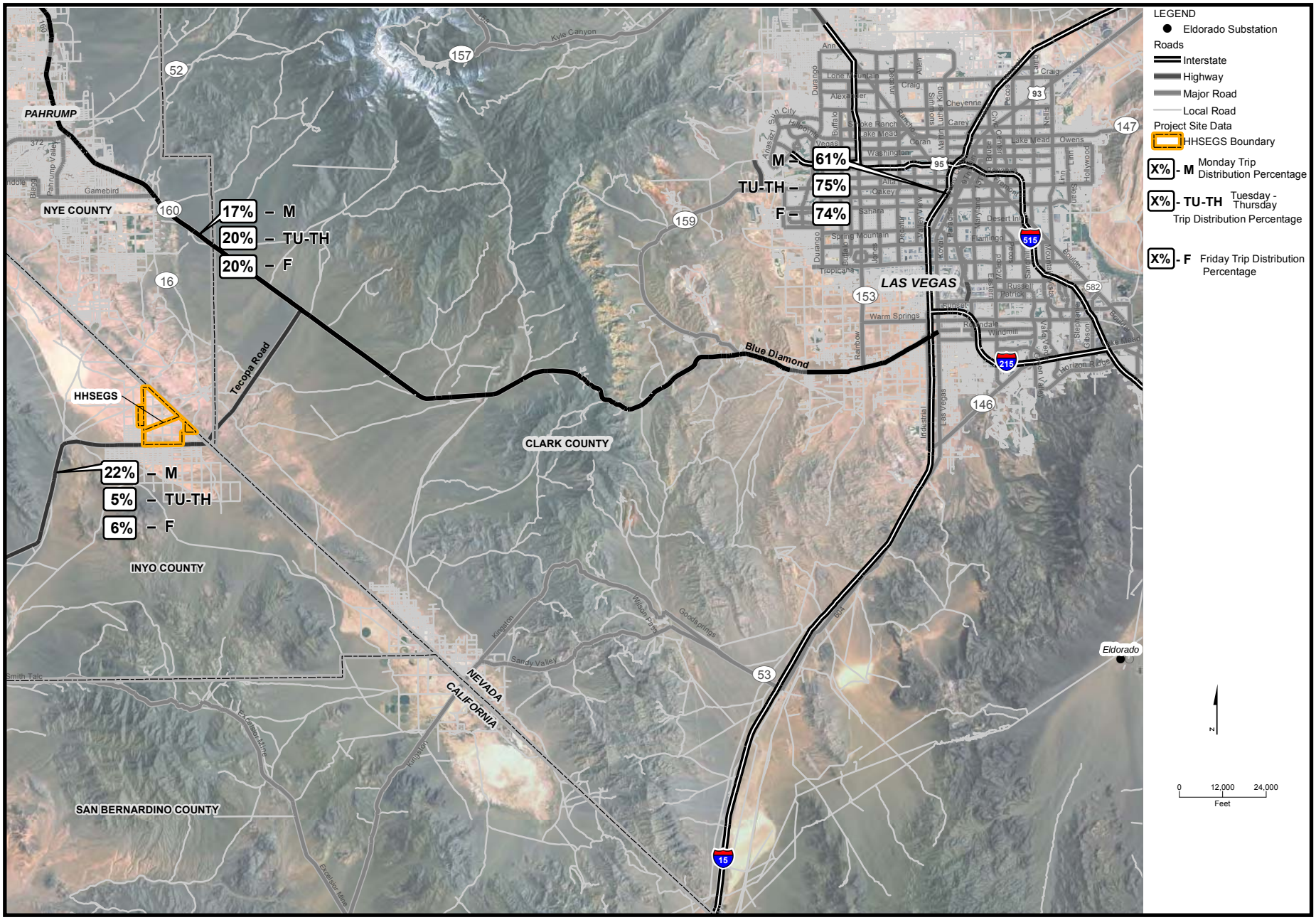
TRAFFIC AND TRANSPORTATION

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: AFC Figure 5.12-2

TRAFFIC AND TRANSPORTATION - FIGURE 5

Hidden Hills Solar Electric Generating System (HHSEGS) - Project Trip Distribution Percentages AM Peak Hour

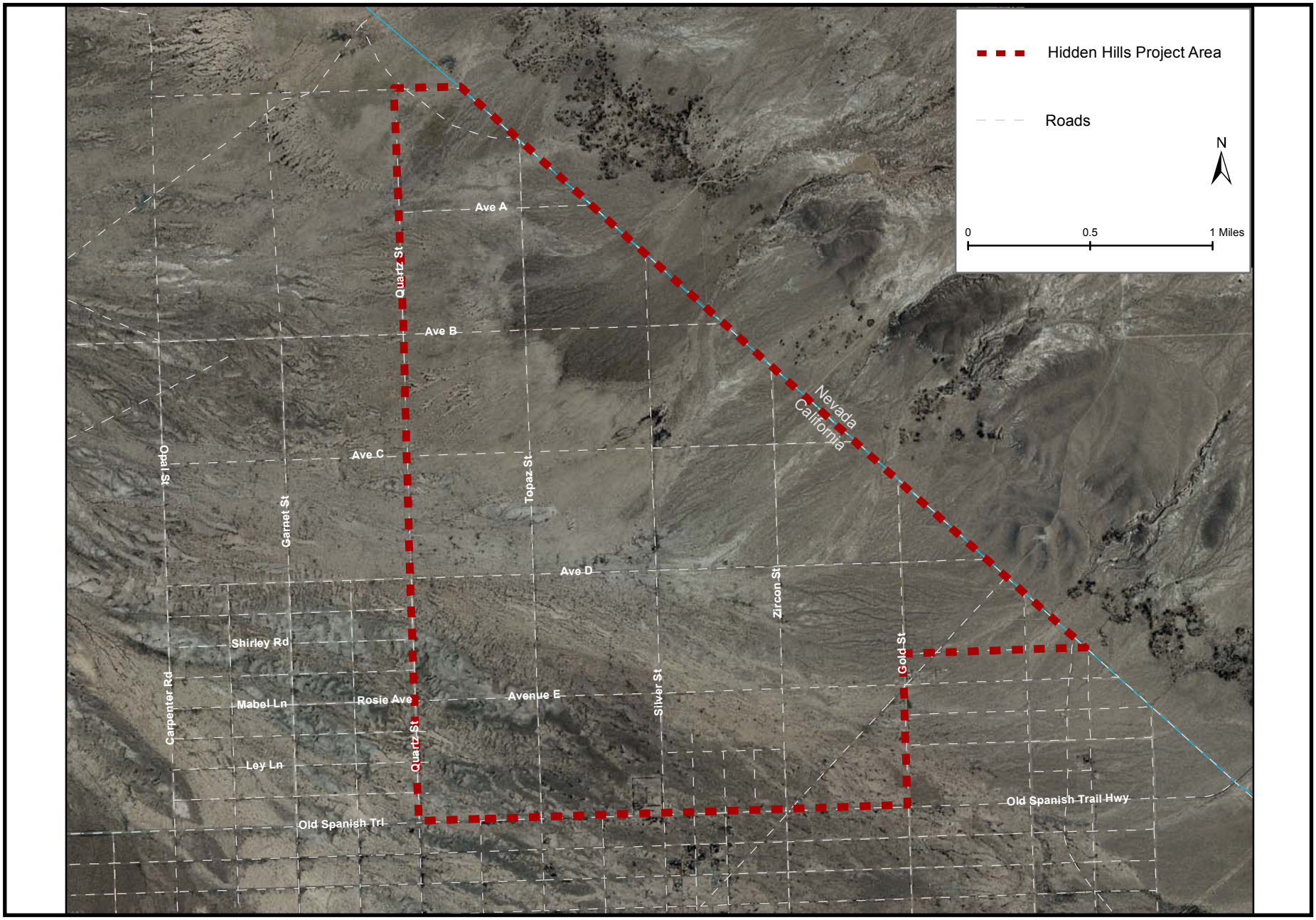


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: 2012-10-01 Updated Workforce Analysis TN-67434 - Fig 5.12-4AR1

TRAFFIC AND TRANSPORTATION - FIGURE 6

Hidden Hills Solar Electric Generating System (HHSEGS) - Grid Pattern of Roads within the Project Area.

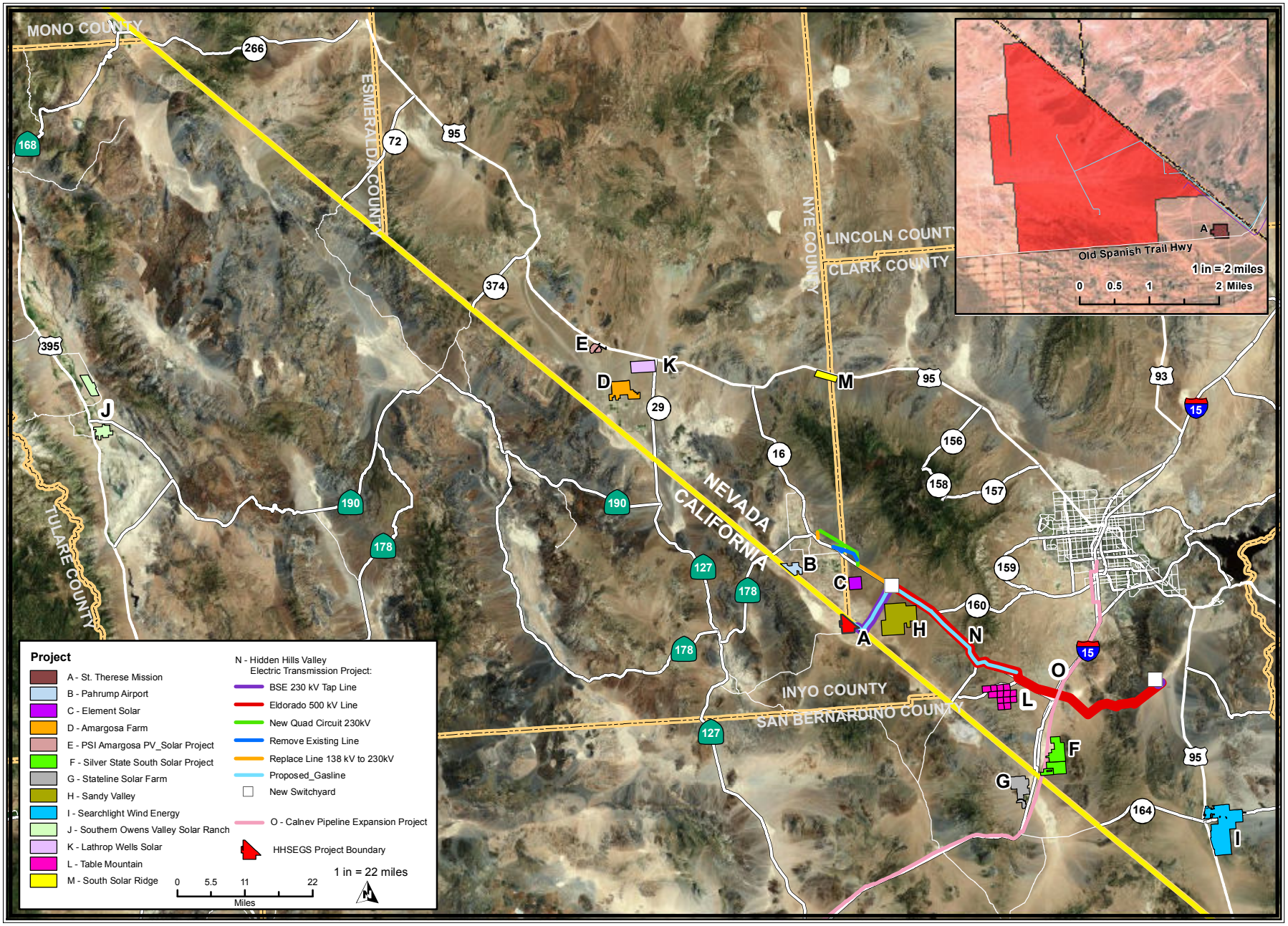


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Inyo County

TRAFFIC AND TRANSPORTATION - FIGURE 7

Hidden Hills Solar Electric Generating System (HHSEGS) - Master List of Cumulative Projects



CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: BLM Southern Nevada District - Renewable Energy in Southern Nevada, BLM California - Renewable Energy Priority Projects, and Los Angeles Department of Water and Power.

TRAFFIC AND TRANSPORTATION - FIGURE 8

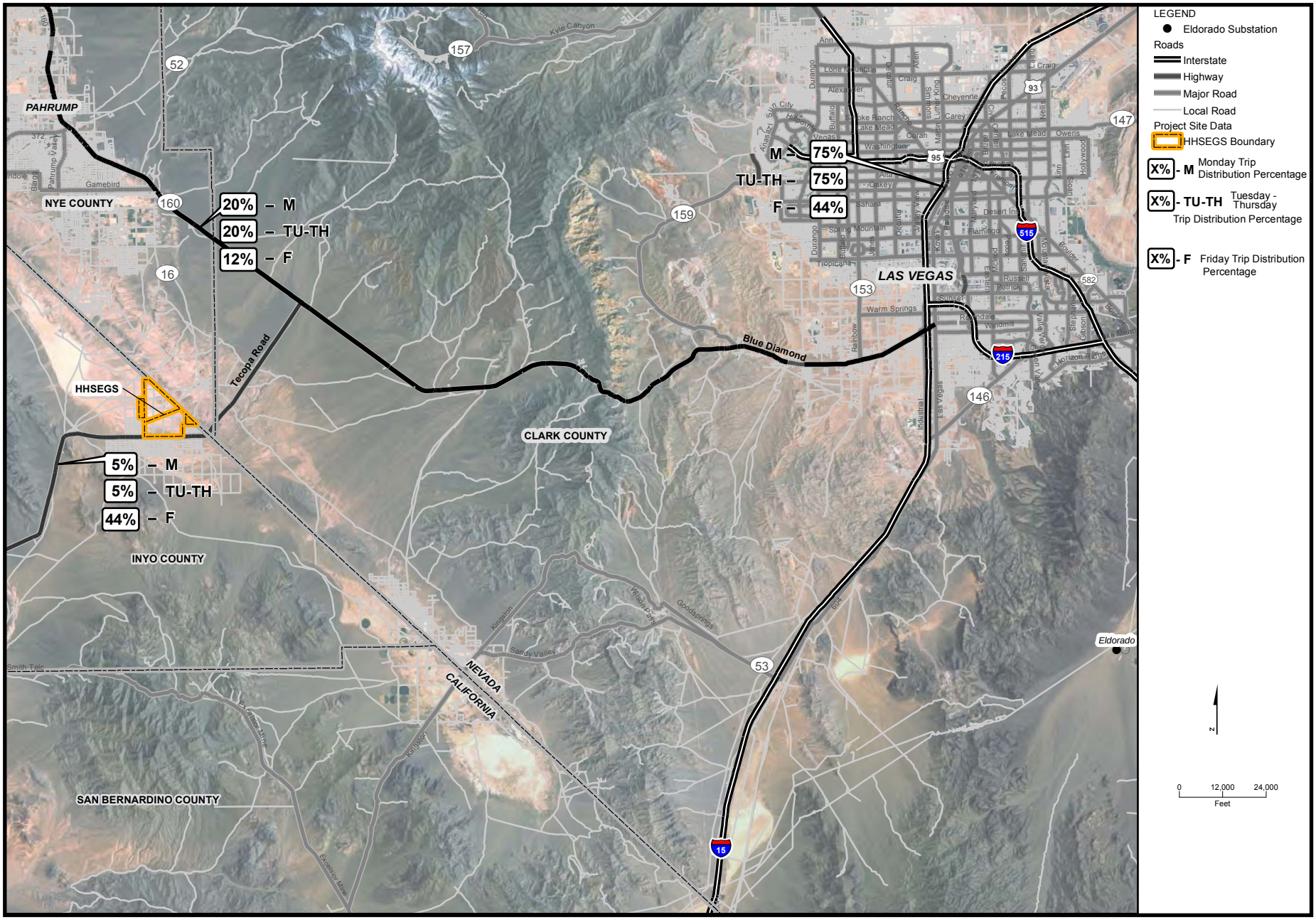
Hidden Hills Solar Electric Generating System (HHSEGS) - State Route 127 Segment Map

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CA DOT

TRAFFIC AND TRANSPORTATION - FIGURE 9

Hidden Hills Solar Electric Generating System (HHSEGS) - Project Trip Distribution Percentages PM Peak Hour

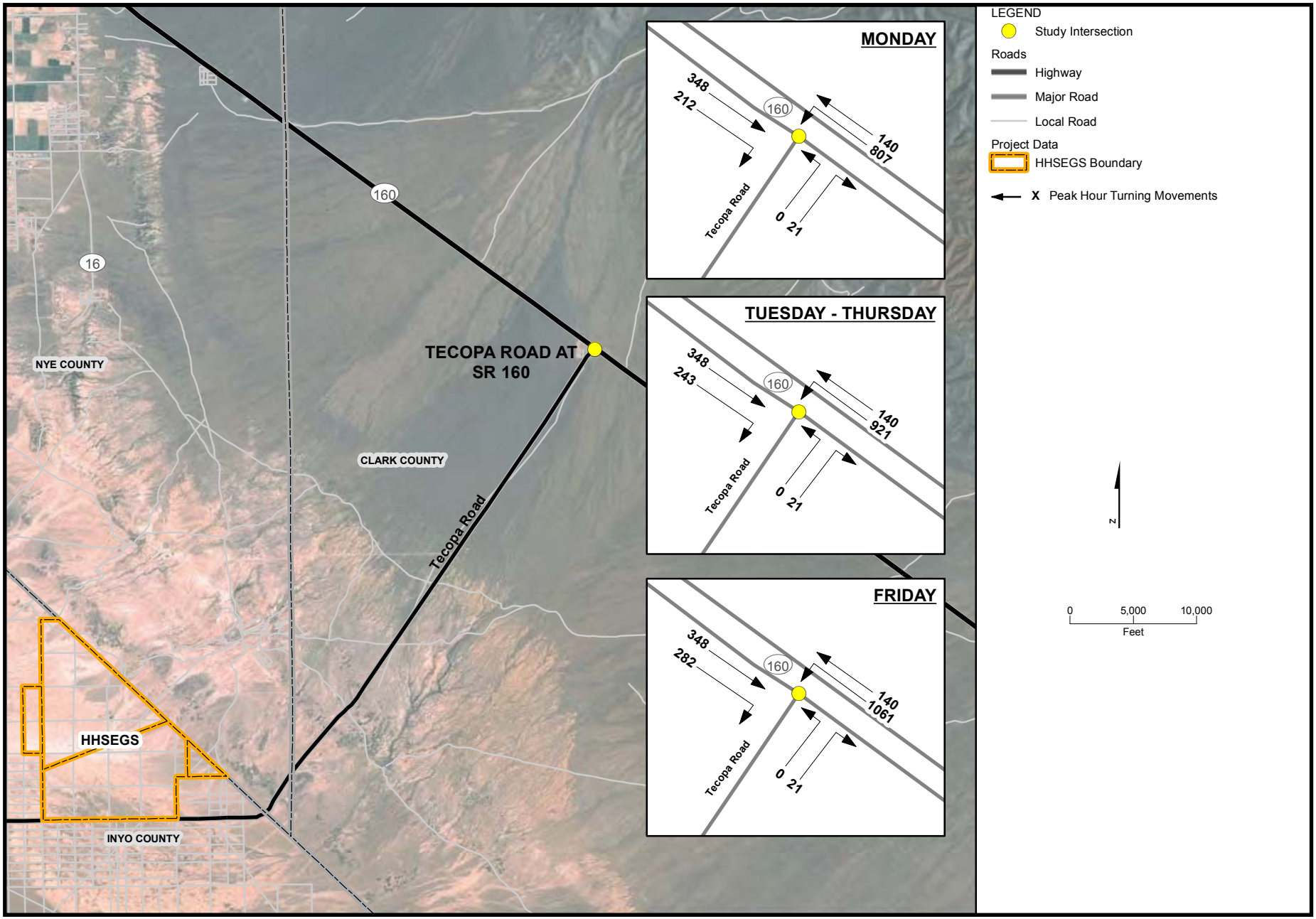


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: 2012-10-01 Updated Workforce Analysis TN-67434 - Fig 5.12-4BR1

TRAFFIC AND TRANSPORTATION - FIGURE 10

Hidden Hills Solar Electric Generating System (HHSEGS) - Existing + Construction Project AM Peak Hour Intersection Volumes



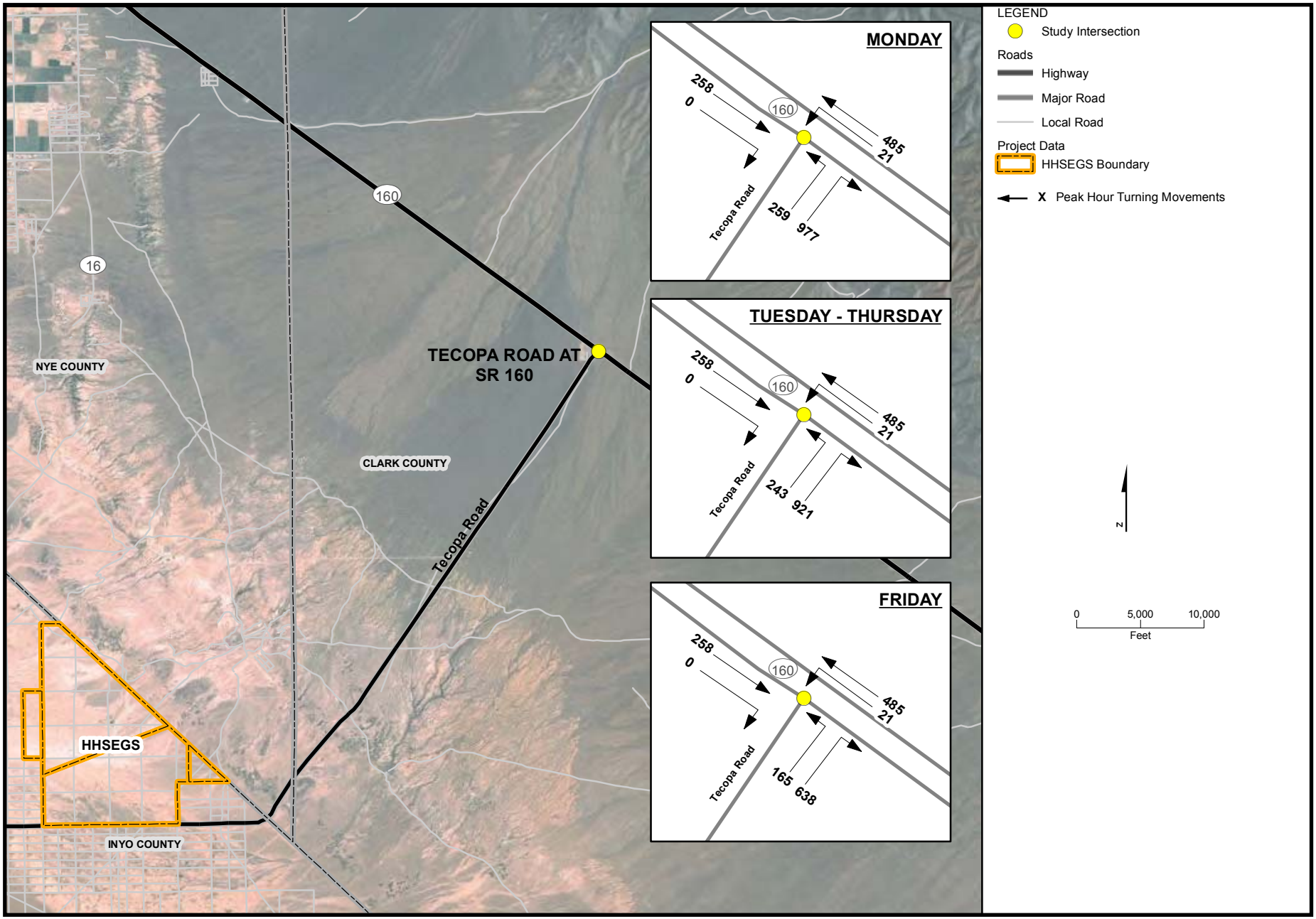
TRAFFIC AND TRANSPORTATION

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: 2012-10-01 Updated Workforce Analysis TN-67434 - Fig 5.12-5R1

TRAFFIC AND TRANSPORTATION - FIGURE 11

Hidden Hills Solar Electric Generating System (HHSEGS) - Existing + Construction Project PM Peak Hour Intersection Volumes



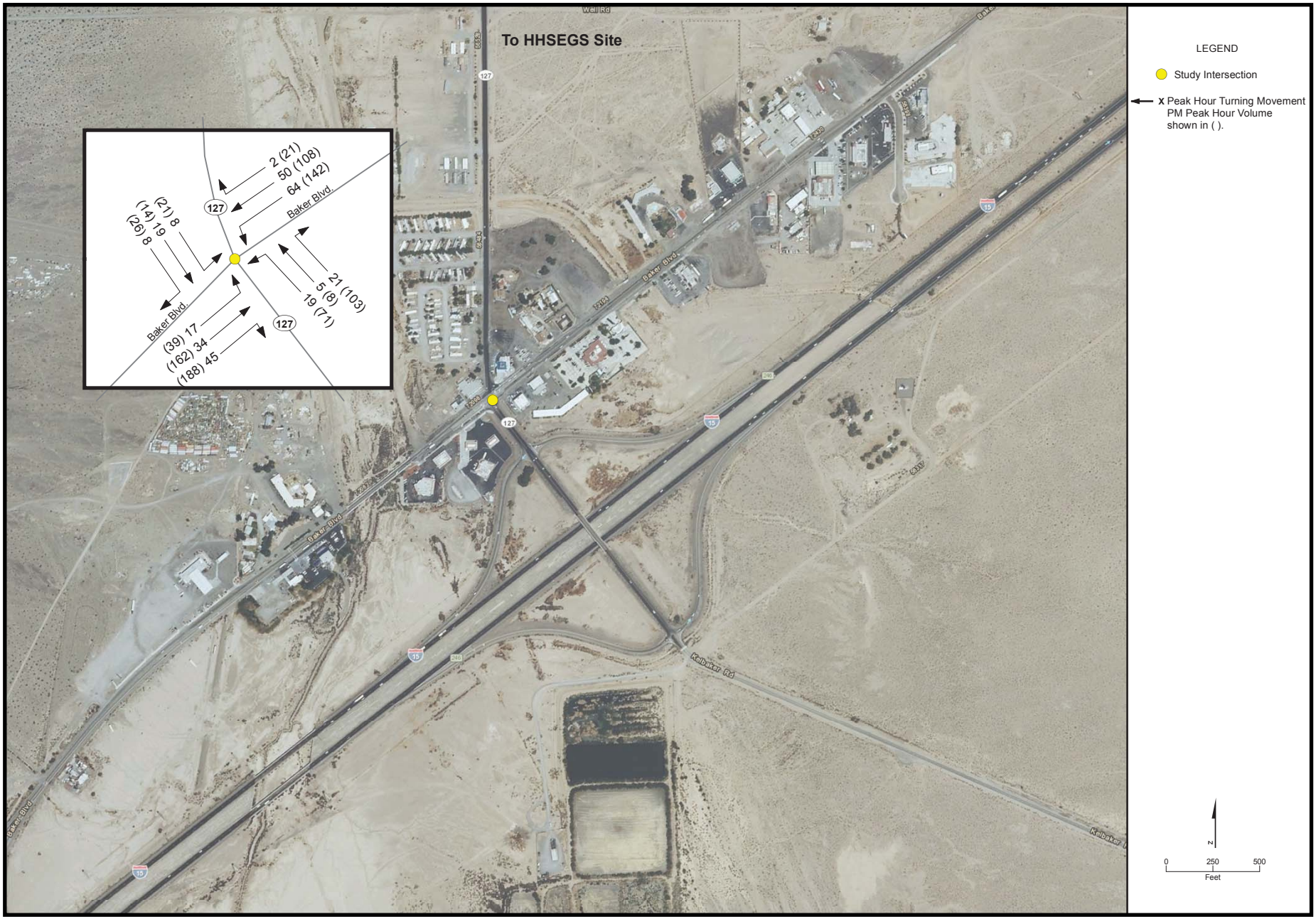
TRAFFIC AND TRANSPORTATION

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: 2012-10-01 Updated Workforce Analysis TN-67434 - Fig 5.12-6R1

TRAFFIC AND TRANSPORTATION - FIGURE 12

Hidden Hills Solar Electric Generating System (HHSEGS) - Existing Peak Hour Intersection Volume

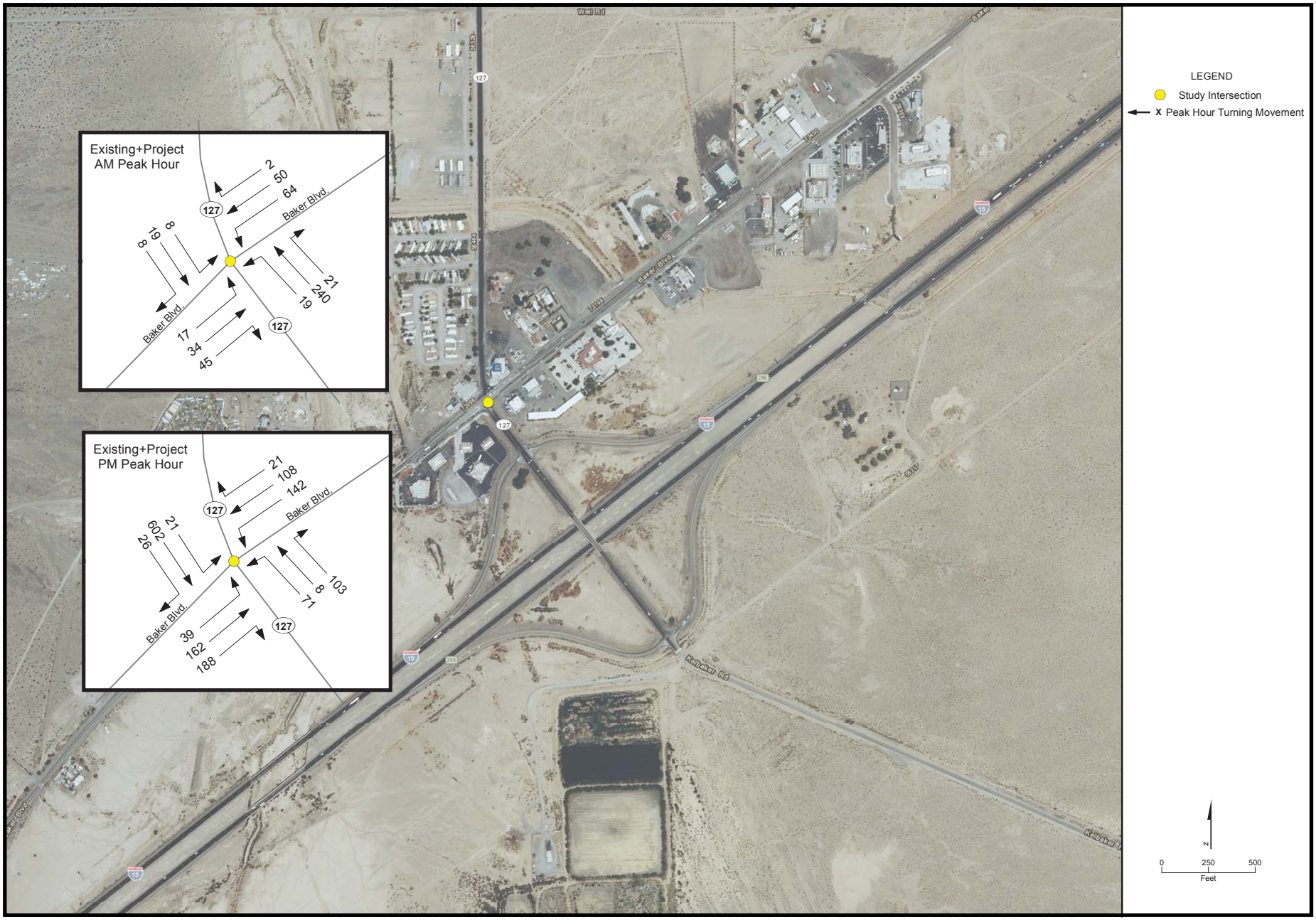


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2M HILL 12/10/12

TRAFFIC AND TRANSPORTATION - FIGURE 13

Hidden Hills Solar Electric Generating System (HHSEGS) - Existing + Project Peak Hour Intersection Volume



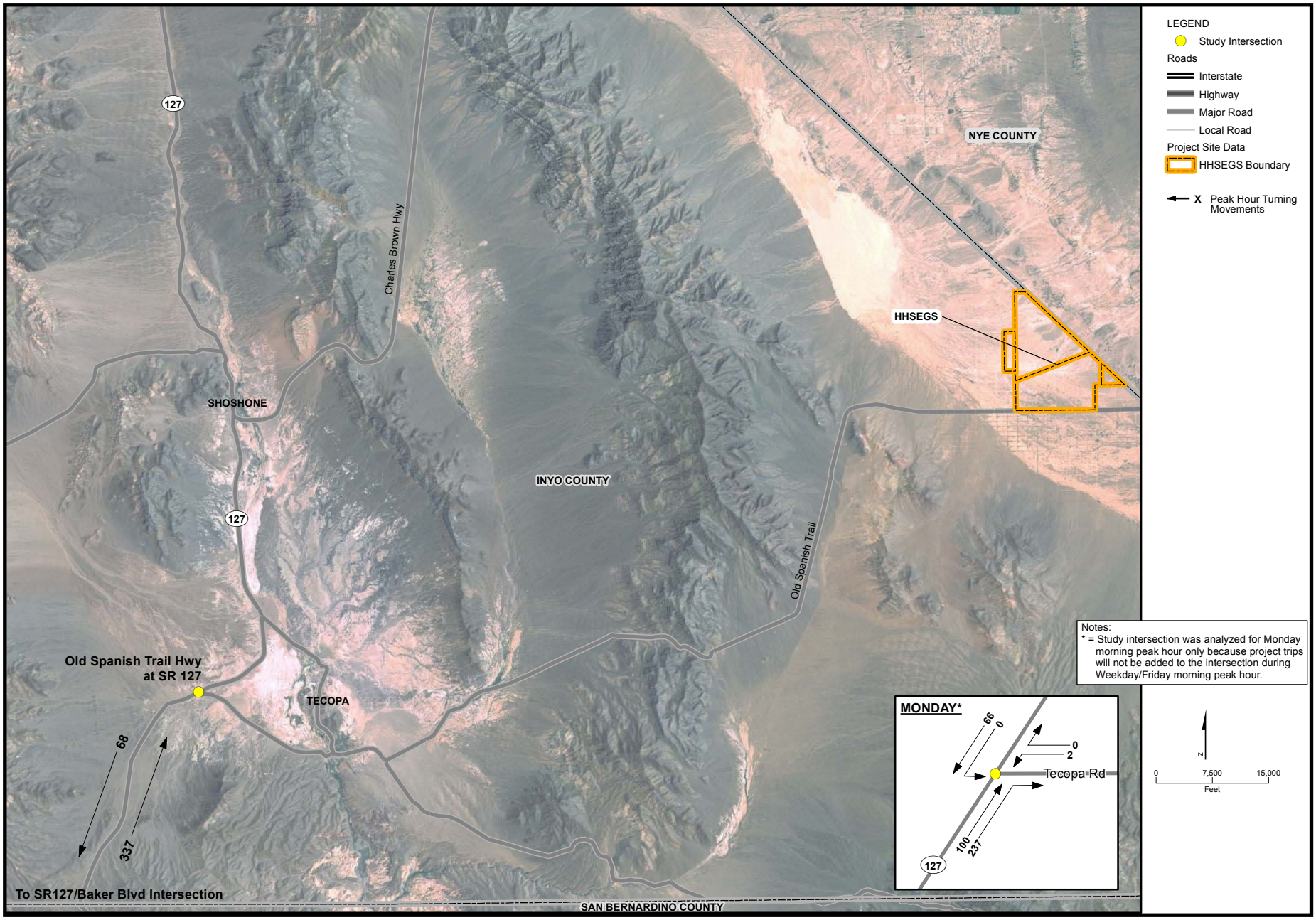
CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL 12/10/12

TRAFFIC AND TRANSPORTATION

TRAFFIC AND TRANSPORTATION - FIGURE 14

Hidden Hills Solar Electric Generating System (HHSEGS) - Existing + Construction Project AM Peak Hour Intersection Volume

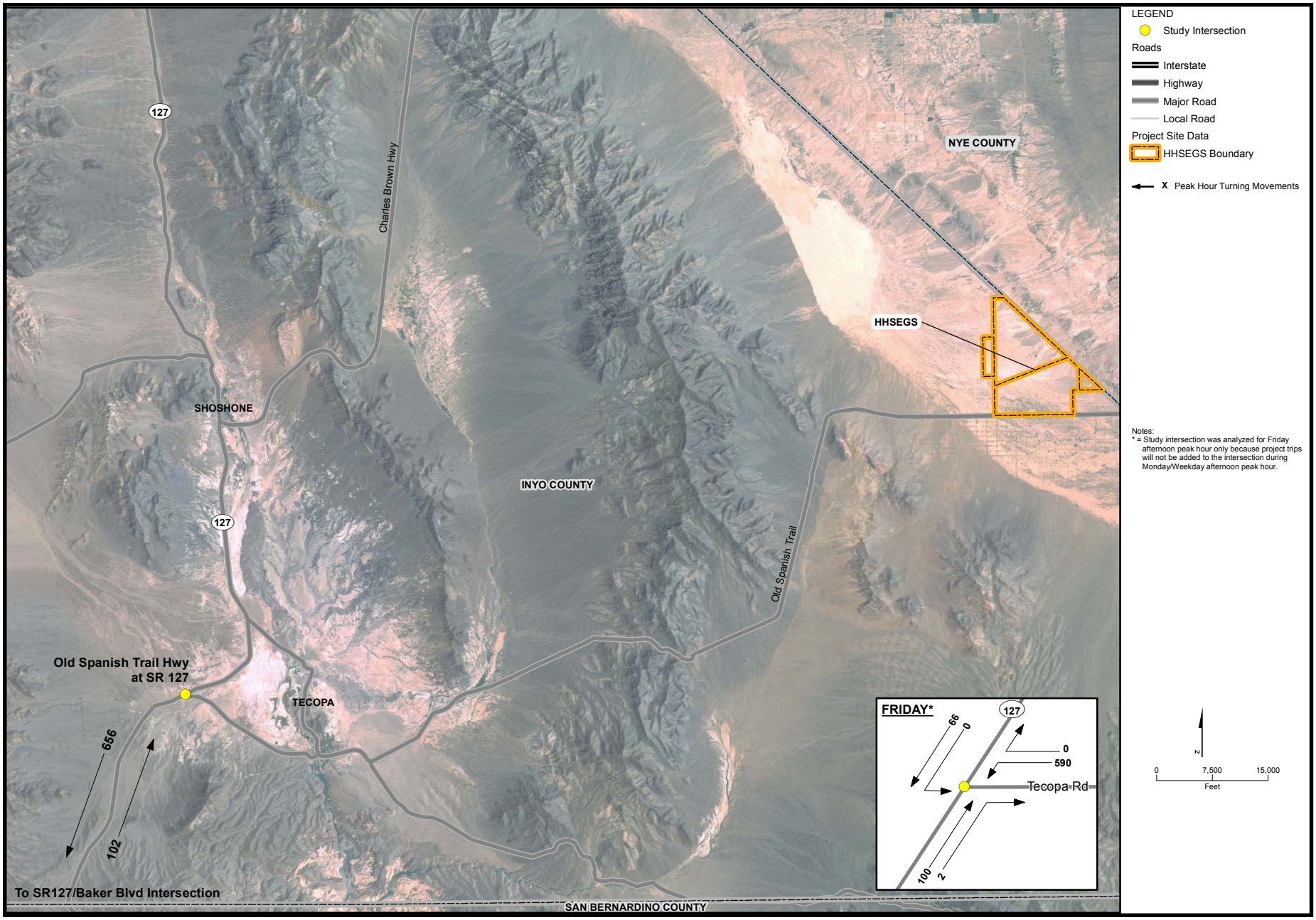


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL - Figure 5.12-5b Updated Workforce Analysis

TRAFFIC AND TRANSPORTATION - FIGURE 15

Hidden Hills Solar Electric Generating System (HHSEGS) - Existing + Construction Project PM Peak Hour Intersection Volume



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL - Figure 5.12-6b Updated Workforce Analysis

TRANSMISSION LINE SAFETY AND NUISANCE

Testimony of Obed Odoemelam, Ph.D.

SUMMARY OF CONCLUSIONS

The California Energy Commission staff concludes that construction and operation of the transmission line for the Hidden Hills Solar Electric Generating System (HHSEGS) would not pose an aviation hazard according to the current FAA criteria. In addition, compliance with the requirements outlined in the proposed conditions of certification would minimize the potential for nuisance and hazardous shocks and maintain the generated fields within levels not associated with radio-frequency interference or audible noise. The proposed line design, routing, and operational plan would be adequate to ensure that the generated electric and magnetic fields are managed to an extent the California Public Utilities Commission considers appropriate in light of the available health effects information. The line would be operated to comply with all federal, state, and local laws, ordinances, regulations, and standards related to transmission line safety and nuisance if staff's recommended conditions of certification are adopted and implemented.

This assessment is limited to the portion of the HHSEGS line located within California. The environmental aspects of the section to be located in Nevada will be assessed by the U.S. Bureau of Land Management (BLM).

INTRODUCTION

The purpose of this analysis is to assess the proposed HHSEGS transmission line design, routing, and operational plan to determine whether the related field and non-field impacts would constitute a significant environmental hazard in the area around the route within California. Similar impacts within Nevada will be assessed by the U.S Bureau of Land Management. All related health and safety laws, ordinances, regulations, and standards are currently aimed at minimizing these impacts. Staff's analysis focuses on the following issues taking into account both the physical presence of each of the two considered lines and the physical interactions of their respective electric and magnetic fields:

- aviation safety,
- interference with radio-frequency communication,
- audible noise,
- fire hazards,
- hazardous shocks,
- nuisance shocks, and
- electric and magnetic field (EMF) exposure.

The following federal, state, and local laws and policies apply to the control of the field and nonfield impacts of electric power lines in California. Staff's analysis examines the project's compliance with these requirements.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

TRANSMISSION LINE SAFETY AND NUISANCE (TLSN) Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	Description
Aviation Safety	
Federal	
Title 14, Part 77 of the Code of Federal Regulations (CFR),"Objects Affecting the Navigable Air Space"	Describes the criteria used to determine the need for a Federal Aviation Administration (FAA) "Notice of Proposed Construction or Alteration" in cases of potential obstruction hazards.
FAA Advisory Circular No. 70/7460-1G, "Proposed Construction and/or Alteration of Objects that May Affect the Navigation Space"	Addresses the need to file the "Notice of Proposed Construction or Alteration" (Form 7640) with the FAA in cases of potential for an obstruction hazard.
FAA Advisory Circular 70/460-1G, "Obstruction Marking and Lighting"	Describes the FAA standards for marking and lighting objects that may pose a navigation hazard as established using the criteria in Title 14, Part 77 of the CFR.
Interference with Radio Frequency Communication	
Federal	
Title 47, CFR, section 15.2524, Federal Communications Commission (FCC)	Prohibits operation of devices that can interfere with radio-frequency communication.
State	
California Public Utilities Commission (CPUC) General Order 52 (GO-52)	Governs the construction and operation of power and communications lines to prevent or mitigate interference.
Audible Noise	
Local	
Noise Limits by the Inyo County Planning Commission.	Establishes noise standards for the different land uses in the county.
Inyo County General Plan.	Establishes exterior noise standards for receptors in the county.
Hazardous and Nuisance Shocks	
State	
CPUC GO-95, "Rules for Overhead Electric Line Construction"	Governs clearance requirements to prevent hazardous shocks, grounding techniques to minimize nuisance shocks, and maintenance and inspection requirements.
CPUC GO 128. Rules for Construction of Underground Electric Supply and Communications Systems.	Applies to the design construction of underground transmission lines. Specifically establishes requirements and minimum standards to be used for the underground installation AC power and communication circuits.

Title 8, California Code of Regulations (CCR) section 2700 et seq. “High Voltage Safety Orders”	Specifies requirements and minimum standards for safely installing, operating, working around, and maintaining electrical installations and equipment.
National Electrical Safety Code	Specifies grounding procedures to limit nuisance shocks. Also specifies minimum conductor ground clearances.
Industry Standards	
Institute of Electrical and Electronics Engineers (IEEE) 1119, “IEEE Guide for Fence Safety Clearances in Electric-Supply Stations”	Specifies the guidelines for grounding-related practices within the right-of-way and substations.
Electric and Magnetic Fields	
State	
CPUC GO-131-D, ”Rules for Planning and Construction of Electric Generation Line and Substation Facilities in California”	Specifies application and noticing requirements for new line construction including EMF reduction.
CPUC Decision 93-11-013	Specifies CPUC requirements for reducing power frequency electric and magnetic fields.
Industry Standards	
American National Standards Institute (ANSI/IEEE) 644-1944 Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields from AC Power Lines	Specifies standard procedures for measuring electric and magnetic fields from an operating electric line.
Fire Hazards	
State	
14 CCR sections 1250–1258, “Fire Prevention Standards for Electric Utilities”	Provides specific exemptions from electric pole and tower firebreak and conductor clearance standards and specifies when and where standards apply.

SETTING

As noted in the **Project Description** section, the proposed HHSEGS site would be 3,097 acres of privately owned land in unincorporated Inyo County California, adjacent to the Nevada border. The site is approximately 8 miles directly south of Pahrump, Nevada and 45 miles northwest of Las Vegas, Nevada. The project would consist of two solar plants: the northern solar plant (Solar Plant 1 occupying 1,483 acres or 2.3 square miles) and the southern solar plant (Solar Plant 2 occupying 1,510 acres or 2.4 square miles). There would be a commonly shared area of 103 acres between the two plants to accommodate an administration, warehouse, and a maintenance complex together with a common on-site switchyard. As more fully discussed by the applicant (HHSEGS 2011a, p. 3-3) the generated power would be transmitted to the Valley Electric Association (VEA) system from each plant’s power block, first to the common on-site switchyard, and then across the California/Nevada line into the area Nevada power grid. Each plant’s line would begin at the power block as an underground line and extend through the heliostat field to emerge at a transition point into an

overhead configuration. It is from this transition point that the line would extend to the on-site switchyard.

The applicant's chosen option for further transmission into the Nevada grid is the line exiting from the common on-site switchyard on the eastern side of the HHSEGS site and stretching 900 feet on the California side before crossing into Nevada. It is only the 900-foot overhead portion within California that is assessed in this staff report together with the on-site underground sections running beneath the heliostat fields. The potential impacts from the segments within the state of Nevada would be assessed by BLM under the requirements of the National Environmental Policy Act (NEPA) of 1969 (HHSG 2011a, pp. 3-2 and 3-3).

The area around HHSEGS and its proposed transmission line is open undisturbed desert land with relatively sparse vegetation and no nearby residences. The nearest residence to the proposed power blocks would be approximately 3,500 feet south of Solar Plant 2, and about 950 feet south of the site's southern boundary. The absence of residences in the immediate line vicinity means that there would not be the types of residential field exposure at the root of the health concern of recent years. That would leave only the potential short-term worker exposures or exposure to an individual crossing over the line.

PROJECT DESCRIPTION

The environmental impacts of the proposed connecting line within California are best assessed separately as impacts from the on-site underground sections and impacts from the noted 900-foot segment from the common on-site switchyard to the California/Nevada border which would mark the end of the segment under California's jurisdiction. The complete project line would be a 10-mile 230-kV transmission line stretching from its noted origination point at the HHSEGS on-site 230-kV switchyard, and would cross the California/Nevada line, avoiding the mesquite vegetation to the south, and continue east for approximately 1.5 miles until reaching Tecopa Road from where it would extend northeastward on a path parallel to Tacopa Road until it reaches the new Valley Electric Association (VEA) Substation (the Crazy Eye Tap Substation) located immediately east of the Tecopa Road/SR 160 intersection in Clark County Nevada. The Crazy Eye Tap Substation would interconnect to the existing VEA Pahrump-Bob Tap 230-kV line connected to the Colorado Substation with a 1-mile line.

The proposed line would be designed, built and operated by the applicant according to the guidelines of the major area utility, which is the Valley Electric Association (VEA). Specifications in VEA design document (SCE 2004) ensure safety, efficiency, reliability and maintainability for underground and overhead lines (HHSG 2011a pp. and 3-4). The requirement for design according to the guidelines of the area's major utility is current CPUC policy on line field management.

The underground segment of the on-site line for Solar 1 would be approximately 3,800 feet (0.7 miles) while the overhead segment would be 10,275 feet or 1.9 miles. For Solar Plant 2, the equivalent underground segment would be 7,300 feet (1.4 miles) while the remaining overhead portion would be 3,270 feet or 0.6 miles.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHODS AND THRESHOLDS FOR DETERMINING SIGNIFICANCE

The potential magnitude of the line impacts of concern in this staff analysis depends on compliance with the listed design-related LORS and industry practices. These LORS and practices have been established to maintain impacts below levels of potential significance. Thus, if staff determines that the project would comply with applicable LORS, we would conclude that any transmission line-related safety and nuisance impacts would be less than significant for either candidate line. The nature of these individual impacts is discussed below together with the potential for compliance with the LORS that apply.

DIRECT IMPACTS AND MITIGATION

Aviation Safety

Any potential hazard to area aircraft would relate to the potential for collision in the navigable airspace. The related requirements in **TLSN Table 1** establish the standards for assessing the potential for obstruction hazards within the navigable space and establish the criteria for determining when to notify the FAA about such hazards. These regulations require FAA notification in cases of structures over 200 feet from the ground. Notification is also required if the structure were to be below 200 feet in height but located within the restricted airspace in the approaches to public or military airports. For airports with runways longer than 3,200 feet, the restricted space is defined by the FAA as an area extending 20,000 feet (3.98 miles) from the runway, with no obstructing structures for whom the ratio of distance from runway to height is greater than 100:1. For airports with runways of 3,200 feet or less, the restricted airspace would be an area that extends 10,000 feet from this runway. For heliports, the restricted space is an area extending 5,000 feet.

As noted by the applicant, the nearest commercial airport to the HHSEGS site and either of the two possible connecting lines is McCarran International Airport in Las Vegas approximately 45 miles to the east (HHSG 1011a, p. 5.12-11 and 5.12-12). The Pahrump Valley General Aviation Airport is proposed to be located approximately 10 miles northwest of the HHSEGS site and thus too far for any of the lines' structures to pose a significant obstruction risk to utilizing aircraft. Furthermore, the line supports would be erected according to SCE guidelines ensuring heights below the FAA threshold for concern over collision with area aircraft. Other area airports would similarly not pose an aviation hazard because of the distance from the lines or orientation of their respective runways. There are no heliports in the area leading staff to agree with the applicant (HHSG 1211a, p. 5.12-14) that neither of the two candidate lines would pose an aviation hazard to both area helicopters and fixed-wing aircraft.

Interference with Radio-Frequency Communication

Transmission line-related radio-frequency interference is one of the indirect effects of overhead line operation and is produced by the physical interactions of line electric fields. Since electric fields cannot penetrate the soil and most materials, the discussed electric field effects would not occur in the underground segments. These electric field-related interferences are due to the radio noise produced by the action of the electric fields on the surface of the energized conductor. The process involved is known as "corona discharge,"

but is referred to as “spark gap electric discharge” when it occurs within gaps between the conductor and insulators or metal fittings. When generated, such noise manifests itself as perceivable interference with radio or television signal reception or interference with other forms of radio communication. Since the level of interference depends on factors such as line voltage, distance from the line to the receiving device, orientation of the antenna, signal level, line configuration, and weather conditions, maximum interference levels are not specified as design criteria for modern overhead transmission lines. The level of any such interference usually depends on the magnitude of the electric fields involved and the distance from the line. The potential for such impacts and related complaints is therefore unlikely because the responsible fields would be reduced using SCE designs, and the line located away from inhabited areas. The absence of such electric field impacts around underground lines would further serve to minimize the potential for complaints. Staff does not recommend any related conditions of certification.

Audible Noise

The noise-reducing designs for low-intensity electric fields are not specifically mandated by federal or state regulations in terms of specific noise limits. As with radio noise, such noise is limited instead through design, construction, or maintenance practices established from industry research and experience as effective without significant impacts on line safety, efficiency, maintainability, and reliability. Audible noise usually results from the action of the electric field at the surface of the line conductor and could be perceived as a characteristic crackling, frying, or hissing sound or hum, especially in wet weather. Since the noise level depends on the strength of the line electric field, the potential for perception around an overhead line can be assessed from estimates of the field strengths expected during operation. Such noise is usually generated during rainfall, but mainly from overhead lines of 345-kV or higher. It is, therefore, not generally expected at significant levels from lines of less than 345-kV but is possible for a 500-kV line. Given the use of noise-reducing design and noise-eliminating undergrounding in the nearest area to residences, staff does not expect either line option to add significantly to current background noise levels in the project area. For an assessment of the noise from the proposed line and related facilities, please refer to staff’s analysis in the **Noise and Vibration** section of this **FSA**.

Fire Hazards

The fire hazards addressed through the related LORS in **TLSN Table 1** are those that could be caused by sparks from conductors of overhead lines, or that could result from direct contact between the line and nearby trees and other combustible objects. Since the proposed line corridors would traverse a desert environment without combustible materials at high enough levels, staff does not anticipate a fire hazard during operations and does not recommend a related condition of certification.

Hazardous Shocks

Hazardous shocks are those that could result from direct or indirect contact between an individual and the energized line, whether overhead or underground. Such shocks are capable of serious physiological harm or death and remain a driving force in the design and operation of transmission and other high-voltage lines. No design-specific federal regulations have been established to prevent hazardous shocks from overhead or underground power lines. Safety is assured within the industry from compliance with the requirements specifying

the minimum national safe operating clearances applicable in areas where the line might be accessible to the public.

The applicant's stated intention to implement the GO-95- and GO-128-related measures against direct contact with the energized line (HHSG 2011a, p. 3-4) would serve to minimize the risk of hazardous shocks for the chosen line as located overhead or underground. Staff's recommended Condition of Certification **TLSN-1** would be adequate to ensure implementation of the necessary mitigation measures.

Nuisance Shocks

Nuisance shocks are caused by current flow at levels generally incapable of causing significant physiological harm. They result mostly from direct contact with metal objects electrically charged by fields from the energized line. Such electric charges are induced in different ways by the line's electric and magnetic fields.

There are no design-specific federal or state regulations to limit nuisance shocks in the transmission line environment. For modern overhead high-voltage lines, such shocks are effectively minimized through grounding procedures specified in the National Electrical Safety Code (NESC) and the joint guidelines of the American National Standards Institute (ANSI) and the Institute of Electrical and Electronics Engineers (IEEE). For the proposed project lines, the project owner would be responsible in all cases for ensuring compliance with these grounding-related practices within the rights-of-way.

The potential for nuisance shocks around the proposed lines would be minimized through standard industry grounding practices (HHSG 2011a, p. 3-7). Staff recommends Condition of Certification **TLSN-3** to ensure such grounding for the line segments assessed.

Electric and Magnetic Field Exposure

The possibility of deleterious health effects from EMF exposure has increased public concern in recent years about living near high-voltage lines. Both electric and magnetic fields occur together whenever electricity flows and exposure to them together is generally referred to as EMF exposure. The available evidence as evaluated by the CPUC, other regulatory agencies, and staff has not established that such fields pose a significant health hazard to exposed humans. There are no health-based federal regulations or industry codes specifying environmental limits on the strengths of fields from power lines. Most regulatory agencies believe, as staff does, that health-based limits are inappropriate at this time. They also believe that the present knowledge of the issue does not justify any retrofit of existing lines.

Staff considers it important, as does the CPUC, to note that while such a hazard has not been established from the available evidence, the same evidence does not serve as proof of a definite lack of a hazard. Staff, therefore, considers it appropriate in light of present uncertainty, to recommend feasible reduction of such fields without affecting safety, efficiency, reliability, and maintainability.

While there is considerable uncertainty about EMF health effects, the following facts have been established from the available information and have been used to establish existing policies:

- Any exposure-related health risk to the individual will likely be small.
- The most biologically significant types of exposures have not been established.
- Most health concerns are about the magnetic field.
- There are measures that can be employed for field reduction, but they can affect line safety, reliability, efficiency, and maintainability, depending on the type and extent of such measures.

State

In California, the CPUC (which regulates the installation and operation of many high-voltage lines owned and operated by investor-owned utilities) has determined that only no-cost or low-cost measures are presently justified in any effort to reduce power line fields beyond levels existing before the present health concern arose. The CPUC has further determined that such reduction should be made only in connection with new or modified lines. It requires each utility within its jurisdiction to establish EMF-reducing measures and incorporate such measures into the designs for all new or upgraded power lines and related facilities within their respective service areas. The CPUC further established specific limits on the resources to be used in each case for field reduction. Such limitations were intended by the CPUC to apply to the cost of any redesign to reduce field strength or relocation to reduce exposure. Publicly owned utilities, which are not within the jurisdiction of the CPUC, voluntarily comply with these CPUC requirements. This CPUC policy resulted from assessments made to implement CPUC Decision 93-11-013.

In keeping with this CPUC policy, staff requires a showing that each proposed overhead line would be designed according to the EMF-reducing design guidelines applicable to the area's main utility which in this case is SCE. These field-reducing measures can impact line operation if applied without appropriate regard for environmental and other local factors bearing on safety, reliability, efficiency, and maintainability. Therefore, it is up to each applicant to ensure that such measures are applied in ways that prevent significant impacts on line operation and safety. The extent of such applications would be reflected by ground-level field strengths as measured during operation and required by staff for all permitted lines. When estimated or measured for lines of similar voltage and current-carrying capacity, such field strength values can be used by staff and other regulatory agencies to assess the effectiveness of the applied reduction measures. These field strengths can be estimated for any given design using established procedures. Estimates are specified for a height of one meter above the ground, in units of kilovolts per meter (kV/m), for the electric field, and milligauss (mG) for the companion magnetic field. Their magnitude depends on line voltage (in the case of electric fields), the geometry of the support structures, degree of cancellation from nearby conductors, distance between conductors and, in the case of magnetic fields, amount of current in the line.

Since most new lines in California are currently required by the CPUC to be designed according to the EMF-reducing guidelines of the main electric utility in the service area involved, their fields are required under this CPUC policy to be similar to fields from similar lines in that service area. Designing the proposed project lines according to existing SCE field strength-reducing guidelines would constitute compliance with the CPUC requirements for line field management.

The CPUC has recently revisited the EMF management issue to assess the need for policy changes to reflect the available information on possible health impacts. The findings did not point to a need for significant changes to existing field management policies. Since there are no residences in the immediate vicinity of the proposed project lines, there would not be the long-term residential EMF exposures mostly responsible for the health concern of recent years. The only project-related EMF exposures of potential significance are the short-term exposures of plant workers, regulatory inspectors, maintenance personnel, visitors, or individuals in the vicinity of the lines. These types of exposures are short term and well understood as not significantly related to the health concern. Staff uses their measured intensities to (a) compare the effective application of control measures on lines of similar voltage and current-carrying capacities and (b) to assess the similarity in worker or other short-term exposures around similar lines.

Industry's Approach to Reducing Field Exposures

The present focus is on the magnetic field because unlike electric fields, it can penetrate the soil, buildings, and other materials to produce the types of human exposures at the root of the health concern of recent years. The industry seeks to reduce exposure, not by setting specific exposure limits, but through design guidelines that minimize exposure in each given case. As one focuses on the strong magnetic fields from the more visible high-voltage power lines, staff considers it important, for perspective, to note that an individual in a home could be exposed to much stronger fields while using some common household appliances than from high-voltage lines (National Institute of Environmental Health Services and the U.S. Department of Energy, 1998). The difference between these types of field exposures is that the higher-level, appliance-related exposures are short-term, while the exposure from power lines is lower level, but long term. Scientists have not established which of these types of exposures would be more biologically meaningful in the individual. Staff notes such exposure differences only to show that high-level magnetic field exposures regularly occur in areas other than around high-voltage power lines.

As with similar SCE lines, specific field strength-reducing measures would be incorporated into the proposed lines to ensure the field strength minimization currently required by the CPUC in light of the concern over EMF exposure and health.

As discussed by the applicant (HHSG 2011a, p. 3-4), the field reduction measures to be applied to any overhead segments include the following:

1. Increasing the distance between the conductors and the ground to an optimal level;

2. Reducing the spacing between the conductors to an optimal level;

3. Minimizing the current in the line; and

4. Arranging current flow to maximize the cancellation effects from interacting of conductor fields.

The strengths of the line fields along the two candidate routes would depend on the effectiveness of the field-reducing measures incorporated into their designs for the overhead segment. These fields should be of the same intensity as SCE lines of the same construction, voltage and current-carrying capacity. The requirements in Condition of Certification **TLSN-2**

for field strength measurements are intended to validate the applicant's assumed minimization efficiency for the overhead line. For the underground segment, undergrounding by itself would yield the magnetic fields of the lowest intensity possible (without affecting safety, reliability, and efficiency) since undergrounding allows for the closest conductor spacing and field strength cancellation possible). The only related requirements for this project would be for undergrounding according to requirements of CPUC's GO-128, and compliance with standard industry and SCE standards and practices. Only the magnetic field would be involved since only they can penetrate the soil and most materials to reach the area above the line. Since there would be no long-term residential exposure as previously noted, the field measurement in **TLSN-2** would allow for direct comparison with short-term human exposures around SCE lines of the same voltages and current-carrying capacity.

CUMULATIVE IMPACTS AND MITIGATION

When field intensities are measured or calculated for a specific location, they reflect the interactive, and therefore, cumulative effects of fields from all contributing conductors. This interaction could be additive or subtractive depending on prevailing conditions. Since either of the proposed candidate project transmission lines would be designed and erected according to applicable field-reducing SCE guidelines as currently required by the CPUC, any contribution to cumulative area exposures should be at levels expected for SCE lines of similar voltage and current-carrying capacity. It is this similarity in intensity that constitutes compliance with current CPUC requirements on EMF management. The actual field strengths and contribution levels for the chosen line would be assessed from the results of the field strength measurements specified in Condition of Certification **TLSN-2**.

COMPLIANCE WITH LORS

As previously noted, current CPUC policy on safe EMF management requires that any high-voltage line within a given area be designed to incorporate the field strength-reducing guidelines of the main area utility lines to be interconnected. As previously noted, the utility in this case is SCE. Since each of the proposed lines would be designed according to the respective requirements of the LORS listed in **TLSN Table 1**, and operated and maintained according to current SCE guidelines on line safety and field strength management, staff considers the proposed design and operational plan to be in compliance with the health and safety requirements of concern in this analysis. The actual contribution to the area's field exposure levels would be assessed from results of the field strength measurements required in Condition of Certification **TLSN-2**.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Staff received no public or agency comments on the transmission line nuisance and safety aspects of the proposed HHSEGS. However, Please see **Appendix 1**, PSA Response to Comments, TLSN, for responses to Applicant's Preliminary Staff Assessment (PSA) comments.

CONCLUSIONS

Staff does not expect either of the two candidate HHSEGS transmission lines to pose an aviation hazard according to current FAA criteria, and therefore, does not consider it necessary to recommend location changes on the basis of a potential hazard to area aviation.

The potential for nuisance shocks would be minimized through grounding and other field-reducing measures to be implemented in keeping with current SCE guidelines (reflecting standard industry practices). These field-reducing measures would maintain the generated fields within levels not associated with radio-frequency interference or audible noise. The potential for hazardous shocks would be minimized through compliance with the height and clearance requirements of PUC's General Order 95 and General Order 128 in the case of the underground section. Compliance with Title 14, California Code of Regulations, section 1250, would minimize fire hazards, while the use of low-corona line designs, together with appropriate corona-minimizing construction practices would minimize the potential for corona noise and its related interference with radio-frequency communication in the area around the route.

Since electric or magnetic field health effects have neither been established nor ruled out for the proposed HHSEGS and similar transmission lines, the public health significance of any related field exposures cannot be characterized with certainty. The only conclusion to be reached with certainty is that the proposal to design, build and operate either line option according to SCE guidelines would be adequate to ensure that the generated electric and magnetic fields are managed to an extent the CPUC considers appropriate in light of the available health effects information. The long-term, mostly residential magnetic exposure of health concern in recent years would be insignificant for the proposed lines given the general absence of residences along either of the proposed routes. On-site worker or public exposure would be short term and at levels expected for SCE lines of similar design and current-carrying capacity. Such exposure is well understood and can be used for comparison with similar SCE lines.

Since both of the candidate project lines would be operated to minimize the health, safety, and nuisance impacts of concern to staff and would be located away from areas of human habitation, staff considers the proposed design, maintenance, and construction plan as complying with the applicable laws for either line. With the conditions of certification proposed below, any such impacts would be less than significant for the chosen alternative.

The impacts from the segments within the state of Nevada would be assessed by BLM under the requirements of the National Environmental Policy Act (NEPA) of 1969 (HHSG 2011a, pp. 3-2 and 3-3).

PROPOSED CONDITIONS OF CERTIFICATION

TLSN-1 The project owner shall construct the chosen 230-kV or 500-kV transmission line according to the requirements of California Public Utility Commission's GO-95, GO-52, GO-131-D, Title 8, and Group 2, High Voltage Electrical Safety Orders,

sections 2700 through 2974 of the California Code of Regulations, GO-128 (in the case of any underground segment), and SCE's EMF-reduction guidelines.

Verification: At least 30 days before starting the construction of the chosen line option and related facilities, the project owner shall submit to the Compliance Project Manager (CPM) a letter signed by a California registered electrical engineer affirming that the lines will be constructed according to the requirements stated in the condition.

TLSN-2 The project owner shall use a qualified individual to measure the strengths of the electric and magnetic fields from the chosen line at the points of maximum intensity along its route. The measurements shall be made after energization according to the American National Standard Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) standard procedures. These measurements shall be completed not later than six months after the start of operations.

Verification: The project owner shall file copies of the post-energization measurements with the CPM within 60 days after completion of the measurements.

TLSN3 The project owner shall ensure that all permanent metallic objects within the right-of-way of each of the chosen project line are grounded according to industry standards.

Verification: At least 30 days before the lines are energized, the project owner shall transmit to the CPM a letter confirming compliance with this condition.

REFERENCES

(EPRI). Electric Power Research Institute. 1982. Transmission Line Reference Book: 345 kV and Above.

HHSG 2011a. (BrightSource Energy/J. Woolard (tn:61756). Application for Certification Volumes 1&2: Submitted to the California Energy Commission on August 5, 2011.

National Institute of Environmental Health Services, 1998. An Assessment of the Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields. A Working Group Report, August 1998.

SCE 2004 (Sothern California Edison). EMF Design Guidelines for Electrical Facilities. EMF Research & Education, Irwindale, California. September.

TLSN

List of Comment Letters

		TLSN Comments?
1	Inyo County	
2	Bureau of Land Management	
3	National Park Service	
4	The Nature Conservancy	
5	Amargosa Conservancy	
6	Basin & Range Watch	
7	Pahrump Paiute Tribe	
8	Richard Arnold, Pahrump Piahute Tribe	
9	Big Pine Tribe of Owens Valley	
10	Intervenor Cindy MacDonald	
11	Intervenor Center for Biological Diversity	
12	Intervenor, Old Spanish Trail Association	
13	Applicant, BrightSource Energy, Inc.	**X**

Comment #	DATE	COMMENT TOPIC	RESPONSE
13	**July 23, 2012**	**Applicant, BrightSource Energy**	
13.1	**p. 258 #1**	Page 4.12-1, Summary of Conclusions, 1st paragraph, 1st sentence: The PSA is referencing the lines in Nevada, outside the CEC's jurisdiction. Discussion needs to be limited to onsite transmission lines. Comment is referring to the following text in the first sentence: *".. that construction and operation of either of the two candidate transmission lines…"*	Comment noted
13.2	**p. 258 #2**	Page 4.12-3, Setting, 1st paragraph, 1st sentence: The following text should be added to the end of the 1st sentence: "and a 103-acre Common Area for a total plant size of 3,096 acres."	103-acre Common Area added. Project size remains 3,097, however, as was indicated in AFC and uniformily throughout the Final Staff Assessment

13.3	**p. 258 #3**	Page 4.12-3, Setting, 1st paragraph, 3rd sentence: The project size is 3,096 acres (per general comment). The third sentence should be revised to reflect the correct project size.	Project size remains 3,097, however, as was indicated in AFC and uniformily throughout the **Final Staff Assessment (FSA)**
13.4	**p. 258 #4**	Page 4.12-4, Setting, 1st paragraph, 1st sentence: This sentence is confusing because the PSA is talking about the aboveground versus underground segments. Note the use of the following text: "Each transmission line option…"	Comment noted
13.5	**p. 258 #5**	Page 4.12-4, Setting, 2nd paragraph, 1st sentence: This sentence is confusing because the PSA is talking about the aboveground versus underground segments. Note the use of the following text: "two candidate connecting lines…"	Comment noted
13.6	**p. 258 #6**	Page 4.12-4, Project Description, 1st paragraph, last three sentences: These three sentences require updating once the EIS is published.	Comment noted
13.7	**p. 258 #7**	Page 4.12-4, Project Description, 2nd paragraph: Please see the revised transmission system project description in the General Document Comments.	Comment noted, clarification made to discussion in **FSA**
13.8	**p. 258 #8**	Page 4.12- 5, 1st paragraph, 1st sentence: Valley Electric Associate (VEA) would be the owner of most of the 230-kv facilities beyond the gen-tie. Replace "Southern California Edison (SCE)" at the end of this sentence with "VEA."	Comment noted, clarification made to discussion in **FSA**

VISUAL RESOURCES

Testimony of Melissa Mourkas, ASLA

SUMMARY OF CONCLUSIONS

Energy Commission staff concludes that the Hidden Hills Solar Electric Generating System (HHSEGS) project would result in substantial adverse visual impacts. This impact would be significant even after employing all feasible mitigation, in large part because of the visual prominence of the two 750 foot solar power towers that are a feature of its design. Examples of these significant visual effects are provided by analysis of several Key Observation Points.

The project would also result in a significant cumulative effect when viewed in combination with existing and foreseeable future Nevada-side projects within the project viewshed. Project impacts, in combination with existing and foreseeable future solar and other development projects within the greater Pahrump Valley, including both California and Nevada, would contribute to a perceived sense of industrialization of the open, undeveloped desert landscape and impact views of scenic resources in the Pahrump Valley viewshed, having the potential to be significant and unavoidable.

Finally, the project would not be consistent with several applicable goals and policies of the Inyo County General Plan and Renewable Energy Ordinance (Title 21). The project is found to be generally consistent with Nevada's laws, ordinances, regulations, and standards (LORS) as they pertain to Visual Resources, although they are not applicable to the project in California.

If the Energy Commission approves the project, staff recommends that all of staff's proposed conditions of certification be adopted in order to minimize visual impacts to the greatest feasible extent.

INTRODUCTION

Visual resources consist of the viewable natural and built features of the environment. In this section, staff evaluates the construction and operation of the HHSEGS using the "Aesthetics" criteria in the California Environmental Quality Act (CEQA) Guidelines to determine if the project would a cause significant impact on the environment. In addition, staff assesses the extent to which the project would comply with applicable federal, state, and local LORS pertaining to aesthetics and preservation and protection of sensitive visual resources.

To provide a consistent framework for this analysis, a standard visual assessment methodology developed by the California Energy Commission staff and applied to numerous siting cases in the past was employed in this study. A description of this methodology is provided in **Appendix VR-1**.

REGIONAL SETTING

The project site would be located in the unincorporated community of Charleston View, within the Pahrump Valley, which extends across the California-Nevada state line. The

valley is well-defined by the mountain ranges which form a nearly continuous circumference. The proposed site is located adjacent to Old Spanish Trail Highway, also known locally and on some maps as Tecopa Road[1], approximately 10 miles east of Nevada State Highway 160, which bisects the valley in a northwesterly-southeasterly trajectory. The landscape is generally characterized by rugged mountain ranges with broad alluvial fans leading to the valley floor. The city of Pahrump, Nevada, is located to the northwest of the project site, with the city center (the intersection of Nevada State Highways 160 and 372) being approximately 8 miles as the crow flies from the center of the project site. Pahrump is not a densely developed city, but instead has a rural development pattern of residential areas interspersed with small commercial and agricultural uses. The city has an underlying rectangular grid of streets, some of which are incomplete or not through streets. There is no direct-access paved road to the project site from Pahrump. There are dirt roads that criss-cross the valley floor, so it possible to reach Charleston View from Pahrump via four-wheel drive vehicle.

Nearby designated recreation areas include the Nopah Wilderness Area and Pahrump Valley Wilderness Areas in California and the Spring Mountains Recreation Area, including Mt. Charleston, in Nevada (see **Visual Resources Figure 1-Project Vicinity Map**). Wilderness Areas are designated by legislation under the 1964 Wilderness Act[2].

The Bureau of Land Management (BLM) describes Wilderness Areas as places of solitude where people may experience freedom from our fast-paced industrialized society. Motorized vehicle use is prohibited in Wilderness Areas, except within designated roadways. Recreation opportunities generally include hiking, camping, rockhounding, fishing and hunting.

The Nopah Range Wilderness Area encompasses 106,623 acres to the west of the project site. It incorporates the Resting Spring Range on the western side and the Nopah Range on the eastern side, as well as the Chicago Valley, which divides the two ranges. Nopah Peak rises to 6,395 feet in elevation and is visible from the greater Pahrump Valley. The area is comprised of alluvial fans, badlands, playa, plains, river washes and hills. The portion of the wilderness facing the project site can be characterized as rugged mountains which give way to broad alluvial fans, upon which is found creosote bushes, yucca and other Mojave Desert shrub species.

Pahrump Valley Wilderness encompasses 73,726 acres, and is located south of the proposed project site. Its three valleys, California, Pahrump and Mesquite, are comprised of alluvial slopes rising southward into the Kingston Range, which is partially located within the Wilderness Area. The highest peak is 4,569 feet in elevation. Vegetation includes species typical of the Mojave Desert at this elevation plus a few unique plants which thrive in the limestone soils of the area. The Pahrump Valley Wilderness Area landscape can be characterized as rugged and changeable. Like the Nopah Range, the pronounced alluvial fans are fairly densely vegetated in contrast to the less-vegetated, rugged mountainsides.

[1] This section will use Old Spanish Trail Highway in lieu of Tecopa Road.

[2] The Wilderness Act, Public Law 88-577 (16 U.S. C. 1131-1136), 88th Congress, Second Session, September 3, 1964

The Mount Charleston Wilderness and the Spring Mountains National Recreation Area are located east of the proposed project site in Nevada, within the Humboldt-Toiyabe National Forest. The Spring Mountains get their name from the many natural springs in the area. The higher elevations of the range provide an alpine respite from the heat of the valley floor. Charleston Peak, at 11,918 feet in elevation, is a prominent feature of the range and dominates the overall landscape of the Pahrump Valley. The recreation area spans 316,000 acres and offers numerous hiking trails, including along the spine of the mountains. Access to the trails and the recreation areas are from Highway 95 in Nevada, on the eastern side of the range. Access from the Pahrump Valley appears limited.

Pahrump Valley is also home to segments of the Old Spanish National Historic Trail (OST). OST was designated as a National Historic Trail when Congress passed Senate Bill No. 1946 and was signed into law in December, 2002. The trail segments in California as recorded by the National Park Service (NPS) may be seen in Visual Resources Figure 2. For the purposes of this analysis, the current NPS alignments provided to Energy Commission cartography staff will be used as the primary routes for the OST. However, there are differences of opinion as to the correct alignment of the OST routes, whether it is the current NPS routes, routes shown in the Final Feasibility Study (2001)3, routes shown on DeLorme maps, routes identified by members of the Old Spanish Trail Association (OSTA) or the route used by the applicant in the AFC. OSTA provided Energy Commission staff with independently-surveyed traces of the trail after becoming interveners in the process. This resource is discussed in more detail in the **Cultural Resources** section of this Final Staff Assessment (**FSA**).

Visual Resources Figure 1 shows the relationship between the proposed project site and the wilderness and recreation areas described above and the national historic trail in the area. Figure 1 clearly shows the “bowl” whose bottom is the project site and whose sides are made up of areas of high scenic quality. It is this high-quality scenic landscape which is the backdrop for the proposed industrial-scale development of HHSEGS.

The proposed project site is privately-owned land located in an area where most of the land is publicly-owned or managed by the Bureau of Land Management (BLM). The BLM lands surrounding the project site have been inventoried by the respective California and Nevada BLM field offices and both Visual Resource Inventory (VRI) and Visual Resource Management (VRM) classes have been applied. The system BLM uses classifies BLM-owned or managed land into one of four visual inventory classes. From the inventory data, the Resource Management Plan (RMP) process then assigns a VRM class to the inventoried areas. The VRM class reflects the way the visual landscape will be managed and the amount of visual change that will be permitted to take place within that landscape area.

VRI classes are assigned by evaluating Visual Sensitivity, Scenic Quality and Distance Zone. Examples of high visual sensitivity would include areas within scenic byways, national monuments, wilderness areas or major transportation corridors. Scenic quality

[3] Old Spanish Trail National Historic Trail Feasibility Study and Environmental Assessment July 2001, http://parkplanning.nps.gov/document.cfm?parkID=454&projectID=12591&documentID=38207

is established by rating the following landscape features: land forms, vegetation, water, color, adjacent scenery, scarcity and cultural modifications from Key Observation Points (KOPs) within a defined viewshed. The overall score determines the scenic quality. Distance is the third component used to establish a VRI rating by using foreground, middle ground, background or seldom seen to describe the part of the viewshed that is most critical.

From the VRI ratings, VRM takes into account the management of the resource as a whole and policy decisions regarding land management. VRM classes do not necessarily reflect the VRI classes that were established for the particular area. There are four VRM classes:

- Class I: the objective is to preserve the existing character of the landscape and the level of change allowed should be very low. Wilderness Areas are automatically placed into Class I;
- Class II: the objective is to retain the existing character of the landscape and level of change to the landscape must be low;
- Class III: the objective is to partially retain the existing character of the landscape and the level of change can be moderate;
- Class IV: the objective is to provide for activities that require major modification of the landscape and the degree of change can be high.

Visual Resources Figure 3 shows the Visual Resource Inventory Classes for the BLM lands in the vicinity of the project area. Nearly 50 percent of the land shown in Figure 3 is Class I, areas of the highest scenic quality and viewer sensitivity. These Class I areas extend beyond the boundaries of the wilderness areas. The Class II areas are seen in both mountains and valleys adjacent to Class I areas and on the Pahrump Valley floor. Class III areas appear to be the smallest component of the areas shown in the figure. Class IV are found mostly in the Pahrump Valley. The figure demonstrates that, according to the BLM rating system, there is a generally a high degree of scenic quality in the vicinity of the project site.

Visual Resources Figure 4 shows the VRM classes assigned to the area in the most recent RMP. Note the significant migration of Class I areas to Class II, III and IV, and the significant downgrade of the valley floor and alluvial fans to Class III and IV. The only remaining Class I designations are the Nopah and Pahrump Valley Wilderness Areas. The two figures clearly illustrate the high degree of scenic quality that exists with the viewshed of the proposed project site.

Other sources have characterized the scenic qualities of the Pahrump Valley and the project location.The Environmental Impact Report prepared for Roland Wiley in 1974 for the subdivision of Parcels 86 and 87 describes the aesthetic character of the area to be subdivided, now portions of the project site. “With over 90 basins and 160 mountain ranges and spurs, the regional topography offers much in the way of visual enjoyment “. The report goes on to describe “marbled mountain formations” and concludes “the region has a high aesthetic value, one not measured solely in currency” (EDB 1974, p. 41). The report states that “the present aesthetic aspects of the site are predominantly visual, i.e., a desert valley with surrounding ranges of mountains”, although the report

described the “desert flora and lightly timbered mountains” as providing little in the way of visual diversity (EDB 1974, p. 68).

Landscape character photographs of the regional setting can be found in **Visual Resources Figures 5-16**. Located immediately to the south of the project site and Old Spanish Trail Highway is the community of Charleston View. The 1960s residential subdivision’s unpaved streets are in a very recognizable grid and the lots are predominantly 2.5 acres in size. 2010 U.S. Census data[4] indicates there are 68 residents living within 6 miles of the project site in California. While the residences are scattered throughout the subdivision, many are located within the area bounded by Silver Street on the west, an unnamed street two blocks to the east, and Charity Lane to the south. The residences include single-family homes and other structures such as trailers and outbuildings. In addition to permanent residents, Inyo County’s Director of Health and Human Services indicates there exist a number of squatters on various lots throughout Charleston View[5].

PROJECT SITE

The project site would encompass approximately 3,277 acres (5.12 square miles) of privately owned land in the community of Charleston View, Inyo County, California. The site is immediately adjacent to the border with Nevada; the border forms the eastern boundary of much of the project site. The land was subdivided in the 1960s and features a grid of dirt roads approximately one-half mile apart. The roadways have been maintained and continue to experience vehicular travel. The grid of dirt roads also extends into the residential area south of the project site. Other than a storage area for boats and trailers located just beyond the eastern boundary of the project site, the remnants of an old orchard and the roads created in the 1960s, much of the project site is undisturbed. It is a landscape of typical Mojave Desert Scrub and shadscale scrub[6] plant species, a generally flat to mildly sloping terrain, gravelly sandy soil[7] and is criss-crossed by washes and minor depressions and rises.

Visual Resources Table 1 provides the proposed project’s approximate dimensions, colors, materials, and finishes for major buildings and structures.

VISUAL RESOURCES Table 1
Proposed HHSEGS Project’s Dimensions, Colors, Materials and Finishes Of Major Buildings and Structures

Element	Height (ft)	Length (ft)	Width (ft)	Diameter (ft)	Color	Materials	Finish
Power Tower	590			72	Natural	Concrete	Natural

[4] Source: U.S. Census Bureau, 2010 Census

[5] Inyo County, Health and Human Services Department, Jean Turner, Director, letter dated December 12, 2011, received by CEC as attachment to **INYO 2012b – Inyo County/K. Carunchio (tn: 63719)** Inyo County Letter from Inyo County regarding Preliminary Estimates for the Fiscal Impacts of the Construction and Operation. 02/16/2012.

[6] 11-AFC-02, Figure 5.2-3 Vegetation Map.

[7] 11-AFC-02, Figure 5.11-1, Soil within 1 mile of HHSEGS.

							Concrete Finish
Solar Receiver Steam Generator (SRSG)	160			102	Black or Brightly Glowing	Metal	Flat
Switchyard (off site)	36	420	310		Gray & Silver	Metal	Flat
Steam Turbine Generator Enclosure	45	110	46		Metal	Metal	Flat
Aux. Boiler	25	78	68		Not Specified	Painted	Not Specified
Element	**Height (ft)**	**Length (ft)**	**Width (ft)**	**Diameter (ft)**	**Color**	**Materials**	**Finish**
Aux. Boiler Stack	135			5.5	Not Specified	Painted	Flat
Night Preservation Boiler	14	25	15		Not Specified	Painted	Not Specified
Night Preservation Boiler Stack	30			1.5	Not Specified	Not Specified	Not Specified
Fin Fan Dry Coolers	13.5	80	60		Rusted Finish	Metal	Flat
Air-cooled Condenser (ACC)	120	310	218		Not Specified	Metal	Flat
Emergency Generator (Power Block)	10	30	9		Not Specified	Metal	Flat
Emergency Generator (Common Area)	7	15	6		Not Specified	Painted	Not Specified
Generator Step Up Transformer	25	40	58		Gray	Metal	Flat
Unit Auxiliary Transformer	14	24	25		Gray	Metal	Flat
Service/Fire Water Storage Tank	32		1	34	Not Specified	Metal	Flat
Treated Water Storage Tank	32			34	Not Specified	Metal	Flat

Potable Water Storage Tank	9			6	Not Specified	Not Specified	Flat
Potable Water Treatment System Feed Tank	Not Specified	Not Specified	Not Specified	Not Specified	Not Specified	Not Specified	Not Specified
Demineralized Water Storage Tank	32			30	Not Specified	Metal	Flat
Element	**Height (ft)**	**Length (ft)**	**Width (ft)**	**Diameter (ft)**	**Color**	**Materials**	**Finish**
Waste Water Collection Tank	25			14	Not Specified	Metal	Flat
Mirror Wash Water Storage Tank	16			23	Not Specified	Metal	Flat
Heliostats	14.5' Max	17.16'	Not Specified		White (back of unit)	Galvanized (steel parts)	Semi-Matte (back of unit)
Admin/Control/Warehouse Building	14-22	325	85		Not Specified	Metal	Flat
Deaerator/Feed Water Heaters	130	162	43		Not Specified	Metal	Flat
Mirror Wash Covered Parking	20	300	55		Not Specified	Metal	Flat
Plant Services Building	15	88	40		Not Specified	Metal	Flat
Plant Electrical Building	30	132	38		Not Specified	Metal	Flat
Water Treatment Building	30	150	85		Not Specified	Metal	Flat

Source: 11-AFC-02, Supplemental DR Set 2, Table 5.13-4R1, DR Set 2C, Figure DR 152-1.

Transmission Line(s)

The interconnecting transmission lines are proposed to be located in Nevada, leaving the HHSEGS facility at the state line, connecting to the project switchyard in Nevada and proceeding in a corridor parallel to Old Spanish Trail Highway toward Nevada Highway 160. The transmission corridor in Nevada is within BLM's permitting jurisdiction, and the impacts of the project's offsite transmission lines will be assessed through the National Environmental Policy Act (NEPA), process by BLM in its Environmental Impact Statement (EIS) for the transmission lines. The on-site underground transmission lines originate at Solar Plants 1 and 2, and extend under the heliostat arrays to the substation located in the common area.

The Nevada transmission corridor is shown in Figure TSE-2 in the Application for Certification (AFC), which depicts "typical" Double-Circuit Monopole 230kV pole

structure, ranging in height from 90 feet to 120 feet. The transmission poles are listed in Table 5.13-4 as one-hundred feet in height, and the proposed color and materials are rusted metal. KOP-1 in Nevada includes a portion of a pole in the view of the KOP.

Natural Gas Pipeline

The natural gas pipeline would be underground and not visible on the project site. A 12-inch diameter pipeline is anticipated, and would enter the HHSEGS site in the common area where it would connect with an onsite gas metering station. It would exit the project site at the state border, and continue parallel to Old Spanish Trail Highway in Nevada. The portion of the underground gas line that is onsite is shown in Data Response Set 1A, Revised Figure DR34-1. No visible components of the onsite gas line are anticipated.

Water Supply and Discharge

Water for facility use would be pumped from several (up to six) onsite wells. Groundwater would be treated and stored on site in a storage tank at each power block noted on Figure 2.2-1-R1 (Supplemental Data Response Set 2, April 2, 2012). The tanks would be located within the cluster of facilities of each solar power plant at the base of the power tower. The largest of the storage tanks would be 32 feet in height and 34 feet in diameter.

Construction Laydown and Staging Area

The temporary construction laydown area would be an approximately 180-acre area roughly bounded by Quartz Street on the east, Avenue B on the north, Avenue D on the south and extending west of the project site approximately one-quarter mile. The southern edge of construction laydown area as defined would be approximately one mile north of Old Spanish Trail Highway at Avenue D and extend one mile north to Avenue B. The AFC indicates that construction traffic would enter through the main HHSEGS entry drive, however, a later figure, Access Roads and Paved Internal Roadways (AFC, Traffic and Transportation Figure 2), shows construction traffic entering at what is now Topaz Street, on the western project boundary. The laydown area would be used for parking, storage of construction materials and some construction assembly activities.

APPLICANT PROPOSED MITIGATION MEASURES AND CONDITIONS OF CERTIFICATION

The applicant's discussion of the impacts of the HHSEGS is found in Section 5.13.6, pages 5.13-32 to 33 in the AFC. The applicant concludes that HHSEGS includes features that reduce visual impacts to less than significant, with mitigation, from the construction and operation of the facility. The applicant proposes the following visual resources mitigation measures to reduce visual impacts to less-than-significant levels:

1. Ground disturbance and soil erosion will be minimized by avoiding steep slopes and by minimizing the amount of construction and ground clearing needed for roads and staging areas. Dust suppression techniques will be employed to minimize impacts of vehicular and pedestrian traffic, construction and wind on exposed surfaces.

2. A lighting plan that minimizes the project's nighttime light impacts will be developed and submitted to Energy Commission staff for review. Provisions contained in this plan will include installation of nighttime lighting only in areas where it is required for operations or safety, use of the lowest levels of lighting consistent with operational needs and safety regulations, use of light fixtures that are hooded to direct light only to the areas where it is needed and to prevent light from spilling off the site or up into the sky, and use of switches and motion detectors to assure that lighting is turned on only when required.

2. A color treatment plan to blend the project facilities into the existing setting will be developed in consultation with Inyo County and Energy Commission staff.

3. A landscape plan will be developed for the project setback area along Old Spanish Trail Highway. In the portion of the setback area directly north of Charleston View residential area, this plan will include the use of a mix of tall growing trees to provide partial screening of the views toward the solar power towers from the residential area, and lower growing shrubs to screen views into the site from Old Spanish Trail Highway. The plant species selected for this area will emphasize species with low water needs that are aesthetically compatible with the landscape setting. In the remainder of the setback area along Old Spanish Trail Highway, the emphasis will be on use of native shrubs with low water requirements that are planted in an informal, naturalistic pattern to provide partial screening of views into the project site. The landscape plan will be submitted to Inyo County and Energy Commission staff for review.

5. To reduce and compensate for the changes to the views toward the project site seen from Charleston View (KOP 4), two measures will be implemented:

    a. The applicant will make provisions for a one-time program to plant trees on the properties of any Charleston View residents who indicate an interest in having them. The intent is to plant the trees in locations that will screen views looking toward the solar power towers from the residences on the property and from the property's primary outdoor living areas. The applicant's professional arborist will identify a set of species that are well adapted to the local conditions and which have characteristics that provide effective screening of views. The applicant's arborist will work with residents to select up to eight trees from this set of species and will assist the residents in indentifying appropriate locations for their installation. The applicant will take responsibility for purchasing and installing the trees, which will be up to ten gallons in size. Once installed, irrigation and maintenance of the trees will be the responsibility of the property owner.

    b. To compensate for the visual clutter the solar power towers will add to a portion of the view from Charleston View, the applicant will assist with a one-time clean-up program within the Charleston View rural residential subdivision. This clean-up program will entail the applicant making provisions to assist property owners with clean-up of their properties by providing free hauling and disposal of unwanted debris and vehicles.

The applicant discusses applicable laws, ordinances, regulations and standards (LORS) in Section 5.13.2 of the AFC. On page 5.13-3 to 4, the applicant discusses the project's compliance with state and local laws. The applicant concludes the proposed project would be in conformance with state scenic highway regulations and local Inyo County General Plan provisions and ordinances. Staff notes that the Renewable Energy Overlay Zone General Plan Amendment of April, 2011, was revoked by the County Supervisors in September of 2011. This was after publication of the AFC. The General Plan Designation for the project site has since returned to Open Space and Recreation. Industrial development such as the HHSEGS facility is not permitted in Open Space and Recreation designations and the assumptions made in the AFC as to conformance with the Overlay Zone are no longer applicable. Please see the **Land Use** section of this **FSA** for more discussions on land use zoning. Staff provides a full summary of conformance with LORS in **Visual Resources Table 6**.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Staff evaluates the project to determine compliance with federal, state and local laws, ordinances, regulations and standards. Federal and state laws reviewed generally fall under scenic by-way and highway designations. No National Scenic By-Ways or State Scenic Highways are located within the project vicinity; therefore there is no discussion of these laws in this section.
California Government Code, section 65300, requires each city and county in California to adopt a general plan for the physical development of the county or city and any land outside its boundaries that bears relation to its planning. On the basis of these general plans, cities and counties establish policies and strategies necessary to carry out elements of the plan.

The Inyo County General Plan, adopted in 2001, sets forth the Goals and Policies that provide direction for the adoption of regulations, ordinances and codes. **Visual Resources Table 2** lists the local laws, ordinances, regulations, and standards (LORS) as they pertain to the HHSEGS.

Visual Resources Table 2 includes information about relevant local laws, ordinances, regulations, and standards (LORS) pertaining to aesthetics or the preservation and protection of sensitive visual resources.

VISUAL RESOURCES Table 2
Applicable Laws, Ordinances, Regulations, and Standards

Source	Policy and Strategy Description
STATE	
State of California AB 1881 (2006), Water Efficient Landscape Ordinance (WELO).	Local agencies were required to adopt a WELO based on the state model by January 31, 2010, or the state's model ordinance would be applicable within the jurisdiction of the local agency. Inyo County has not adopted its own ordinance; therefore the state model ordinance applies.
LOCAL	
Inyo County, California	

Source	Policy and Strategy Description
Inyo County General Plan, Goals and Policies Report, December, 2001. Public Services and Utilities, Policy PSU-1.7: Undergrounding Utilities.	The County shall require undergrounding of utility lines in new development areas…except where infeasible for operational or financial reasons. Additional implementation measures are found in Table 4-4, page 4-44.
Inyo County General Plan, Goals and Policies Report, December, 2001. Public Services and Utilities, Policy PSU-3.1: Efficient Water Use.	The County shall promote efficient water use by encouraging and enforcing water-conserving landscaping and other measures.
Inyo County General Plan, Goals and Policies Report, December, 2001. Gas and Electrical Facilities, Policy PSU-10.1: Expansion of Services	The County shall work with local electric utility companies to design and locate appropriate expansion of electric systems, while minimizing impacts to agriculture and minimizing noise, electromagnetic, visual and other impacts on existing and future residents.
Inyo County General Plan, Goals and Policies Report, December, 2001.7.3, Scenic Highways, Policy SH-1.1: Protect the Natural Qualities of Designated Scenic Routes.	The natural qualities of designated scenic routes should be protected. Definitions of scenic routes may be found in Section 7.3.1, page 7-11.
Inyo County General Plan, Goals and Policies Report, December, 2001. 7.8 Canals, Pipelines and Transmission Cables. Policy CPT-1.1: Placement of Corridors.	The County shall consider the visual and environmental impacts associated with placement of regional conveyance corridors. Table 7-7, page 7-33, lists implementation measures.
Inyo County General Plan, Goals and Policies Report, December, 2001. 8.8 Visual Resources, 8.8.3: Visual Resource Issues.	Critical visual resource issues identified: • Maintain small town character; • Preserve panoramic views; • Maintain open natural character of the County; Maintain visual resources of scenic corridors, highways and roadways.
Inyo County General Plan, Goals and Policies Report, December, 2001. 8.8 Visual Resources. Goal VIS-1.	• Preserve and protect resources throughout the County that contribute to a unique visual experience for visitors and quality of life for County residents. This includes a number of policies (not listed here) to protect historic character, encourage community design themes, establish grading standards and ensure outdoor advertising does not degrade visual resources.

Source	Policy and Strategy Description
Inyo County General Plan, Goals and Policies Report, December, 2001. 8.8 Visual Resources. Goal VIS-1.1: Historic Character.	The County shall preserve and maintain the historic character of communities within the County.
Inyo County General Plan, Goals and Policies Report, December, 2001. 8.8 Visual Resources, Policy VIS-1.4: Equipment Screening.	Within communities, building equipment shall be screened from public view.
Inyo County General Plan, Goals and Policies Report, December, 2001. 8.8 Visual Resources, Policy VIS-1.6: Control of Light and Glare.	The County shall require that all outdoor light fixtures use low-energy, shielded light fixtures which direct light downward.
Inyo County General Plan, Goals and Policies Report, December, 2001. 8.8 Visual Resources, Policy VIS-1.7: Street Lighting.	Street lighting shall only be utilized where needed to protect public safety related to traffic movement.
Inyo County Renewable Energy Ordinance, August 17, 2010.	• Potential adverse impacts may include scenic views which may be blocked or degraded, which may affect the attractiveness of the County for tourism. Other impacts may include light and glare. The County requires that adverse impacts are avoided or acceptably mitigated. • Police powers of the County include protection of the environment of Inyo County, including biological and other natural resources, aesthetics, recreational attractiveness. • The term “environment” includes the ecological, social, aesthetic and economic environment of the County. It is not limited by and may be broader than the environmental considerations under CEQA or NEPA [National Environmental Policy Act]. In lieu of imposing development standards set forth in Title 18 (above), the County may impose such standards as are deemed appropriate and may incorporate or impose such other standards and mitigation measures as are deemed necessary.
Clark County, Nevada	

Source	Policy and Strategy Description
Northwest Clark County Land Use Plan, November 7, 2007: Wilderness Areas	Three Wilderness Areas and one Wilderness Study Area are located in Northwest Clark County. These include Mt. Charleston, La Madre Mountain and Rainbow Mountain Wilderness Areas and the Mount Stirling Wilderness Study Area. Mount Charleston and Mount Stirling are within the viewshed of the project area.
Northwest Clark County Land Use Plan, November 7, 2007: Scenic Byways	Northwest Clark County has two county-designated Scenic Highways, a BLM Back Country Route and four state-designated Scenic Byways. No designated scenic highways, byways or back country routes are in the vicinity of the proposed project site.
Clark County Chapter 30.56: Site Development Standards, Part F: Lighting Standards	Provides lighting standards that restricts height of poles to 25 feet and that all outdoor freestanding liuminariesluminaries shall be hooded and directed downward. Security lighting on sensors are exempt from the standards.
Clark County Chapter 30.68.30: Site Environmental Standards: Lighting	Lighting shall be designed to prevent light from shining directly on residential uses. All light sources shall be shielded and directed downward at all times.
Clark County Comprehensive Plan, November 16, 2010, Volume One, Environmentally Sensitive Lands (ESL) Policy and ESL Advisory Committee Report, January 29, 2004.	Aesthetic Areas are defined in the 2004 ESL Report These areas include Scenic Routes, Slopes of 50% or more, Significant Geologic Features and Scenic Points or Features identified in Table one of the report. There are slopes of more 50%, significant geologic features and scenic points potentially within the viewshed of the proposed project site. The policies outlined in the Comprehensive Plan generally pertain to land use and not aesthetics.
Nye County, Nevada	
Nye County Comprehensive/Master Plan, June 7, 2011, Section 3.5.1, Solar Energy, Figures 7 and 8.	Figure 7 shows pending and approved renewable energy projects. Figure 8 shows those areas of the county best suited to solar development based upon a March 2010 analysis.[8] The greater Pahrump

[8] Suitability Analysis for Nye County Solar Generation, Transmission and Related Support Facilities, March 2010.

Source	Policy and Strategy Description
	Valley is shown as “Better” for solar development, on a scale Best- Better-Good-Unsuitable. An area adjacent to Highway 160 is identified as best. This is presumably the same area identified in Figure 7 as “pending solar project”.This appears to be in the vicinity of the possible solar project listed in Visual Resources Table 5 Cumulative Impacts as Sandy Valley in Clark County.
Nye County Comprehensive/Master Plan, June 7, 2011, 6.1.7: Scenic Drives	Three scenic roads are identified on page 53: Lunar Crater Back Country Byway, The Extraterrestrial Highway and Tonopah Star Trails. None of the roads are in the proposed project vicinity.

ASSESSMENTS OF IMPACTS AND DISCUSSION OF MITIGATION

This section includes information about the following:

1. Method and threshold for determining significance
2. Direct/indirect/induced impacts and mitigation
3. Cumulative impacts and mitigation

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

To determine whether there is a potentially significant visual resources impact generated by a project, Energy Commission staff reviews the project using the 2011 CEQA Guidelines, Appendix G Environmental Checklist, pertaining to “Aesthetics.” The checklist questions include the following:

A. Would the project have a substantial adverse effect on a scenic vista?

B. Would the project substantially damage scenic resources, including, but not limited to trees, rock outcroppings, and historic buildings within a state scenic highway?

C. Would the project substantially degrade the existing visual character or quality of the site and its surroundings?

D. Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

Staff evaluates both the existing visible physical environmental setting, and the anticipated visual change introduced by the proposed project to the view, from representative, fixed vantage points known as “Key Observation Points” (KOPs). KOPs are selected to be representative of the most characteristic and critical viewing groups and locations from which the project would be seen. The likelihood of a visual impact

exceeding Criterion C of the CEQA Guidelines, above, is determined in this analysis by two fundamental factors: the susceptibility of the setting to impact as a result of its existing characteristics (reflected in its current level of visual quality, the potential visibility of the project, and the sensitivity to scenic values of its viewers); and the degree of visual change anticipated as a result of the project. These two factors are summarized respectively as *visual sensitivity* (of the setting), and *visual change* (due to the project). Briefly, KOPs with high sensitivity (Environmental Checklist pertaining to "Aesthetics", takes into account scenic quality, high levels of viewer concern, etc.), that experience high levels of visual change from a project, are more likely to experience adverse impacts. KOPs with low sensitivity or low levels of visual change are less likely to experience adverse impacts. **Visual Resources Appendix VR-1** provides information about the process used to evaluate each KOP. Staff's analysis of the project's effect on each KOP is presented under Operation Impacts and Mitigation section of this analysis.

Visual Resources Figure 17 shows the locations of the seven KOPs provided by the applicant in the AFC. The four KOPs located in California used in this analysis are as follows:

- **KOP 3** – View from Old Spanish Trail Highway and Property Boundary of Proposed St. Therese Mission, Charleston View, California
- **KOP 4** – View from Silver Street at Charity Lane, Charleston View, California
- **KOP 5** – View from Old Spanish Trail Highway Eastbound, Inyo County, California
- **KOP 7** – View from Garnett Road at Old Spanish National Historic Trail Alignment/4WD Road, Charleston View, California

The following three KOPs are located in Nevada, looking toward the project site:

- **KOP 1** – View from Old Spanish Trail Highway Westbound, Nevada
- **KOP 2** – View from Stump Springs ACEC, Nevada
- **KOP 6** – View from Thorne Drive at Homestead Road, Pahrump, Nevada

The KOPs were selected to represent the overall project viewshed or area of potential visual effect (the area within which the project could potentially be seen). Staff also reviews applicable federal, state, and local LORS and their policies or guidelines for aesthetics or preservation and protection of sensitive visual resources that may be applicable to the project site and surrounding area. These LORS include local government land use planning documents (e.g., General Plan, zoning ordinance). See **Visual Resources Table 2** for applicable LORS and **Table 6** for the project's consistency with applicable LORS.

Direct/Indirect Impacts and Mitigation

Information about direct and indirect impacts and proposed mitigation is included in this section and grouped according to the questions found in the CEQA Environmental Checklist, A through D below.

A. SCENIC VISTA

"Would the project have a substantial adverse effect on a scenic vista?"

For the purposes of this analysis, a *scenic vista* is defined as a distant view of high pictorial quality perceived through and along a corridor or opening, or from a designated scenic area. Staff has conducted site visits to the project area and researched national, state and local scenic vista designations in the vicinity of the project area.

Yes. As seen in **Visual Resources Figures 1 and 3**, the project is surrounded by identified areas of high scenic value. Views of the Nopah Range and Wilderness Area, Kingston Range and Pahrump Valley Wilderness Area and Spring Mountains National Recreation Area, including the prominent Mt. Charleston, would all be significantly impacted by the project. An earlier environmental document prepared for Roland H. Wiley, concluded that the previously proposed agricultural development of "dispersed farm buildings and housing units will probably not interfere with the view of the surrounding mountains as would a high-rise development or an industrial complex with smoke stacks and other structures which ordinarily protrude above buildings (EDB 1974, p. 68). As described earlier in this section, these areas were inventoried by the BLM as Classification 1, the highest scenic value that can be assigned. Views from some of these scenic resources would also be significantly impacted, as would views from some alignments of the Mormon and Old Spanish National Historic Trails.

KOPs 5 and 7 clearly show the impact of the project on the existing scenic view of Mt. Charleston, a prominent landmark of importance in pre-history and current times. KOP 5, while located just beyond the boundary of the Nopah Wilderness Area, is representative of the view from the Nopah Wilderness Area as Old Spanish Trail Highway passes through the same alluvial foothills as the mountain range. KOP 7, located just outside the boundary of the Pahrump Valley Wilderness Area, representative of a portion of the Mormon/Old Spanish National Historic Trail, illustrates the project's visual disturbance of the view of Mt. Charleston from the historic trail alignment and from the wilderness area.

KOP 3 manifests the adverse impact of the project on the motorists' view of the highly scenic Nopah Range and Wilderness Area. There is no physical mitigation that can be offered to reduce the substantial adverse effect on the high pictorial quality in this valley by the introduction of two 750-foot power towers and related facilities into the landscape in both California and Nevada.

B. SCENIC RESOURCES

"Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway corridor?" For the purpose of this analysis, *scenic resources* include a unique water feature (waterfall, transitional water, part of a stream or river, estuary); a unique physical

geological terrain feature (rock masses, outcroppings, layers or spires); a tree having a unique/historical importance to a community (a tree linked to a famous event or person, an ancient, old growth tree); historic building; or other scenically important physical features, particularly if located within a designated federal scenic byway or state scenic corridor. Staff has conducted site visits to the project area and researched national, state and local scenic resource designations in the vicinity of the project area.

No. The valley floor in the project area consists primarily of desert scrub vegetation and a sandy or gravelly soil. The project site is not located within an eligible state scenic highway corridor and there are no notable scenic features or historic structures located within the site. Therefore, the project would not substantially damage scenic resources such as trees, rock outcroppings, or historic buildings within a state scenic highway.

C. VISUAL CHARACTER OR QUALITY

"Would the project substantially degrade the existing visual character or quality of the site and its surroundings?" **Yes**, as described below.

The visual aspects evaluated according to this criterion are organized into two categories: 1) construction impacts and 2) operational impacts.

Construction Impacts and Mitigation

Information about construction impacts are organized according to project site and construction laydown and parking area and linear routes. Per the AFC, construction would take place over 29 months.

Project Site and Construction Laydown Area

Construction activities at the project site and construction laydown area would substantially degrade the visual character or quality of the site and surrounding areas as viewed from KOPs 3, 4, 5 and 7, due in large part to the construction of the power towers. The construction activity, other than the power towers, would be moderately to highly visible from KOP 3, representative of the motorists travelling westbound on Old Spanish Trail Highway. Construction activities, including movement of large vehicles and materials and installation of heliostats, would occur along the entire two-mile linear project boundary fronting the road and would be at least partially visible from multiple vantage points. Construction-related truck traffic would be entering and leaving the project by way of what is now known as Topaz Street, at the westernmost boundary of the project site, and would introduce activity into the views not currently seen. The laydown area, where much of the storage and assembly would occur, is approximately one mile north of Old Spanish Trail Highway, and therefore would have low visibility from KOP 3 and the road. The construction of the power towers would be highly visible from all vantage points and therefore produce the most significant visual impact of the project. Construction views of the project structures, other than the power towers, from KOPs 4 and 7, would be diminished by the distance and screening provided by existing vegetation and topography. The project view from KOP 5 would be seen in its entirety on the valley floor and would be significantly altered by the construction activity.

Light or Glare

Nighttime construction and security lighting would have the potential to produce glare or off-site light trespass. If bright exterior lights were not shielded or directed onsite, they could introduce significant light or glare to the vicinity, particularly for motorists on Old Spanish Trail Highway, as represented by KOP 3 and 5. This has the potential to cause distraction in the form of glare and confusion as to the light source origin for motorists, who are used to travelling along a fairly dark stretch of highway. Depending upon the project setbacks, without screening and lighting controls, the impact upon motorists on Old Spanish Trail Highway would be adverse and significant. As the power towers are constructed, aviation safety lighting would need to be operational as the towers reach each successive level of lighting required by the FAA. In addition, cranes used in the project construction would also require aviation safety lighting.

The construction lighting and activity have the potential to create significant and unavoidable visual impacts on residents, motorists and other viewers. The applicant's proposed mitigation measures do not address nighttime construction lighting (5.13-32), but does describe that assembly of the heliostats would occur within a building and therefore this activity would not be visible. Impacts from nighttime construction lighting may be partially mitigated through effective implementation of Conditions of Certification **VIS-4** and **VIS-5**, screening fencing and lighting controls. Conditions of Certification **VIS-4** and **VIS-5** would also limit visibility of the construction site and the potential for glare and light trespass during construction for the lower profile construction activities. There is no mitigation for reducing the visual lighting impacts during construction of the solar tower facilities and FAA required lighting of the power towers, therefore these visual effects would remain significant and unavoidable.

Linears

Gas pipeline construction would occur primarily in Nevada on BLM-managed lands. Due to their temporary nature and low visibility, there would be no significant adverse impacts from construction of the pipelines.

On-site construction would include underground transmission facilities. There would be temporary visual impacts of staged construction materials, equipment and excavation. With effective implementation of **VIS-4** and **VIS-5**, onsite linear construction would be largely screened from view for viewers at close proximity, such as KOP 3. Staff anticipates that no significant adverse visual impacts would occur during construction of the linears associated with the project in California. BLM is addressing the impacts of linear construction in Nevada.

CONCLUSION

Overall, staff concludes that the project's proposed construction activities as described above would substantially degrade the existing visual character or quality of the site and its surroundings. The adoption of the conditions of certification noted herein would mitigate some of the visual impacts at ground level but there is no mitigation for the visual impacts during construction of the power towers.

Staff has reviewed **Socioeconomics Figure 1** showing the minority population is less than 50 percent within a six-mile radius of the proposed HHSEGS. The absence of an

environmental justice population within that radius and, by extension, the lack of visual impacts to any environmental justice population leads Energy Commission staff to the conclusion that there are no visual resources environmental justice issues related to the construction of this project and no minority or low-income populations would be significantly or adversely impacted.

Operational Impacts and Mitigation

Operation impacts are discussed by representative Key Observation Points (KOPs) followed by a summary of impacts from Linears and Water Vapor Plumes. As discussed earlier, seven KOPs were identified within the AFC and all are analyzed for CEQA purposes. Potential impacts are identified by two fundamental factors for each KOP: *visual sensitivity* (the susceptibility of the setting to impact as a result of its existing characteristics, including current level of visual quality, potential visibility of the project, and sensitivity to scenic values of viewers); and the degree of *visual change* anticipated as a result of the project.

KEY OBSERVATION POINTS IN CALIFORNIA

KOP 3 (Figure 20a)

KOP 3 is designed to represent the view of the project from the perspective of motorists traveling westbound on Old Spanish Trail Highway and visitors to the St. Therese Mission, currently under construction. The mission is located 0.75 mile east of the eastern boundary of the HHSEGS project, The 17.5 acre campus-style environmental park will function primarily as a columbarium. St. Therese Mission[9], will include the following structures and activities:

- A small chapel;
- Two enclosed columbarium buildings, each built to store 2000 niches;
- An outdoor garden featuring 68 family columbaria and 132 garden niches;
- A restaurant with indoor and outdoor seating space and banquet area;
- A visitor's center with offices;
- A children's playground and a small dog park;
- A residential unit developed for housing two full-time staff members; and
- A meditation garden will feature 14 life-sized Stations of the Cross.

St. Therese Mission includes areas set aside for large passenger busses navigating the entry area of the site and parking in dedicated bus parking stalls. Therefore, it may be safely assumed that the St. Therese Missions expects visitors to arrive by both automobile and bus.

Visual Sensitivity

Old Spanish Trail Highway is a two-lane roadway and the westbound direction provides drivers and passengers a panoramic vista of the Pahrump Valley and the Nopah Range.

[9] http://www.sttheresemission.com/

The view from KOP 3 is of roadside edge elements in the foreground, such as fencing and wooden transmission poles, construction activities at St.Therese Mission in the middle ground, and the Nopah Range and Wilderness Area in the background. The view would be cohesive and highly scenic due to the panoramic nature of the horizon line formed by the Nopah Range were it not for the roadside elements in the foreground and construction activity in the middle ground. This combination reduces KOP 3 to moderate visual quality. Viewer concern takes into account views of residential, recreational and motoring viewers. The view at KOP 3 is primarily viewed by drivers and passengers. The overall scenic and panoramic view at KOP 3 creates moderate-high viewer concern for passing viewers.

Drivers and passengers along Old Spanish Trail Highway travelling westbound have a largely unobstructed view of the project site, giving KOP 3 a high degree of visibility. 2007 Traffic counts indicate 258 to 275 automobiles per day for this stretch of Old Spanish Trail Highway[10]. Staff observations concur with those figures. This is a low number of viewers[11]. Upon completion of the St. Therese Mission, the number of viewers from KOP 3 may increase by up to 40 per day[12]. For the purposes of this analysis, based on existing traffic data, the number of viewers is rated as low.
At fifty-five miles per hour (nearly one mile per minute), the driver's attention is rightly more focused on the road and scanning for vehicles or pedestrians entering the roadway, and therefore their view duration at KOP 3 may be considered low to moderate[13]. Passengers, however, are more inclined to take in the passing view and so the view duration for passengers is naturally higher than for drivers. Passengers have the luxury of scanning the horizon and taking in the larger view, therefore they would experience a moderate view duration. The completion of the St. Therese Mission campus would increase the view duration significantly as, not only would visitors be entering the property in automobiles and busses, but would be lingering on the property for hours. This would give the future viewers from the Mission a high degree of view duration. Averaging the three viewing durations above, staff rates the view duration at KOP 3 as moderate.

Thus, based on the moderate visual quality and viewer exposure, and moderate to high viewer concern, overall visual sensitivity at KOP 3 is moderate.

Visual Change (Figures 20b, 20c)

The addition of the proposed project to the view from KOP 3 would add two very formidable and tall industrial power towers to the view. This is true of all of the KOPs. Other structures seen in the simulation, such as the air-cooled condenser unit at Solar Plant 2, are much smaller in comparison to the power towers strong vertical profile. The towers break the horizon line of the Nopah Range and clearly capture the attention of the viewer due to their stark contrast to the pristine wilderness area behind them. The

[10] E-mail to Candace Hill from Joshua Hart, Inyo County Planning Director, April 3, 2012.

[11] CEC staff characterizes daily motor vehicle trips of 151-300 as low and 501-2,500 as low-moderate.

[12] Visitation expectations included in Conditional Use Permit #2010-02/St. Therese Mission, and Negative Declaration associated with the permit.

[13] CEC staff generally characterizes view duration as low if less than 10 seconds, low-moderate 10-20 seconds, moderate 20-60 seconds, moderate-high 1-2 minutes and high longer than 2 minutes.

conical forms, thick vertical lines, industrial gray color, luminous tops and smooth surfaces are markedly different than any other landscape or built feature in the view. Insertion of the towers into the view provides a high degree of contrast to the existing view as there are no other structures like them in the vicinity. While existing structures such as wooden roadside transmission poles already provide a minor degree of vertical intrusion, the sheer size of two 750-foot tall towers and their mass (72 feet in diameter, capped by a distinct 102 foot diameter "head" that is the solar receiver) are disproportionate to anything else in the view and their dominance is high. While the two towers pierce the horizon line of the mountain range (known as skylining), they do not have the effect of blocking any views in a significant way, as might a more traditional gas-fired power plant, with its more horizontal structures. But the towers do interrupt the highly scenic panorama of the Nopah Range and Wilderness Area, therefore view disruption is moderate.

As a result of a Data Request by staff (DR 154-155), the applicant revised KOP 3 to illustrate the visual effects of airborne dust and particles (**Visual Resources Figure 20c**). KOP 3 was chosen for this revision as it is the closest KOP to the project site and the location where the visual effect of "haloing" or "tee-peeing" would be the most pronounced. The applicant references in the response to DR-154 that the "tee-pee" effect would be seen at either high humidity (RH) conditions (above 40 percent) or during hazy (i.e. dusty) conditions. The applicant discusses that high RH values are normally expected during the cool hours of the day (most typically in the morning). Therefore the "tee-pee" effect is more likely to be seen in the cooler hours of the morning or evening, when RH is highest. It is also stated that the effect may be more pronounced when the sun is low over the horizon. This would create a potentially higher incidence of visual distraction from the motorist's perspective at KOP 3. If the sun were low in the horizon to the south (as in the winter months) or to the west (as in the summer months), the visual dominance and the potential view disruption of the scattering effect of light would add to the overall visual change, which under these circumstances would now both be characterized as high. This results in the overall visual change at KOP 3 as high.
The contrast and dominance of the project structures in the landscape as seen in the simulation are high and the view disruption of the Nopah Range is high. The overall visual change at KOP 3 is high.

KOP 3 Summary

Taking into account the moderate visual sensitivity and the high overall visual change, visual impacts at KOP 3 would remain significant even with mitigation. Views of the dominant power towers and bright solar receivers cannot be effectively screened. Views of other project structures may be partially screened with perimeter tree plantings, solid walls and fencing. Adoption of Condition of Certification **VIS-1** (Surface Treatment) and **VIS-2** (Landscape Screening) will reduce the project's contrast with the surroundings by requiring neutral tones complimentary to the desert landscape and providing a perimeter screening consisting of vegetation, walls and/or screened fencing. Adoption of Condition of Certification **VIS-6** would provide remedial mitigation for the loss of scenic views from KOP 3 by providing an interpretive area highlighting the natural and cultural visual resources in the area. The interpretive area would benefit the public by providing information about the Wilderness Areas, National Recreation Areas, named peaks and

the Old Spanish National Historic Trail, all adversely impacted by the introduction of the project. This remedial mitigation and its public benefit does not, however, reduce the visual impacts to less than significant, and is offered as an educational tool.

Partial screening of the project may also occur with the buildout of the St. Therese Mission project. The Mission project will introduce various building structures and landscape plantings into the foreground partially masking the HHSEGS structures except for the power towers. A tree canopy on site, as shown in the renderings, would have the effect of limiting the direct view of lower-profile HHSEGS structures to visitors arriving and using the St. Therese Mission facility.

KOP 4 (Figure 21a)

KOP 4 is representative of the view from residences in Charleston View, the only residential community in California near to the project site. The community can be characterized as sparsely populated (population of 68 in 2010 census count, see footnote 4) and composed of scattered low-profile, one story structures and planted vegetation including trees and shrubs. Charleston View has a total of 34 housing units, 29 of which are occupied[14]. The lots are 2.5 acres in size and a street grid of unpaved roads exists and appears to be maintained by the County Public Works Department (grading). The community has uninterrupted views of Mount Charleston and the Spring Mountains, hence the name Charleston View. As seen in KOP 4, the long view from Charleston View extends northwest to the range of mountains adjacent to Pahrump, Nevada. Charleston View residents also have direct, uninterrupted views of the Nopah Wilderness Area to the west and the Pahrump Valley Wilderness Area to the south of the community. The subdivision, laid out and permitted in the 1960s, never even began to approach its full build-out capacity. Visual Resources Figures 12 and 13 are characteristic of the developed portions of Charleston View.

KOP 4 is located at the intersection of Silver Street and Charity Lane. The view is panoramic, with the Spring Mountains forming an unbroken horizon line. The view north along Silver Street takes the eye beyond Old Spanish Trail Highway and to brightness on the ground in the distance before the toe of the mountain range, which appears to be the sandy plateau of the landform locally-referred to as Hidden Hills. The foreground is composed of the unpaved roads, and some sparse desert vegetation with a large expanse of sandy soil exposed in the right portion of the view. The middle ground is occupied by a single house, sited at a roughly forty-five degree angle to the Silver Street and flanked by vegetation and other structures on the property. The west side of Silver Street has native desert vegetation that appears undisturbed in the middle ground. The background is composed of the distinct linear form of the Spring Mountains and the snow-covered peaks of Mount Charleston and Mount Stirling. The line of the mountain range is subordinate to the expanse of blue sky, which makes up approximately forty percent of the view at KOP 4. The low profile of the fore- and middle ground and long vistas to the mountains characterize this view.

[14] CH2MHILL - Census 2010 PL 94-171 Data

Visual Sensitivity

The Spring Mountains provide a highly scenic backdrop to this view. To the residents, who have chosen to live within this viewshed, it may be perceived as picture-postcard-like in its scenic value, and therefore of high quality. Other than the low-profile buildings and scattered plantings, there is little to obstruct the view, which is highly visible from the treeline above and down the linear corridor of Silver Street. Typically, residential areas are considered to have a high degree of visual concern. As mentioned earlier, the 2010 U.S. Census counts the population in the vicinity of Charleston View as 68. Therefore the number of permanent viewers is moderately high[15]. Because of the permanent nature of residential viewers, the duration of the view is also extended and therefore is rated as high. Considering the high visibility of the open expanse, the moderate to high number of viewers and the high duration of the view, the overall viewer exposure is high. With the high visual quality, high degree of viewer concern and the overall high degree of viewer exposure, the overall visual sensitivity at KOP 4 is high.

Visual Change (Figure 21b)

The introduction of the structures for the HHSEGS facility into the view at KOP 4 dramatically alters the nature of the view from rural and highly scenic to highly industrial. The two power towers as seen on Silver Street are very visible and do not mimic any existing line, form, color or texture in the view. The verticality of the towers and their smooth conical form topped by a luminescent cap are in direct contrast to the horizontal, soft-edged forms of the natural vegetation and low profile of the existing residential structures and plants. The industrial gray tone of the tower and the bright white solar receiver on top are in marked contrast from the low-key, natural desert palette. While gray foliage is characteristic of some of the desert plant species seen in the view, they are accompanied by plants of various hues of browns, tans and greens. The sleek, smooth surfaces and strong vertical directionality of the towers adjacent to the coarse, gravely texture of the roadbed and the irregularity of the desert vegetation and scattered structures is not conducive to the surrounding area, therefore the visual contrast is high.

The broad, panoramic horizon line of the Spring Mountains and expansive blue sky are both pierced by the towers. The two 750-foot towers with their luminescent solar receiver caps dominate the landscape so completely that it will be hard to imagine the unbroken, highly scenic quality of the existing view. It is noted here that staff conducted reconnaissance trips to the Pahrump Valley several times and have made note of some of the valley's tallest and largest existing structures as reflected in **Visual Resources Figures 15 and 16**. There is nothing in the entire valley that dominates the landscape in the way the towers would as shown in the KOP 4 simulation, therefore, dominance is high. The high visual quality and continuity of the view of the mountains and expanse of sky is disrupted by the industrial towers and their introduction would cause some view disruption. View disruption is moderate to high. High visual contrast and dominance together with moderate to high view disruption yields a high degree of overall visual change.

[15] CEC staff characterizes residential viewers as very low: 1 or none; low: 2 to 5; low-moderate: 6-20; moderate: 21-50; moderate- high: 51-100; and high: more than 100.

KOP 4 Summary

Overall visual sensitivity is high and overall visual change is high at KOP 4, so visual impacts at KOP 4 would be significant and unavoidable. Adoption of Condition of Certification **VIS-1** would ensure the project structures other than the towers and SRSGs do not contrast with the surroundings by requiring neutral tones complimentary to the existing desert landscape. Implementation of Condition of Certification **VIS-2** would have some screening effect from this distance on the lower project structures, such as the air-cooled condenser. Adoption of Condition of Certification **VIS-6** would provide remedial mitigation for the loss of scenic views from KOP 4. The applicant's proposed Mitigation Measure 5 and staff's proposed Condition of Certification **VIS-7** provide for tree plantings on the property of Charleston View residents. For those who choose this option, it may partially screen the view of the power towers. It may also, in some instances, have the effect of screening the resident's highly scenic view of the northern portion of the Spring Mountain range. The planting of trees, however, does not provide complete mitigation for the visual impact of the towers. Therefore, the visual impacts would remain significant and unavoidable.

KOP 5 (Figure 22a)

KOP 5 primarily represents the view of the motorist travelling eastbound on Old Spanish Trail Highway, which overlooks the greater Pahrump Valley. It also represents the view of visitors to the Nopah Wilderness Area. **Visual Resources Figure 17** and AFC Figure DR 32-1 (not included in this section) show the visibility of the towers and the heliostat field respectively. Based on the applicant's visibility models, and staff's own field visits, the KOP 5 location on the road is where the valley becomes visible to the motorist for the first time travelling eastward from Tecopa. The viewer has a panoramic view of the valley and the Spring Mountains, with Mount Charleston centered in the frame. The foreground is made up of the asphalt roadway, gravel shoulder and a slightly rising slope with fairly dense native vegetation. The middle ground is comprised of the undeveloped valley floor. A portion of Old Spanish Trail Highway is visible traversing at an angle toward Mount Charleston in the right half of the frame of KOP 5. The background is composed of the unbroken line of the Spring Mountains and a vast expanse of blue sky.

Visual Sensitivity

At certain times of year, the scene of the Pahrump Valley is quite vibrant, with the dark bluish hue of the mountains with snow-capped peaks set against the medium blue sky and verdant vegetation adjacent to the roadway. Throughout the season, the views are panoramic and feature the focal point of Mount Charleston in the center of the view.

The Old Spanish Trail Highway snaking through the valley and the broad expanse of sky and mountains with ample vegetation is a picture-postcard quality scene of high visual quality and has a high degree of visibility. Motorists' visual concerns generally take in oncoming or roadside traffic, the ability to see clearly the road ahead, the existence of distracting or discordant elements and effects of glint or glare from both natural and human-developed causes. Natural causes may be the sun or a reflection on a water body and human-developed causes might be a reflection on car's window, headlights at night or lighting adjacent to the road. KOP 4 is largely devoid of much of those causes of glint and glare, other than the obvious headlights and possible sun

reflections on automobile glass. Viewer concern from the motorists' perspective is moderate. There are expected to be at least some recreationists in the Nopah Wilderness area who would have a higher level of viewer concern, due to the very nature of the designated scenic wilderness in which they have chosen to spend time, as the BLM describes it, in "places of solitude where people may experience freedom from our fast-paced industrialized society". That would place the viewer concern as high. A combined viewer concern of the motorist and the recreationist is moderate to high. Staff investigated visitation figures for the Nopah Wilderness Area with BLM staff at the Barstow Field Office. BLM staff was unable to provide visitation counts as they do not keep these records. BLM staff mentioned that logs are kept on some outdoor recreation sites, but there is no way to verify those figures. Staff agrees with the applicant that the number of viewers is low. As mentioned in the analysis of KOP 3, the traffic data for Old Spanish Trail Highway in the vicinity of the proposed project, and staff's own observations, indicate the number of motorists is low. Therefore, the combined number of recreational and motoring viewers represented by KOP 5 is low.

Duration of views would be different for motorists and recreationists. At this fixed point, the view would be quite fleeting for the motorist. Compared to the view duration of KOP 3, from KOP 5, the entirety of the valley can be seen for some time descending from the Nopah Range to the valley floor, a distance of approximately nearly five miles to the project center. KOP 5 is described as 3.8 miles west of the project site boundary in the AFC. The center of the power blocks, where the power towers are located, is approximately 5 miles from KOP 5. At a speed of approximately one mile per minute, the project's power towers would be in full view of the motorist for nearly five minutes, which is considered a high view duration. Likewise for the recreationist, who is hiking, or camping, possibly enjoying the solitude of the view, the duration would be high. As both views would last longer than two minutes, view duration at KOP 5 is rated as high. Overall viewer exposure, made up of high visibility, low number of viewers, high duration of view, is moderate to high. Overall visual sensitivity at KOP 5 is comprised of high visual quality, moderate to high viewer concern and viewer exposure and is therefore rated as high.

Visual Change (Figure 22b)

The introduction of the industrial structures of the proposed power plant creates strong contrast with the existing view. The simulation reveals a clearly visible project footprint and field of mirrors. The height of the towers nearly extends into the horizon line of the mountains, stopping just short. The vertical line and cylindrical form of the towers is unlike anything else seen in the view. The broad horizontal expanse of heliostats creates the illusion of a lakebed on the valley floor and introduces a strong horizontal line that did not exist before. The smooth gray concrete towers capped with a radiant solar generator do not blend in with the natural hues of the desert floor, mountains and sky. The project facilities at the base of towers, while noticeable even at this distance, do not contrast in the same overt way as the towers themselves. The facilities are shown in colors suited to the desert environment. The simulation shows areas of brightness within the heliostat field. The contrast with the existing view at KOP 5 is high. The simulation does not represent the actual brightness of the SRSG, which when viewed from KOP 5 would appear to be slightly above the direct eye level of a motorist. (The elevation of KOP 5 is approximately 143 feet above the valley floor location of

Solar Plant 2[16]). The direct view of the brightly illuminated SRSG would present an extreme visual change for the motorist who has just travelled through a canyon road bounded by natural vegetation and landform features.

The proposed project is co-dominant with other features in the landscape at KOP 5. From this distance, the project towers are subordinate to the peaks of the Spring Mountains. They remain below the horizon line of the peaks, and yet compete for the viewer's attention as focal points, therefore dominance is moderate. As the towers are not breaking the line of the mountains, and have a great deal of visual space between them from this viewpoint, the view disruption is moderate. In terms of high contrast, moderate dominance and moderate view disruption, the net overall visual change is moderate to high.

KOP 5 Summary

Overall visual sensitivity is moderate to high and overall visual change is moderate to high, consequently visual impacts would be significant and unavoidable. Recommended adoption of Condition of Certification **VIS-1** would ensure the project structures other than the towers do not contrast with the surroundings by requiring neutral tones complimentary to the existing desert landscape. However, the visual impact of the towers and the SRSGs is unmitigable.

KOP 7 (Figure 24a)

KOP 7 was selected to represent the view of the project site from the perspective of a hiker or driver following what is identified in many documents as the Old Spanish National Historic Trail (OST) and/or the Mormon Trail (see citations on **Visual Resources Figure 2**). As the actual traces of the historic trails have not been inventoried and published, for the purposes of this analysis staff would proceed on the assumption that remnants of the historic trails are in the vicinity of the alignment provided by the National Park Service, as seen in the composite Visual Resources Figure 2. The two-track path, seen in KOP 7, is also used by four-wheel drive motorists. Staff has seen evidence of vehicle tire tracks on several site visits. The location of KOP 7 also places it just outside the bounds of the Pahrump Valley Wilderness Area and therefore also represents the view of potential recreationists within the wilderness area, as well as those following the historic trail route on foot or by vehicle.

In the foreground, fairly dense desert vegetation carpets the gravelly soil. Leading off to the right is one track of the two-track path of the Old Spanish/Mormon Trail. The middle ground reveals a broad expanse of valley floor, culminating in the sandy cliffs of the Hidden Hills escarpment. From there, the Spring Mountains rise majestically, with Mount Charleston crowning the range with its snow capped peak. The bluish cast of the mountains nearly blends into the sky above, and yet the horizon line of the ridge is distinct. At certain times of year, the hue of the range is dark blue and capped with snow (see **Visual Resources Figures 6, 7** and **21a**). The vegetation in the foreground displays a surprisingly varied palette of hues from brown to gray to dark green to lighter green, and it is nicely set off by the medium tan and brown tones of the gravelly soil

[16] Google Earth 2012

below. Like the other KOPs, this frame features a large expanse of sky as a co-dominant element.

Visual Sensitivity

The panoramic view of desert valley floor, regal mountains and large expanse of clear blue sky, with little interruption in the way of human development, is of high scenic quality. During the times of year when vegetation becomes dormant, the residential structures of Charleston View appear faintly in the middle ground, to the right of the frame, due to lack of screening. Even then, at this distance, the structures are barely discernable in the view.

Viewers at this location are locals traversing the two-track path in their four-wheel drive vehicles and recreationists. For motorists, the viewer concern would be low-moderate as they would likely be intent on navigating the path safely and reaching their destination. Recreationalists would naturally have a higher degree of viewer concern, as they would be traveling more slowly and taking in the surroundings, including the panoramic view as shown in KOP 7 as well as the views to and within the Pahrump Valley Wilderness Area. Therefore, staff finds a moderate level of viewer concern at KOP 7. As mentioned earlier, the BLM Barstow field office does not have visitation figures for the wilderness area or the historic trail. Staff observations are that vehicular use of the path appears to be light; there was never more than a singular set of tire tracks evident at any of the site visits staff made to this KOP.

Visual Resources Figure 5 shows the two-track path headed in a southwesterly direction near this same viewpoint. One can see evidence of vehicle use but it does not appear to be highly impacted by multiple tire tracks. **Visual Resources Figure 7** shows the trail alignment in an easterly direction toward Mount Charleston and the vehicular use appears to be even lighter. Staff concludes that the number of viewers is very low at KOP 7.From KOP 7, the view is panoramic and unobstructed, giving it a high degree of visibility. The duration of views would vary, with motorists having shorter views than recreationists. Drivers would be focused on traversing the unpaved path but passengers would have undistracted views. Recreationalists would experience longer view durations. Given the various types of viewers, the duration of view is moderate-high at KOP 7. Considering the high degree of visibility, the low number of viewers and the moderate-high duration of view, the overall viewer exposure is moderate.

It should be noted that BLM is developing an Old Spanish Trail (OST) Interpretive Auto Tour for California (Las Vegas to Los Angeles). The auto tour is modeled after the National Park Service National Trails System National Historic Trails Auto Tour Route Interpretive Guides and will be presented both in physical booklet form and online as a PDF. The auto tour stays on paved roads: highways, interstates, city roads, etc. and its path approximates the OST corridor. Selected OST historical sites, museums, state historical markers, parks and trails will be listed as tour stops. The publication of this auto tour may have the effect of increasing visitorship to the off-road trails and sites along the route in the future, thereby increasing the viewer concern.
The high visual quality of the scene, with moderate viewer concern and exposure yields a moderate to high overall visual sensitivity. This is borne out as the KOP represents

both the view from a wilderness area as well as from a point on a national historic trail, where viewer concern should be higher than average.

Visual Change (Figure 24b)

The introduction of the HHSEGS structures into the KOP 7 view would alter the landscape substantially. The vast scene of natural features and broad horizontality would be disrupted by the strong vertical lines of the power towers in the middle ground. The smooth, cylindrical towers, with their luminescent caps, would be in direct opposition to the texture of natural landforms and vegetation seen in the view, therefore contrast is high. The proposed facility, including the broad array of reflective mirrors, would dominate the view. Even though the towers do not break the horizon line of the mountains, their appearance in the tranquil desert landscape is jarring and commands the viewer's attention. Dominance is moderate to high. The towers disrupt the continuous horizontal refrain of valley floor and mountain range and in so doing, introduce an element of view disruption. By not extending into the ridgeline's horizon, the effect of disruption is reduced. View disruption is moderate. The overall visual change at KOP 7 is moderate to high.

KOP 7 Summary

KOP 7 has a moderate to high overall visual sensitivity and a moderate to high degree of visual change, consequently visual impacts would be significant. Implementation of the proposed conditions of certification would not substantially reduce the impacts at this KOP. Adoption of Condition of Certification **VIS-1** would reduce the contrast with the surroundings by requiring neutral tones complimentary to the existing landscape but the unobstructed view of the project structures, including the towers, prevents any mitigation which would reduce the overall impact to less than significant. Adoption of Condition of Certification **VIS-6** would provide remedial mitigation for the loss of scenic views from KOP 7.

KEY OBSERVATION POINTS IN NEVADA

While BLM is the lead agency for NEPA analysis in Nevada and has the responsibility to assess visual impacts and assign conditions to the portions of the project in Nevada, Energy Commission staff have analyzed the visual impacts of the solar plant in California on the KOPs in Nevada.

In addition to the Nevada KOPs provided by the applicant, staff briefly analyzed the impacts from the perspective of motorists on Highway 160 and recreationists in the Spring Mountains Recreation Area.

State Highway 160 in Nevada is the primary throughway for the Pahrump Valley. The descent into the Pahrump Valley from the east presents the motorist with a high quality view of relatively undisturbed landscapes. While a KOP has not been established from Highway 160, it is important to note the high degree of visibility of the valley floor to motorists travelling northwest on the highway from Las Vegas toward Pahrump (See **Visual Resources Figure 14**). Based on the 2008 traffic counts provided by the Nevada Department of Transportation, SR 160 carried approximately 8,900 vehicles daily at a point just west of the Old Spanish Trail Highway turnoff. Traffic counts in

subsequent years have fallen from the 2008 levels. However, the traffic counts still represent a moderate to high number of viewers[17]. With the view duration fairly extended, even at 70 miles per hour, the view toward the project site would last for several minutes, therefore providing high view duration[18]. While drivers may be focused on the road ahead, passengers would have the opportunity for an extended view toward the project site. Given the distance from the project, the viewer concern from SR 160 is low to moderate. It is likely the view of the heliostat field would resemble a dry lake bed (not unlike Pahrump Dry Lake, which is also in the view from SR 160) from elevated positions. Therefore the contrast with the existing landscape would be low to moderate. The glow of the power tower receivers would be noticeable but not as bright as from locations closer to the project.

Considering the distance from SR 160, for example, from a point directly east of the project site, which is approximately 15 miles from the center of the project site, the visual impacts would be less than significant. The project would not dominate the landscape or disrupt the horizon line of the ridges. Staff concludes that while the project would be visible and noticeable from SR 160, the contrast, dominance and disruption would be low to moderate, therefore overall visual change is low to moderate.

In response to comments received from Basin and Range Watch, staff analyzed the view toward the proposed project site from a high elevation position in the Spring Mountains National Recreation Area in Nevada. Using a photograph and Universal Transverse Mercator (UTM) provided by Basin and Range Watch, staff mapped the position of the photograph taken from the Bonanza Peak Trail, northwest of Mount Charleston. The elevation of this point is approximately 9,882 feet above sea level (ASL). The view distance from the trail point to the project site is approximately thirty miles. Staff was able to create a simulation of the proposed project in the view from the trail. Visual Resources Figure 26 includes a simulation of the view from the Bonanza Peak Trail and map of the viewpoint location. Staff has determined that, while the project would be visible from this location, the distance and atmospheric interference would lessen the visual impacts to less than significant. The contrast of the towers with the landscape at large is low-to-moderate from this high-elevation view. It is the reflection from the mirrors which would create the greatest contrast, and yet it would not likely be much different visually than the dry lake bed also visible from this viewpoint. Staff appreciates the opportunity to review this viewpoint and finds that the impacts on visual resources would be less than significant from this location.

KOP 1 – View from Old Spanish Trail Highway Westbound, Nevada (Figures 18a-18b)

The view from Old Spanish Trail Highway is an important view from the motorist's perspective. This is a travel route to and from Tecopa, California, a small community approximately 34 miles west from Nevada Highway 160. The current view across the Pahrump Valley is largely undisturbed and highlights the Nopah Range to the west and

[17] Energy Commission staff characterizes 5,001-10,000 motorists as a moderate to high number of viewers.

[18] Energy Commission staff characterizes view durations longer than 2 minutes as high.

the Pahrump Valley Wilderness to the south. The terrain drops slowly in elevation as the road approaches the California-Nevada state line, approximately 9 miles from the intersection of Old Spanish Trail Highway and Nevada Highway 160. KOP 1 was selected to represent the motorist's view at a point where the project structures become highly visible from the road, approximately 1.75 miles from the closest portion of the project site.

Visual Sensitivity

The existing view is uncluttered by human elements, except for the roadbed and shoulder (Figure18a). Mesquite coppices are visible in the foreground. The middle ground is an expansive plain of Mojave Desert vegetation. The Nopah Range forms a formidable backdrop to this view, its craggy slopes offering contrast to the relative smoothness of the desert floor below. It has a high degree of visual quality due to the undisturbed nature of the view. Viewer concern is from the motorists' perspective and is high, given the highly scenic and undisturbed view of the desert and the Nopah Range. The view from KOP 1 has a high degree of visibility, as there are no foreground or middle ground elements to disturb the panoramic scene of the Nopah Range in the background. Traffic counts from the Inyo County portion of the Old Spanish Trail Highway indicate 258 to 275 automobiles per day, which can be extracted to apply to the Nevada segment of this roadway. This is a low number of vehicles and therefore viewership is low. It is interesting to note that some of the vehicle trips made on this road have an ultimate destination of either Dumont Dunes Off- Highway Area or Death Valley National Park. Death Valley visitors may have a heightened degree of sensitivity to the scenic qualities of the natural desert environment around them. While the duration of the view at the KOP may be fleeting, the length of time the general panoramic view is seen by the driver and passengers is several minutes. Given that the project site would be visible from Highway 160 to the state line, a distance of nearly 10 miles, the duration of view is high. Taking into account the high visibility, low number of viewers and high duration of view, overall viewer exposure is moderate to high. In conjunction with high visual quality, high viewer concern and moderate to high overall visual concern, the overall visual sensitivity at KOP 1 is high.

Visual Change

With the Nopah Range and Nopah Peak as the backdrop for KOP 1, the power towers rise vertically from the valley floor in direct contrast to the broad horizontal lines of the expansive desert floor and horizon line of the mountain range (Figure 18b). Topography appears to mask the view of the heliostat array but the power block facilities, such as the air-cooled condenser, may be seen at the base of Solar Plant 2's power tower, to the left of center of the frame. This KOP also shows the lower portion of a transmission pole in the left of the view. These transmission poles are proposed to be installed parallel to Old Spanish Trail Highway. The power towers and transmission structures would collectively dominate the view and while there is no view disruption or skylining (structures breaking the horizon line) by the power towers from this viewpoint, the transmission poles disrupt the panoramic quality of the view. Dominance is moderate to high and view disruption is moderate. The contrast of the industrial scale structures with the surrounding undeveloped desert landscape is high. Moderate to high dominance, moderate view disruption and high contrast creates a scenario of an overall moderate to high degree of visual change to the view. The visual impacts of the proposed project at

KOP 1 would be high, and considered significant and unavoidable and are unmitigable from this vantage point.

KOP 2 – View from Stump Springs ACEC, Nevada (Figures 19a-19b)

Stump Springs is an Area of Critical Environmental Concern (ACEC). Areas of Critical Environmental Concern are special management areas designated by BLM to protect significant historic, cultural, or scenic values, fish and wildlife resources, natural process or systems, and natural hazards. In southern Nevada, twelve ACECs protect and preserve irreplaceable significant cultural resource sites that include prehistoric rock art sites, prehistoric village and habitation sites, and historic mining, town, railroad, and trail sites. These sites are either eligible for, or are on the National Register of Historic Places (NRHP)[19]. Stump Springs is believed to be located on a segment of the Old Spanish Trail and/or the Mormon Trail and was used by the Native Americans who lived in and around Pahrump Valley. While actual trail traces have not been formally documented and recorded, the general corridor of all of the historic trails would have included Stump Springs. (See discussion of trails in KOP 7 and Regional Setting above, and in the Cultural Resources Staff Assessment).

KOP 2 represents the view of a visitor to the historic springs toward the project site, and is approximately 2.3 miles from the eastern edge of the project site. Existing conditions reveal desert vegetation and sandy dune-like terrain in the foreground and the strong horizontal line of the Nopah Range in the background. The view is taken at a high point above the actual streambed of the spring area. The view is undisturbed by the introduction of human elements and likely remains very similar to the view during the historic periods of use. Lacking a scenic middle ground, the visual quality is moderate to high. Based on its status as an ACEC, viewer concern is high. No visitation counts are available, but the numbers of viewers is believed to be low. While in the early 20th Century, Native American tribes used the site for gatherings (story related to staff by Elders of the Pahrump Paiute on August 1, 2011), staff has observed in numerous site visits that the area now seems more likely to be used by four-wheel drive enthusiasts or campers. Due to the intervening topography, visibility toward the project site is considered moderate to high. It is difficult to establish a view duration, but staff estimates it to be low to moderate as the attention of the viewer is likely more on navigating the 4WD track or finding the springs themselves. The overall viewer exposure is therefore low to moderate. Taking into account the moderate to high visual quality, high viewer concern and low to moderate viewer exposure, the overall visual sensitivity at KOP 2 is moderate to high.

Introduction of the project's power towers into the simulated view (Figure 19b) adds two strong vertical architectural elements that provide a high degree of contrast with the existing conditions. There are distinct changes in lines, forms, and texture in the simulated view. Change in color tones is more moderate for the towers themselves, as they are depicted as a dull gray, but the brightness of the solar receivers stand out from the blue hues of the Nopah range in the background. Similar to KOP 1, there is no skylining, and moderate view disruption. With the foreground terrain partially blocking the view of the towers, they appear co-dominant with other elements in the view,

[19] http://www.blm.gov/nv/st/en/fo/lvfo/blm_programs/lvfo_recreation/accessing_your_public/acec_information.html

particularly the balancing peaks of the Nopah Range. The towers are unmistakable, due to their height and luminance, therefore dominance is moderate to high. Taking into account the towers high degree of contrast, moderate to high dominance and moderate view disruption, the degree of visual change is moderate to high.

The project as simulated in KOP 2 would have a moderate to high impact on visual resources. The impacts are significant and unavoidable and there is no feasible mitigation.

KOP 6 – View from Thorne Drive at Homestead Road, Pahrump, Nevada (Figures 23a-23b)

KOP 6 represents the view of the project site from the southern extents of Pahrump, Nevada, approximately 5.5 miles northwest of the project's northern boundary. Pahrump is an unincorporated city with 36,441 residents and is the largest township in Nye County. Located within a residential area, across the street from some houses, the existing view from KOP 6 is composed of desert landscape from foreground to middle ground and the Pahrump Valley Wilderness with the distant Kingston Range in the background. A compound of residential and agricultural structures is visible in the middle ground, before it gives way to the horizon line. The existing view is mixed, without uniformity or a clear visual character. The mountain ranges are quite distant and therefore do not add a high degree of definition to the view.

Visual Sensitivity

The mixed nature of the view from KOP 6 (Figure 23a) and the diminished stature of the mountain ranges from this distance provide a moderate degree of visual quality. Viewer concern from residential areas is typically treated as high. Google Earth imagery from October, 2011, indicates a residential development of approximately 25 homes in the vicinity of KOP 6. About 15 of those homes are oriented in such a way that they may have views directly toward the project site. Others have intervening structures or vegetation that would limit the duration of their views. In this case, view duration must also take into account motorists on Homestead Drive travelling southbound. As this development is isolated from other development in Pahrump, it is not likely that there is a great deal of through traffic. Therefore, view duration is rated as moderate, because of the balance of permanent potential views from some of the residences and temporary, short-term views from motorists and other residents. The number of viewers is moderate, falling into the 21-50 range as far as permanent residential viewers are concerned. Viewer exposure at KOP 6 is moderate. Moderate visual quality combined with high viewer concern and moderate overall viewer exposure provides a view with moderate to high visual sensitivity.

Visual Change

The visual simulation of the project (Figure 23b) shows the two towers nearly in alignment with one another, due to the angle of view. The profile of the power towers do not break the horizon line of the mountain range and would appear more distinct from the background if it were a cloudless day with blue sky. From this distance, the view disruption is low. As shown in the simulation, the contrast of brightness of the solar receivers to the background is poorly represented. The SRGS would be much brighter and highlighted against the medium to dark tones of the mountain range. The

brightness of the SGSGs and scale of the towers as seen from this distance could be likened to the look of stadium lights from a lesser distance as seen during daylight hours. The muted color of the tower structure reduces the contrast to the existing surrounding condition. The muted colors and distance from the KOP combined with the brightness of the SRGs would provide a moderate to high degree of contrast. The towers in the background are co-dominant with foreground and middle ground elements. An intervening rise in topography obscures the bases of the power towers and the plant facilities. Without clear dominance, view disruption or a high degree of contrast, the overall visual change is moderate. The overall visual impact from the introduction of the power towers and SRGs to the existing view is low to moderate and less than significant at KOP 6.

Overall Project Operation Impacts on Existing Visual Character or Quality

Project operation impacts from six of seven identified KOPs on the existing visual character and quality of the setting would be significant and unavoidable, even with staff-recommended conditions of certification. Proposed Condition of Certification **VIS-1,** Surface Treatment, would reduce the project's color contrast with the surroundings by requiring neutral tones complimentary to the existing desert landscape; proposed Condition of Certification **VIS-2**, Landscape Improvements, Permanent Fencing and Screening, would provide a screen of vegetation and fencing that would partially mitigate the visual impact of the project structures on viewers at KOP 3. Implementation of Conditions of Certification **VIS-3**, Permanent Exterior Lighting, would control the lighting to minimize off-site spillage. Proposed Condition of Certification **VIS-6** would provide remedial mitigation for the loss of scenic views. **VIS-7** would add varying degrees of reduction of the visual impacts to Charleston View residents during operation, but there is no mitigation for the impacts of the 750 foot tall towers topped by a very bright SRSG and lighted at night with aviation safety lighting. No mitigation is suggested for KOPs 1, 2 and 6 in Nevada. Even with these measures, the impacts from the project at operation would substantially degrade the existing visual character and quality of the site, and its surroundings, as perceived by sensitive receptors in the project viewshed.

Visual Resources Table 4
OVERALL VISUAL CHANGE

KOP No.	VISUAL SENSITIVITY (Existing Condition- California)						
	Visual Quality	Viewer Concern	Viewer Exposure				Overall Visual Sensitivity
			Visibility	No. of Viewers	Duration of View	Overall Viewer Exposure	
1	High	High	High	Low	High	Moderate to High	High
2	Moderate to High	High	Moderate to High	Low	Low to Moderate	Low to Moderate	Moderate to High
3	Moderate	Moderate to High	High	Low	Moderate	Moderate	Moderate
4	High	High	High	Moderate to High	High	High	High
5	High	Moderate to High	High	Low	High	Moderate to High	Moderate to High
6	Moderate	High	Moderate to High	Moderate	Moderate	Moderate	Moderate to High
7	High	Moderate	High	Low	Moderate-High	Moderate	Moderate to High

KOP No.	VISUAL CHANGE (Proposed Condition- California)							
	Project Effect							Overall Visual Change
	Contrast					Dominance	View Disruption	
	Form	Line	Color	Texture	Overall Contrast			
1	High	High	High	High	High	Moderate to High	Moderate	Moderate to High
2	High	High	High	High	High	Moderate to High	Moderate	Moderate to High
3	High	High	High	High	High	High	High	High
4	High	High	High	High	High	High	Moderate to High	High
5	High	High	High	High	High	Moderate	Moderate	Moderate to High
6	Moderate	High	Moderate to High	Moderate	Moderate-High	Low to Moderate	Low	Low to Moderate
7	High	High	High	High	High	Moderate to High	Moderate	Moderate to High

KOP No.	KOP VISUAL IMPACT SIGNIFICANCE DETERMINATION- All KOPs			
	Overall Visual Sensitivity	**Overall Visual Change**	**Visual Impact Significance**	**Mitigation (See Staff Proposed KOP Visual Mitigation**

				Measures)
1	High	High	Significant and unavoidable	There is no feasible mitigation for KOP 1.
2	Moderate to High	Moderate to High	Significant and unavoidable	There is no feasible mitigation for KOP 2.
3	Moderate	High	Significant and unavoidable, even with mitigation for the foreground	Adoption of Condition of Certification **VIS-1**, Surface Treatment, **VIS-2**, Landscape Improvements, Permanent Fencing and Screening. These measures will not lessen the impacts to less than significant.
4	High	High	Significant and Unavoidable	**Adoption of Applicant's Proposed Mitigation Measure 5 and Condition of Certification VIS-7, Tree Plantings, and VIS-2, Landscape Improvements, Permanent Fencing and Screening, will not lessen the impacts to less than significant.**
5	Moderate to High	Moderate to High	Significant and Unavoidable	Recommended adoption of Condition of Certification **VIS-1** would ensure the project structures other than the towers do not contrast with the surroundings There is no feasible mitigation for the towers for KOP 5.
6	Moderate to High	Low to Moderate	Less than significant	No mitigation suggested.
7	Moderate to High	Moderate to High	Significant and Unavoidable	Adoption of **VIS-6** as Mitigation for Loss of Historic Context and Scenic Views from Historic Old Spanish Trail does not reduce the impacts to less than significant.

Linears

Transmission Lines

HHSEGS would interconnect to the Valley Electric Association (VEA) system. The interconnection would require an approximately 10-mile-long generation tie-line (gen-tie line) from the HHSEGS to the proposed Crazy Eyes Tap Station, where the project would interconnect to the VEA electric grid. The gen-tie line would originate at the HHSEGS' onsite switchyard, cross the Nevada state line, and continue east for approximately 1.5 miles until reaching Old Spanish Trail Highway. At Old Spanish Trail Highway, the route would head northeast paralleling Old Spanish Trail Highway until it reached the Crazy Eyes Tap Substation, which would be located immediately east of the Old Spanish Trail Highway /SR 160 intersection.

Pipelines

A 12-inch-diameter natural gas pipeline would be required for the project. The gas pipeline would enter the HHSEGS site in the common area where it would connect with an onsite gas metering station. It would exit the HHSEGS site at the California-Nevada border and extend 32.4 miles to the Kern River Gas Transmission (KRGT) existing mainline system just north of Goodsprings in Clark County, Nevada. The transmission and natural gas pipeline alignments would be located in Nevada, primarily on land managed by BLM. Staff anticipates there would be no adverse visual impacts in California during the operational phase as the proposed gas lines would be underground on the project site.

Water Supply and Discharge

Each solar plant and the administration building would incorporate a septic tank and leach field system for on-site disposal. Water from the solar plant equipment and the general plant drains would be recycled and reused on site. Waste separated from the water during the onsite treatment would be trucked off site for disposal. Staff anticipates no adverse visual impacts from these water supply and discharge lines during the operational phase as they would be underground and or located wholly within on site project structures, such as tanks, subject to the visual mitigation surface treatment, screening and lighting requirements contained in Condition of Certification **VIS-1**, **VIS-2** and **VIS-3**.

Publicly Visible Water Vapor Plumes

The HHSEGS cooling system is proposed to be a dry-cooling system with technologies to minimize water use. The air-cooled condensers would provide the bulk of the cooling for the power generation equipment. A partial dry-cooling system would be used for auxiliary equipment cooling. Based on the proposed technology for the HHSEGS facility and its location in the arid Mojave Desert, potential visible plumes may rarely occur from the cooling system and/or exhaust stack. Since visible plume formation is unlikely, staff did not conduct any modeling. Cooler temperatures are more favorable to formation of visible plumes, which would occur at nighttime or in the early morning or evening hours. As the solar plant would be operational only during daylight hours, the potential for visible water vapor plumes from normal operation is minimal. The night preservation boiler would provide super-heated steam to the system overnight and during other shutdown periods. There would be potential for visible water vapor plumes to form during the nighttime operation of the night preservation boiler. Visible plumes during normal daytime operation are anticipated to be infrequent. Any plumes that may form at

night would not likely be noticeable because uplighting would be minimized by staff's proposed Condition of Certification **VIS-3**.

B. LIGHT OR GLARE

"Would the project create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?" This discussion is separated into two sections: 1. Light and, 2. Glint and Glare, as these are quite different visual phenomenon.

Light:

Yes. The immediate area of Charleston View is sparsely settled and relatively dark at night. There are no existing streetlights along Old Spanish Trail Highway or on the project site as it exists today. There is some limited lighting within the residential areas of Charleston View. The lights of Pahrump are visible from some elevations. Discussions with local residents and the owners of several resorts in Tecopa indicate that the vast majority of nighttime lighting seen in the project area emanates from Las Vegas, at least 40 miles distant and screened by mountains. While several of the Tecopa resorts host astronomy gatherings taking advantage of the area's naturally dark skies, none of the resort operators' staff had concerns about the HHSEGS increasing nighttime lighting in the Tecopa area. During operation, the proposed project has the potential to introduce light offsite to the roadway and surrounding properties, and up-lighting to the nighttime sky. If bright exterior lights were unshielded and lights not directed onsite they could introduce significant nighttime light to the vicinity. The 750-foot towers are well above the FAA threshold for aviation safety lighting and aviation safety lighting for the towers has been proposed and conditioned under Condition of Certification **TRANS-8**, Obstruction Marking and Lighting. Operational areas identified in the AFC in Section 5-13.4.2.3 requiring nighttime lighting include the power blocks, plant services building, switchyard and gas metering station. Other areas requiring lighting indentified in AFC Section 2.2.10, Plant Auxiliaries, include those areas providing personnel with lighting under normal operating conditions, egress under emergency conditions and emergency lighting to perform manual operations during an outage of the normal power source. Additionally, portable lighting would be used to illuminate the areas where heliostat cleaning is taking place. It is further noted in the AFC, Section 5.13.4.2.3, that the exterior lighting would comply with International Dark Sky standards (no specific reference as to what those are) and would be shielded and directed to aim at the places where it would be needed to prevent spill-off of light off the project site.

Staff has reviewed Inyo County's General Plan and other regulations regarding outdoor lighting. The Inyo County General Plan, Goals and Policies Report, December, 2001, 8.8 Visual Resources, Policy VIS-1.6: Control of Light and Glare and Policy VIS-1.7: Street Lighting, addresses nighttime lighting in a limited way. The policies require that lighting be shielded and directed downward and that street lighting shall only be used to provide safety in regards to traffic movement.

The addition of the aviation safety lighting would substantially alter the nighttime appearance of the project area and would be prominently featured in the night sky due to the height of the towers and the number of lights required by the towers' size. The

applicant indicates there would be eighteen FAA warning lights on each tower. Once the project becomes operational, the visual impact of the federally required aviation safety lighting is unmitigable, and therefore would be significant. With effective implementation of the applicant's proposed light trespass mitigation measures as described in the AFC and staff-recommended Condition of Certification **VIS-3**, the project's operation-related lighting impacts, excluding FAA safety lighting, would be less than significant and are anticipated to meet the County requirements for nighttime lighting. Condition of Certification **VIS-3** requires a comprehensive lighting plan be submitted to the County of Inyo for review and comment and to the Energy Commission Compliance Project Manager (CPM) for review and approval. Staff recommends Condition of Certification **VIS-3** to ensure full compliance and verification of night lighting measures.

Glint and Glare:

Facility Surfaces:

No. Surfaces of the facilities of the HHSEGS (excluding the solar receivers and the mirrored surfaces of the heliostats, which are discussed below) have the potential to introduce glare into the visual environment. With the effective implementation of staff-recommended Condition of Certification **VIS-1**, the project would use colors and finishes on surfaces that do not cause excessive glare and would be in harmony with the project's desert environment (with the exception of the heliostat mirrors and SRGSs, discussed below). Implementation of staff-recommended **VIS-2** and **VIS-7** would reduce the visibility of project structures at the ground level and minimize the potential for adverse visual impacts to viewers at KOP 3 and 4. Staff recommends Conditions of Certification **VIS-1, VIS-2 and VIS-7** to reduce the potential for adverse daytime glare impacts to less than significant and comply with LORS.

Heliostats:

No. Energy Commission staff has determined that the potential for a significant impact on Visual Resources from heliostat reflections does not exist for both ground based observers and airborne observers outside of the boundaries of the solar field project site during daytime conditions. The effective implementation of traffic and transportation's recommended Condition of Certification **TRANS-9,** Heliostat Operations Positioning and Monitoring Plan (HPMP), would insure that significant precautionary measures have been applied to the planned heliostat control algorithms to reduce the probability of direct solar heliostat reflections to ground observers outside the boundaries of the solar field project site. See Appendix VR-2 for a detailed analysis of the visual impacts of the heliostats.

Solar Power Towers/SRSGs:

Yes. Energy Commission staff has determined that the visual impact of the SRSGs solar reflections would have a significant and unavoidable impact. Please see the **Visual Resources Appendix VR-2, Visual Resource Glint and Glare Impact Assessment** and the **Traffic and Transportation** section**, Appendix TT1 – Glint and Glare Safety Impact Assessment** for a more detailed analysis of the visual impacts of the SRSGs.

CUMULATIVE IMPACTS AND MITIGATION

As defined in Section 15355 of the CEQA Guidelines (California Code of Regulations, Title 14), a cumulative impact is created as a result of the combination of the project under consideration together with past, present, and reasonably foreseeable future projects causing related impacts. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time. In other words, while any one project may not create a significant impact to visual resources, the combination of the new project with all existing or planned projects in an area may create significant impacts. A significant cumulative impact would depend on the degree to which (1) the viewshed is altered; (2) view of a scenic resource is impaired; or (3) visual quality is diminished. **Visual Resources Table 5** lists those projects located within the visible sphere of the proposed HHSEGS

Visual Resource Table 5
Projects Considered in the Cumulative Impacts Analysis

Project[20]	County	Distance from Project Site	Visual Resources Characteristics	Status of Project
St. Therese Mission	Inyo (California)	0.5 mile	A 17.5-acre, campus-like development with outdoor garden spaces, low-profile structures and a tree canopy.	Permitted and under construction.
Pahrump Airport	Nye (Nevada)	Approximately 12 miles NW of HHSEGS	International Airport to supplement the McCarran International Airport in Las Vegas. 5,934 acre site adjacent to Pahrump, NV. 7,000 acre sphere of influence.	Draft EIS was in progress, but suspended June 2010. News reports in June 2010 suggest project on hold.
Element Power-Solar	Nye (Nevada)	6 ½ miles north of proposed HHSEGS in Nevada.	300 MW Photovoltaic, 4,160 acres	Plan of Development
Hidden Hills Valley Electric Transmission Project (NVN089669)	Nye and Clark, (Nevada)	Less than one mile from HHSEGS, extending 9.7 miles to Highway 160, Nevada and beyond.	A new substation located just east of HHSEGS in Nevada, 230 kV transmission line along Old Spanish Trail Highway to Highway 160. A new 10-acre substation at Highway 160 in Nevada.53.7 miles of new 500kV transmission lines to El Dorado substation in Nevada. A new 230 kV transmission line to Pahrump, Nevada. Introduction of significant industrial-scale electric facilities in an area of high visibility.	DEIS Pending (BLM lead), expected for release in late 2012, early 2013
Sandy Valley (NVN090476)	Clark (Nevada)	8 miles east-southeast of HHSEGS near Highway 160.	Solar Power Tower Plant on BLM-managed land.	Plan of Development

[20] See Visual Resources Figure 25 for locations of the listed projects.

Three quarters of a mile to the east of the project in California is the St. Therese Mission, which is currently under construction. The St. Therese Mission is a 17.5 acre campus-style environmental park functioning primarily as a columbarium with garden niches and outdoor seating for reflection.

Renderings of the project show a tree canopy and a series of outdoor rooms connecting the buildings. It is a low-profile development with structure heights meeting the limitations of the Open Space designation and was found to be consistent with both the Inyo County General Plan and Zoning Ordinance[21]. It is slated to use desert plantings and colors in order to blend in with its environment. The County has reserved the right for additional 10 foot right-of-way along Old Spanish Trail Highway for turning lanes. Therefore it is assumed the project would be set back from the roadbed. This low-profile development would be in stark contrast to the heavy industrial solar electric plant next door. The Notice of Determination found it to be consistent with the General Plan and Zoning Code and did not find any adverse environmental effects that would exceed thresholds of significance either individually or cumulatively.

The community of Charleston View consists of a residential subdivision of two-acre or larger lots south of Old Spanish Trail Highway. Census counts indicate approximately 68 residents in the area and the existing number of scattered residences is 34, 29 of which are occupied. It is possible that, over time, if community services such as utility services upgrades, the community of Charleston View could experience some build-out. This would be low-profile development conforming to the General Plan designations of Rural Residential Medium Density (RRM), Resort/Recreational (REC) and Open Space and Recreation (OSR)[22]. Some of the various uses allowed in those General Plan designations are residential, recreational facilities, parks, campgrounds, restaurants, general stores and gas stations.

For the purpose of discussion of cumulative impacts of development in the project vicinity, staff has expanded the visual sphere of influence due to the high visibility of the power towers and the topography of the valley. Staff has chosen to assess the impacts of projects identified within the visibility range of the towers as depicted in **Visual Resources Figure 17** and shown on **Visual Resources Figure 25.**

The balance of the projects under consideration for cumulative visual resource impacts are in Nevada. Of particular note would be the development of a solar energy plant, Sandy Valley, utilizing power tower technology on BLM land along Highway 160. The area in question appears to be VRM Class IV, which, under BLM guidelines, would provide for activities that require major modification of the landscape and the degree of change can be high (see **Visual Resources Figure 4**). The other significant introduction of structures to the valley viewshed would be the transmission lines associated with HHSEGS. These transmission corridors would also be placed in VRM Class IV areas while these would parallel existing linear facilities, the scale of the new poles would be significantly larger. Existing wood poles along Old Spanish Trail

[21] Notice of Determination, Inyo County, Conditional Use Permit #2010-02//St.Therese Mission, June 23, 2010.

[22] Inyo County General Plan, Land use and Conservation/Open Space Elements, Diagram 29.

Highway are approximately 30 to 40 feet in height. The new poles would be 90 to 120 feet in height and would extend 9.7 miles from HHSEGS to the new Valley Electric Association Tap Substation. The new ten-acre Tap Substation would be located at the intersection of Old Spanish Trail Highway and Highway 160. Transmission line upgrades along Highway 160 would be replacing existing lines in some areas and introducing new lines in other areas. The HHSEGS project would introduce a new 53.7 mile 500kV single-circuit transmission line from the Tap Substation to the El Dorado Substation. A new 230kV transmission line would run from the Tap Substation to Pahrump, replacing an existing 138kV line. The net effect on views throughout the valley would be a noticeable increase in the number and size of electric transmission facilities.

A Draft Environmental Impact Statement (DEIS) from BLM for the Valley Electric Hidden Hills Transmission Project (NVN-089669) is pending publication. The DEIS would include an assessment of cumulative impacts of the projects planned in Nevada. Energy Commission staff has not been able to reference BLM's preliminary findings as part of this analysis because publication of the DEIS is pending as of this writing.

Other projects planned in Nevada include the Element Solar photovoltaic project and the Pahrump Airport. Photovoltaic projects typically are low profile and do not include tall, highly visible ancillary facilities such as air cooling units or boiler stacks, and therefore visibility would be more limited and localized than with the power tower configuration. The project would be likely highly visible from Highway 160 and would require some mitigation measures to protect motorists and other viewers from distracting light, glint or glare. The Pahrump Airport would include a control tower, which might be in the range of 75 to 100 feet in height. Otherwise, the hangar and passenger facilities would likely be relatively low-profile and only visible in a localized way.

The greater viewshed of the Pahrump Valley would be altered significantly if HHSEGS is constructed in addition to these projects as planned. This would result in a significant cumulative impact on the viewshed. Views of the Spring Mountains, the Nopah and Pahrump Valley Wilderness areas would be impaired by the introduction of additional power towers and large-capacity transmission lines. While the proposed transmission and Sandy Valley power tower projects would be located in VRM Class IV areas, the visual quality would be diminished by the industrialization of the landscape. There would be the potential for significant adverse cumulative effects. For viewers in Charleston View, only the proposed Sandy Valley power towers and transmission lines along Old Spanish Trail Highway would be potentially visible. The Sandy Valley project would be approximately 10 miles away, and using KOP 6 as an example, from that distance, the towers would appear quite small. Due to elevation changes, only the upper portions of the towers would likely be visible and the contrast with the mountains and desert landscape would be moderate. From Charleston View, views of the new transmission poles along Old Spanish Trail Highway would diminish quickly and terrain changes would block their view as they progress eastward along the road.

However, the experience of the motorists who traverse the valley would be that of driving through an area that has been industrialized by the addition of two substantial solar power tower projects and their associated transmission linears. For instance, a

motorist travelling from Las Vegas to Tecopa would encounter not one, but two large scale solar power tower projects and their associated transmission facilities. This would be a dramatic shift in the viewshed from the relatively undisturbed and low-profile Mojave desert landscape that exists today.

The connected actions of HHSEGS and its related linears, in conjunction with the reasonably foreseeable proposed development projects in the greater Pahrump Valley viewshed would be cumulatively considerable, significant and adverse. This result would be that, in spite of the fact that much of the proposed energy-related development is on BLM land classified as VRM IV, which provides for major modification of the existing character of the landscape, a high degree of change and features of the projects may dominate the views.

COMPLIANCE WITH APPLICABLE LORS

Staff evaluates the project to determine compliance with federal, state and local laws, ordinances, regulations and standards. Federal and state laws reviewed generally fall under scenic by-way and highway designations. No National Scenic By-Ways or State Scenic Highways are located within the project vicinity; therefore there is no discussion of conformance with these laws in this section

Staff has reviewed applicable laws, ordinances, regulations and standards and the project's consistency with those LORS. Staff concludes that, even with conditions, the project is not in conformance with all applicable LORS, as summarized below.

VISUAL RESOURCES Table 6
Compliance with Applicable Laws, Ordinances, Regulations, and Standards

LORS			
Source	**Policy and Strategy Description**	**Consistency Determination**	**Basis for Consistency**
CALIFORNIA			
State of California AB 1881 (2006), Water Efficient Landscape Ordinance (WELO).	Local agencies were required to adopt a WELO based on the state model by January 31, 2010, or the state's model ordinance would be applicable within the jurisdiction of the local agency. Inyo County has not adopted its own ordinance, therefore the state model ordinance applies.	Yes, as conditioned	Landscape and irrigation plans that meet WELO requirements are conditioned in Condition of Certification **VIS-2**.

LORS			
Source	**Policy and Strategy Description**	**Consistency Determination**	**Basis for Consistency**
LOCAL			
Inyo County, California			
Inyo County General Plan, Goals and Policies Report, December, 2001. Land Use Element, Policy LU-1.15: Buffers.	As part of new development review, the County shall require that residential development/districts are protected from non-residential uses by use of buffers or other devices. Landscaping, walls, building/facility placement, and other similar aesthetically pleasing devices are acceptable for this purpose.	Yes, as conditioned	Perimeter screening with vegetation is included in Condition of Certification **VIS-2**.
Inyo County General Plan, Goals and Policies Report, December, 2001. Land Use Element, Policy LU-4.9: Landscaping.	The County shall require landscaping to screen industrial uses.	Yes, as conditioned	Landscape screening is required in Condition of Certification **VIS-2**.
Inyo County General Plan, Goals and Policies Report, December, 2001. Public Services and Utilities, Policy PSU-1.7: Undergrounding Utilities.	The County shall require undergrounding of utility lines in new development areas…except where infeasible for operational or financial reasons. Additional implementation measures are found in Table 4-4, page 4-44.	Yes	Project includes all underground transmission lines on-site.
Inyo County General Plan, Goals and Policies Report, December, 2001. Public Services and Utilities, Policy PSU-3.1: Efficient Water Use.	The County shall promote efficient water use by encouraging and enforcing water-conserving landscaping and other measures.	Yes, as conditioned	Compliance with WELO would meet this goal and is required in Condition of Certification **VIS-2**.
Inyo County General Plan, Goals and Policies Report, December, 2001. Gas and Electrical Facilities, Policy PSU-10.1: Expansion of Services	The County shall work with local electric utility companies to design and locate appropriate expansion of electric systems, while minimizing impacts to agriculture and minimizing noise, electromagnetic, visual and other impacts on existing and future residents.	No	Conditions of Certification **VIS-1**, **VIS-2**, **VIS-3** and **VIS-7** minimize some of the visual impacts upon the existing and future residents of the county, but the visual impacts of the power towers are unmitigable and contrary to this policy.

LORS			
Source	**Policy and Strategy Description**	**Consistency Determination**	**Basis for Consistency**
Inyo County General Plan, Goals and Policies Report, December, 2001.7.3, Scenic Highways, Policy SH-1.1: Protect the Natural Qualities of Designated Scenic Routes.	The natural qualities of designated scenic routes should be protected. Definitions of scenic routes may be found in Section 7.3.1, page 7-11.	Yes	There are no designated scenic routes in the project vicinity.
Inyo County General Plan, Goals and Policies Report, December, 2001. 7.8 Canals, Pipelines and Transmission Cables. Policy CPT-1.1: Placement of Corridors.	The County shall consider the visual and environmental impacts associated with placement of regional conveyance corridors. Table 7-7, page 7-33, lists implementation measures.	Yes	Conveyance corridors for this project are not located in Inyo County.
Inyo County General Plan, Goals and Policies Report, December, 2001. 8.8 Visual Resources, 8.8.3: Visual Resource Issues.	Critical visual resource issues identified: • Maintain small town character; • Preserve panoramic views; • Maintain open natural character of the County; • Maintain visual resources of scenic corridors, highways and roadways.	No	The project would have significant and unavoidable visual impacts on panoramic views within Inyo County. "Striking views of the contorted layers of the Nopah Range[23]" would be impacted. Condition of Certification **VIS-6** would provide limited remedial mitigation for the loss of scenic views within the County.
Inyo County General Plan, Goals and Policies Report, December, 2001. 8.8 Visual Resources. Goal VIS-1.	Preserve and protect resources throughout the County that contribute to a unique visual experience for visitors and quality of life for County residents.	No	Charleston View is a recognized community in the General Plan with "Striking views of the contorted layers of the Nopah Range." Views of the Nopah Range and other nearby scenic vistas would be disrupted by the project.
Inyo County General Plan, Goals and Policies Report, December, 2001. 8.8 Visual Resources. Goal VIS-1.1: Historic Character.	The County shall preserve and maintain the historic character of communities within the County.	No	The height of the towers inherently changes the landscape in the vicinity of the project and in the Old Spanish National Historic Trail corridor.

[23] Inyo County General Plan, p. 2-8, description of Charleston View.

LORS			
Source	**Policy and Strategy Description**	**Consistency Determination**	**Basis for Consistency**
Inyo County General Plan, Goals and Policies Report, December, 2001. 8.8 Visual Resources, Policy VIS-1.4: Equipment Screening.	Within communities, building equipment shall be screened from public view.	Yes, as conditioned	Condition of Certification **VIS-2** would ensure adequate screening of on-site building equipment from public view.
Inyo County General Plan, Goals and Policies Report, December, 2001. 8.8 Visual Resources, Policy VIS-1.6: Control of Light and Glare.	The County shall require that all outdoor light fixtures…use low-energy, shielded light fixtures which direct light downward.	Yes, as conditioned	Condition of Certification **VIS-3** and **VIS-5** would ensure that lighting is shielded and directed downward during both construction and operation.
Inyo County General Plan, Goals and Policies Report, December, 2001. 8.8 Visual Resources, Policy VIS-1.7: Street Lighting.	Street lighting shall only be utilized where needed to protect public safety related to traffic movement.	Yes	No public right-of-way lighting has been proposed.
Inyo County Renewable Energy Ordinance, August 17, 2010.	Potential adverse impacts may include scenic views which may be blocked or degraded, which may affect the attractiveness of the County for tourism. Other impacts may include light and glare. The County requires that adverse impacts are avoided or acceptably mitigated. Police powers of the County include protection of the environment of Inyo County, including biological and other natural resources, aesthetics, recreational attractiveness. The term “environment” includes the ecological, social, aesthetic and economic environment of the County. It is not limited by and may be broader than the environmental considerations under CEQA or NEPA. In lieu of imposing development standards set forth in Title 18 (above), the	No	The project would have significant and unavoidable visual impacts on scenic views within Inyo County. The project would produce an unmitigable amount of glare due to the technologies employed. Project development standards have been employed in the conditions to mitigate some of the more immediate visual impacts at the ground level but the sheer size and dominance of the power towers and the extreme brightness of the solar receivers are visually unmitigable. The visual impacts to the “environment” in this assessment have been analyzed in a broad context in response to Title 21. Condition of Certification **VIS-6** would provide remedial mitigation for the loss of

LORS			
Source	**Policy and Strategy Description**	**Consistency Determination**	**Basis for Consistency**
	County may impose such standards as are deemed appropriate and may incorporate or impose such other standards and mitigation measures as are deemed necessary.		scenic views within the County.
Clark County, Nevada			
Northwest Clark County Land Use Plan, November 7, 2007: Wilderness Areas	Three Wilderness Areas and one Wilderness Study Area are located in Northwest Clark County. These include Mount.Charleston, La Madre Mountain and Rainbow Mountain Wilderness Areas and the Mount Stirling Wilderness Study Area.	Not applicable.	Mount Chalreston and Mount Stirling are within the viewshed of the project area. Views of Mount Charleston and Mount Stirling within Nevada are not affected by the project in California. Views may be affected by the upgraded transmission facilities in Nevada.
Northwest Clark County Land Use Plan, November 7, 2007: Scenic Byways	Northwest Clark County has two county-designated Scenic Highways, a BLM Back Country Route and four state-designated Scenic Byways.	Not applicable.	No designated scenic highways, byways or back country routes in Clark County are in the vicinity of the proposed project site.
Clark County Chapter 30.56: Site Development Standards, Part F: Lighting Standards	Provides lighting standards that restricts height of poles to 25 feet and that all outdoor freestanding liuminaries shall be hooded and directed downward. Security lighting on sensors are exempt from the standards.	Not applicable.	Generally the project is conditioned to conform to this standard by **VIS-3**.
Clark County Chapter 30.68.30: Site Environmental Standards: Lighting	Lighting shall be designed to prevent light from shining directly on residential uses. All light sources shall be shielded and directed downward at all times.	Not applicable.	Generally the project is conditioned to conform to this standard by **VIS-3**.
Clark County Comprehensive Plan, November 16, 2010, Volume One, Environmentally Sensitive Lands (ESL) Policy and ESL Advisory Committee Report, January 29, 2004.	Aesthetic Areas are defined in the 2004 ESL Report These areas include Scenic Routes, Slopes of 50% or more, Significant Geologic Features and Scenic Points or Features identified in Table one of the report. There are slopes of more 50%, significant geologic	Not applicable.	There are slopes of more 50%, significant geologic features and scenic points potentially within the viewshed of the proposed project site. Generally, views of the Aesthetic Areas within Nevada are not affected by the project

LORS			
Source	**Policy and Strategy Description**	**Consistency Determination**	**Basis for Consistency**
	features and scenic points potentially within the viewshed of the proposed project site. The policies outlined in the Comprehensive Plan generally pertain to land use and not aesthetics.		in California. Views may be affected by the upgraded transmission facilities in Nevada.
Nye County, Nevada			
Nye County Comprehensive/Master Plan, June 7, 2011, Section 3.5.1, Solar Energy, Figures 7 and 8.	Figure 7 shows pending and approved renewable energy projects. Figure 8 shows those areas of the county best suited to solar development based upon a March 2010 analysis.[24]	Not applicable.	The greater Pahrump Valley is shown as "Better" for solar development, on a scale Best- Better-Good-Unsuitable. An area adjacent to Highway 160 is identified as best. This is presumably the same area identified in Figure 7 as "pending solar project". This appears to be in the vicinity of the possible solar project listed in Visual Resources Table 5 Cumulative Impacts as Sandy Valley in Clark County..
Nye County Comprehensive/Master Plan, June 7, 2011, 6.1.7: Scenic Drives	Three scenic roads are identified on page 53: Lunar Crater Back Country Byway, The Extraterrestrial Highway and Tonopah Star Trails.	Not applicable.	None of the roads are in the proposed project vicinity.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Concern was raised about visual impacts of the very tall towers on the setting of the Old Spanish National Historic Trail by the National Trails Intermountain Region office of the National Park Service[25]. These impacts are noted and are detailed above. Inyo County submitted comments regarding setbacks, landscaping, fencing, and an interpretive area[26]. These comments are relevant to several technical sections. Conditions of Certification **VIS-2** and **VIS-**6 reflect the comments of Inyo County as they pertain to

[24] Suitability Analysis for Nye County Solar Generation,Transmission and Related Support Facilities, March 2010.

[25] E-mail from Michael Elliott, National Trails Intermountain Region, NPS, March 21, 2012.

[26] Letter from Joshua Hart, Planning Director, Inyo County, March 20, 2102.

Visual Resources. Comments were received by Basin and Range Watch, including a photograph from Bonanza Peak Trail toward the project site. See **Visual Resources Figure 26** and discussion above regarding visual impacts in Nevada. Other comments received have been summarized in a Table found in **Appendix 1 – PSA Response to Comments, Visual Resources**.

STAFF'S CONCLUSIONS AND PROPOSED FINDINGS

Staff concludes that even with mitigation from recommended Conditions of Certification **VIS-1**, **VIS-2**, **VIS-3**, **VIS-4 VIS-5**, **VIS-6 and VIS-7**, the construction and operation of the Hidden Hills Solar Electric Generating Station would result in a significant, unavoidable and unmitigable aesthetic impact according to the California Environmental Quality Act (CEQA) Guidelines.

Staff recommends implementation of applicant-proposed Mitigation Measure 5b, (AFC, p. 5.13-32 to 33), which is intended to compensate for the visual clutter of the solar power towers would add to a portion of the view from Charleston View. The Applicant proposes assisting with a one-time clean-up program within the Charleston View rural residential subdivision. This clean-up program would entail the applicant making provisions to assist property owners with clean-up of their properties by providing free hauling and disposal of unwanted debris and vehicles.

Staff has reviewed **Socioeconomics Figure 1** showing the minority population is less than 50 percent within a six-mile radius of the proposed HHSEGS. The absence of an environmental justice population within that radius and, by extension, the lack of visual impacts to any environmental justice population leads Energy Commission staff to the conclusion that there are no visual resources environmental justice issues related to the construction of this project and no minority or low-income populations would be significantly or adversely impacted.

FINDINGS OF FACT

Based on the evidence, staff finds and concludes as follows:

1. The project would have a substantial adverse effect on various scenic vistas because of its vast size, height, and disruption of the existing landscape.

2. The project has BLM designated wilderness areas to the south and west of the site.

3. There are views of and from scenic resources in the vicinity of the project that would be substantially disrupted by the introduction of the project at the proposed site. Those scenic resources are the Spring Mountains National Recreation Area, the Nopah and Pahrump Valley Wilderness Areas and the Old Spanish National Historic Trail.

4. The project is not adjacent to a designated scenic highway.

5. The existing visual quality in the project area is high, and the project would degrade the existing visual character of the site and its surroundings.

6. The project's proposed construction activities would substantially degrade the existing visual character or quality of the site and its surroundings.

7. The project's temporary construction activities' impact on visual resources cannot be mitigated to less than significant impact.

8. The project area is dark at night, with little local lighting.

9. HHSEGS's new source of substantial light to nighttime views, including its aviation warning lights on the power towers, would be significant even after the effective implementation of Condition of Certification **VIS-3**.

10. The luminosity of the solar tower receivers, and their height and dominance, would be visually obtrusive for viewers, and is a significant impact that cannot be mitigated.

11. The project's potential impacts on visual resources were analyzed from seven defined key observation points (KOPs) at different locations surrounding the project site in both California and Nevada. The introduction of the project structures at six of the seven KOPs would have significant and unavoidable impacts on visual resources.These impacts would be significant and unavoidable at KOPs 1, 2, 3, 4, 5 and 7.

12. There would be no significant adverse impacts in California to visual resources resulting from the HHSEGS linears, which are located in Nevada.

13. The visual effects of HHSEGS in combination with past, present and reasonable foreseeable projects in the Pahrump Valley would be cumulatively considerable on Visual Resources in the viewshed of the greater Pahrump Valley.

14. The project would not comply with Inyo County laws, regulations and standards regarding project design, scenic views and other requirements related to Visual Resources.

15. The project is generally in compliance with applicable Nevada LORS. The Nevada LORS are not applicable to the project.

PROPOSED CONDITIONS OF CERTIFICATION

Staff proposes the following Conditions of Certification:

Surface Treatment of Project Structures and Buildings

VIS-1 The project owner shall treat the surfaces of all project structures and buildings visible to the public such that a) their colors minimize visual intrusion by blending with the landscape or by providing architectural interest; b) their colors and finishes do not create excessive glare; and c) their colors and finishes are consistent with local policies and ordinances. Surface color treatment shall include painting or tinting of power towers, stacks, dry cooling structures, tanks, heliostat structures and other features in earth tone colors and values to blend in with the surrounding mountains and desert vegetation.

Colors shall be chosen from BLM's Standard Environmental Colors and pre-tested in the field. Any transmission line poles and conductors associated with the project in California shall be non-specular and non-reflective, and the insulators shall be non-reflective and non-refractive. The project owner shall submit for CPM review and approval, a specific surface treatment plan that would satisfy these requirements. The treatment plan shall include:

a.) a description of the overall rationale for the proposed surface treatment, including the selection of the proposed color(s) and finishes, including the photographic results of field testing;

b.) a list of each major project structure, building, tank, pipe, and wall; and fencing, specifying the color(s) and finish proposed for each. Colors must be identified by vendor, name, finish and number; or according to a universal designation system;

c.) one set of 11" x 17" color photo simulations at life size scale of the treatment proposed for use on project structures, including structures treated during manufacture, from representative points of view, Key Observation Points 3 and 5, (Visual Resources Figure 20b and 22b of the Staff Assessment) or color-rendered elevation drawings on 18" x 24" minimum sheet size;

d.) color samples on color card or painted steel;

e.) a specific schedule for completion of the treatment; and

f.) a procedure to ensure proper treatment maintenance for the life of the project.

The project owner shall not specify to the vendors the treatment of any buildings or structures treated during manufacture, or perform the final treatment on any buildings or structures treated in the field, until the project owner receives notification of approval of the treatment plan by the CPM. Subsequent modifications to the treatment plan are prohibited without CPM approval.

Verification: At least 90 days prior to specifying to the vendor the colors and finishes of the first structures or buildings that are surface treated during manufacture, the project owner shall submit the proposed treatment plan to the CPM for review and approval and simultaneously to Inyo County for review and comment. If the CPM determines that the plan requires revision, the project owner shall provide to the CPM a plan with the specified revision(s) for review and approval by the CPM before any treatment is applied. Any modifications to the treatment plan must be submitted to the CPM for review and approval.

Prior to the start of commercial operation, the project owner shall notify the CPM that surface treatment of all listed structures and buildings has been completed and are ready for inspection and shall submit one set of electronic color photographs from the same key observation points identified in (c) above.

The project owner shall provide a status report regarding surface treatment maintenance in the Annual Compliance Report. The report shall specify a): the condition of the surfaces of all structures and buildings at the end of the reporting year; b) maintenance activities that occurred during the reporting year; and c) the schedule of maintenance activities for the next year.

Landscape Improvements, Permanent Fencing and Screening

VIS-2 The project owner shall provide landscaping that reduces the visibility of the power plant structures and is in accordance with local policies. Trees and other vegetation shall be placed along the facility boundaries, in conformance with the Conceptual Landscape Plan, Figures VR-1a, b and c, in the 11-AFC-02 Supplement A. In addition, the project owner shall provide screening plantings along the property borders on the west and east. The objective shall be to create landscape screening of sufficient density and height to screen the power plant structures to the greatest feasible extent within the shortest feasible time from adjacent properties. Selected plants shall avoid invasive exotic species as indentified by the USDA[27] and Invasive Species Council of California (ISCC)[28]. Landscape plantings and other elements must meet the requirements of the applicable General Plan and Zoning Regulations of Inyo County and any site development standards associated with those regulations.

The landscape plan shall also include the permanent perimeter fencing. All chain link or wind fencing shall include neutral-colored privacy slats to screen views of the interior. Concertina razor wire or similar security obstacles shall only be installed on the interiors of the fencing and shall not be visible from the exterior.

The project owner shall submit to the CPM for review and approval and simultaneously to Inyo County for review and comment a Landscape Documentation Package whose proper implementation will satisfy these requirements and the requirements of the Water Efficient Landscape Ordinance (WELO). The plan shall include:

a.) a detailed Landscape Design Plan, at a reasonable scale (1”=40’ maximum). The plan shall demonstrate how the requirements stated above shall be met. The plan shall provide a detailed installation schedule demonstrating installation of as much of the landscaping as early in the construction process as is feasible in coordination with project construction. The Landscape Design Plan shall include a Planting Plan with Plant List (prepared by a qualified landscape architect familiar with local growing conditions) of proposed species, specifying installation sizes, growth rates, expected time to maturity, expected size at five years and at maturity, spacing, number, availability, and a discussion of the

[27] NRCS Invasive Species Policy, Invasive Species Executive Order 13112, Invasive and Noxious Weeds, California State Listed Noxious Weeds.

[28] **The California Invasive Species List,** Presented on April 21, 2010 by the California Invasive Species Advisory Committee (CISAC) to the Invasive Species Council of California (ISCC).

suitability of the plants for the site conditions and mitigation objectives, with the objective of providing the widest possible range of species from which to choose; specifications for groundcover, top-dressing of planting areas and weed abatement measures. Existing vegetation (if any) shall be noted on the Landscape Plan. The Landscape Design Plan shall specify all materials to be used for interior roads, walks, parking areas and hardscape materials (i.e. gravel) to be placed in areas that are not paved or planted, and exterior fencing or walls.

b.) an Irrigation Plan in compliance with the Water Efficient Landscape Ordinance. The plan shall include the following: complete Irrigation Design Plan, specifying system components and locations, and shall include the Water Efficient Landscape Worksheet.

c.) maintenance procedures, including any needed temporary irrigation, and a plan for routine annual or semi-annual debris removal for the life of the project; and

d.) a procedure for monitoring and replacement of unsuccessful plantings for the life of the project.

The plan shall not be implemented until the project owner receives final approval from the CPM.

Verification: The landscape plan shall be submitted to the CPM for review and approval and simultaneously to Inyo County for review and comment at least 90 days prior to installation. If the CPM determines that the plan requires revision, the project owner shall provide to the CPM and simultaneously to Inyo County a revised plan for review and approval by the CPM. The submittal shall include 3 printed sets of full-size plans (not to exceed 24" x 36"), 3 sets of 11" x 17" reductions and a digital copy in PDF format.

Planting must occur during the first optimal planting season following site mobilization. The project owner shall simultaneously notify the CPM and Inyo County within seven days after completing installation of the landscape plan, that the site is ready for inspection. A report to the CPM describing how the completed landscape meets the conditions of VIS-2 shall be submitted in conjunction with the inspection.

The project owner shall report landscape maintenance activities, including replacement of dead or dying vegetation, for the previous year of operation in each Annual Compliance Report.

Permanent Exterior Lighting

VIS-3 To the extent feasible, consistent with safety and security considerations, the project owner shall design and install all permanent exterior lighting such that:

a.) lamps and reflectors are not visible from beyond the project site, including any off-site security buffer areas;

b.) lighting does not cause excessive reflected glare;

c.) direct lighting does not illuminate the nighttime sky;

d.) illumination of the project and its immediate vicinity is minimized, and

e.) the plan complies with local policies and ordinances.

The project owner shall submit to the CPM for review and approval and simultaneously to Inyo County for review and comment a lighting mitigation plan that includes the following:

a.) Location and direction of light fixtures shall take the lighting mitigation requirements into account;

b.) Lighting design shall consider setbacks of project features from the site boundary to aid in satisfying the lighting mitigation requirements;

c.) Lighting shall incorporate fixture hoods/shielding, with light directed downward or toward the area to be illuminated;

d.) Light fixtures that are visible from beyond the project boundary shall have cutoff angles that are sufficient to prevent lamps and reflectors from being visible beyond the project boundary, except where necessary for security;

e.) All lighting shall be of minimum necessary brightness consistent with operational safety and security;

f.) Lights in high illumination areas not occupied on a continuous basis (such as maintenance platforms) shall have (in addition to hoods) switches, timer switches, or motion detectors so that the lights operate only when the area is occupied and

g.) Statement of conformance with all federal, state and local statutes and regulations related to dark skies or glare, including, but not limited to, the Inyo County General Plan.

Verification: At least 90 days prior to ordering any permanent exterior lighting, the project owner shall contact the CPM to discuss the documentation required in the lighting mitigation plan. At least 60 days prior to ordering any permanent exterior lighting, the project owner shall submit to the CPM for review and approval and simultaneously to Inyo County for review and comment a lighting mitigation plan. If the CPM determines that the plan requires revision, the project owner shall provide to the CPM a revised plan for review and approval by the CPM. The submittal shall include 3 printed sets of full-size plans (not to exceed 24” x 36”), 3 sets of 11” x 17” reductions and a digital copy in PDF format. The project owner shall not order any exterior lighting until receiving CPM approval of the lighting mitigation plan.

Prior to commercial operation, the project owner shall notify the CPM that the lighting has been completed and is ready for inspection. If after inspection the CPM notifies the project owner that modifications to the lighting are needed, within 30 days of receiving that notification the project owner shall implement the modifications and notify the CPM that the modifications have been completed and are ready for inspection.

Within 48 hours of receiving a lighting complaint, the project owner shall provide the CPM with a complaint resolution form report as specified in the Compliance General Conditions including a proposal to resolve the complaint, and a schedule for implementation. The project owner shall notify the CPM within 48 hours after completing implementation of the proposal. A copy of the complaint resolution form report shall be submitted to the CPM within 30 days.

Construction Fencing

VIS-4 Unless permanent fencing and or walls are constructed at the outset of construction, the project owner shall install temporary construction fencing on the project site along Old Spanish Trail Highway in such a way as to screen views of the construction activity and equipment. The construction fencing shall meet the following requirements: chain link fence shall have a neutral-colored privacy screening of at least 75% opacity material applied to the fence to reduce or eliminate views into the project site.

Verification: At least 60 days prior to site mobilization, the project owner shall submit to the CPM a Construction Fencing Plan. The plan shall include the following: written description and photographic images of the proposed construction fencing and privacy screening material.

Construction Lighting

VIS-5 The project owner shall ensure that lighting for construction of the power plant is deployed in a manner that minimizes potential night lighting impacts, as follows:

a.) all lighting shall be of minimum necessary brightness consistent with worker safety and security;

b.) all fixed position lighting shall be shielded or hooded, to the extent feasible given safety and security concerns, and directed downward toward the area to be illuminated to prevent direct illumination of the night sky and direct light trespass (direct light extending outside the boundaries of the power plant site or the site of construction of ancillary facilities, including any security related boundaries); and

c.) screening shall be provided to effectively prevent nighttime construction lighting from shining toward Charleston View; and

d.) wherever feasible, safe and not needed for security, lighting shall be kept off when not in use.

e.) FAA required security lighting shall be included on all construction structures per regulations.

Verification: Within seven days after the first use of construction lighting, the project owner shall notify and the CPM that the lighting is ready for inspection. If the CPM requires modifications to the lighting, within 15 days of receiving that notification the project owner shall implement the necessary modifications and notify the CPM that the modifications have been completed.

Within 48 hours of receiving a lighting complaint, the project owner shall provide the CPM with a complaint resolution form report as specified in the General Conditions section including a proposal to resolve the complaint, and a schedule for implementation. The project owner shall notify the CPM within 48 hours after completing implementation of the proposal. A copy of the complaint resolution form report shall be included in the subsequent Monthly Compliance Report following complaint resolution.

Scenic Resources Interpretative Area

VIS-6 The project owner shall provide an Interpretive Area with parking and interpretive panels highlighting the views of wilderness areas and landforms in the project vicinity. A detailed plan shall be developed and shall include visitor interpretation of visual resource highlights which have been adversely impacted by the introduction of the project.

Verification: A conceptual plan for the Scenic Resources Interpretative Area located within the project vicinity in Inyo County shall be submitted to the CPM for review and approval within 180 days of receipt of a license to construct and operate HHSEGS. Following CPM approval of the conceptual plan, detailed plans for the interpretive area shall be submitted to the CPM for review and approval, and to Inyo County for review and comment 90 days prior to completion of the HHSEGS project. Plan details shall include:

a.) Site plan clearly indicating primary project components and location;

b.) Landscape plan, including visitor area surface treatments

c.) Irrigation plan;

d.) Parking area plan indicating lighting (if any), parking striping, ingress and egress;

e.) Material finishes and details for all components;

f.) Design plans for interpretive panels and displays, which take into consideration the following visual resource aspects:

- Identification of the wilderness and national recreation areas and the major landscape features in the vicinity of the project site (i.e. wilderness areas, mountain ranges, named peaks and other landforms, including, at a minimum, Mount Charleston and the Spring Mountains, Nopah Peak and the Nopah Wilderness Area, Emigrant Pass, the South Nopah Wilderness Area and Pahrump Dry Lake). In addition to a description of the formation of these landforms and their geologic history, information shall include a discussion of the significance of these features from a Native American perspective and as landmarks and waypoints relative to the Old Spanish Trail - Mormon Ro
- Introduction to the solar electric technology in use at HHSEGS site.
- Pointers to the interpretive resources provided for in CUL-10.

g.) The plan shall include a maintenance plan and schedule for the duration of the project.

If the Scenic Resources Interpretive Area is located within the project boundaries, a-b-c-d-e-f above may be incorporated into the landscape plans required in **VIS-2** and lighting plans required in **VIS-3**.

The Scenic Resources Interpretive Area shall be installed within 90 days of completion of the HHSEGS or in conjunction with landscape and lighting as required by **VIS-2** and **VIS-3** if located on the project site. The project owner shall simultaneously notify the CPM and Inyo County within seven days after completing installation of the interpretive area plan that the site is ready for inspection. A report to the CPM describing how the completed interpretative area meets the conditions of **VIS-6** shall be submitted in conjunction with the inspection.

The project owner shall report maintenance activities for the previous year of operation in each Annual Compliance Report.

Charleston View Tree Plantings

VIS-7 The project owner shall make provisions to plant trees on the properties of any Charleston View resident or property owner who indicate an interest in having them. The intent is to plant the trees in locations that will screen views looking toward the solar power towers from the residences on the property and from the property's primary outdoor living areas. This shall be available to the residents and property owners for the life of the project. The project owner shall meet the following requirements:

a). The project owner shall employ a professional arborist to identify a list of species that are well adapted to the local conditions and which have characteristics that provide effective screening of views. Selected plants shall avoid invasive exotic species as indentified by the USDA and Invasive Species Council of California (ISCC). (See **VIS-2**)

b). The arborist shall work with residents to select up to eight trees from this list of species and will assist the residents in indentifying appropriate locations for their installation. The project owner will take responsibility for purchasing and installing the trees, which shall be the equivalent of a 15-gallon standard nursery size.

c.) Tree planting is a one-time opportunity for property owners in Charleston View. Once installed, irrigation and maintenance of the trees will be the responsibility of the property owner. Trees that do not survive transplantation within 60 days shall be replaced by the project owner at no charge to the property owner. After the 60-day period ends, the project owner shall have no further responsibility for maintenance of the trees.

Verification: Within 120 days of beginning construction, the project owner shall contact property owners in Charleston View and the CPM by registered mail to notify them of the tree planting program. The project owner shall provide in the Monthly Compliance Report a summary of the program, including the following:

a.) parcel numbers of property owners contacted;

b.) actions taken to ensure property owners fully understand the program;

c.) list of installations by parcel number;

d.) quantity and species installed on each parcel;

e.) documentation of any property owner who declined to participate by parcel number.

REFERENCES

California Code of Regulations (CCR), Title 24, Part 2

California Department of Transportation, California Scenic Highway Program, http://www.dot.ca.gov/hq/LandArch/scenic_highways/scenic_hwy.htm

California Title 14-Natural Resources, Division 1.5-Department of Forestry, Chapter 7-Fire Protection, Subchapter 2 SRA Fire Safe Regulations, Articles 1-5, September 1, 1991

California Streets and Highways Code, sections 260 through 263 – Scenic Highways

Code of Federal Regulations (CFR), 2008,Title 43, Vol. 2, Subtitle B, Part 6300, Management of Designated Wilderness Areas

EDB 1974—Environmental Data Bank of Independence, Environmental Impact Report Parcels 86 and 87, Pahrump Valley, California, prepared for Roland H. Wiley, September, 1974.

Federal Aviation Administration, Obstruction Marking and Lighting Advisory Circular AC70/7460-1K, eff. 02/01/07

Inyo County, Notice of Determination, Conditional Use Permit #2010-02/St. Therese Mission, June 23, 2010

Inyo County, Draft Mitigated Negative Declaration of Environmental Impact and Initial Study, Conditional Use permit #2010-02/ St. Therese Mission

INYO 2012b – Inyo County/K. Carunchio (tn: 63719) Inyo County Letter from Inyo County regarding Preliminary Estimates for the Fiscal Impacts of the Construction and Operation. 02/16/2012

National Park Service, National Trails Intermountain Region, letter from Michael Elliott, Cultural Resource Specialist, March 21, 2012.

National Scenic Byway (ISTEA 1991, Title 23, section 162)

National Scenic Byways Program, http://www.byways.org/ and http://www.bywaysonline.org/

The Wilderness Act, Public Law 88-577 (16 U.S. C. 1131-1136), 88th Congress, Second Session, September 3, 1964

APPENDIX VR-1

ENERGY COMMISSION VISUAL RESOURCE ANALYSIS EVALUATION CRITERIA

Energy Commission staff conducts a visual resource analysis according to Appendix G, "Environmental Checklist Form—Aesthetics," California Environmental Quality Act (CEQA). The CEQA analysis requires that commission staff make a determination of impact ranging from "Adverse and Significant" to "Not Significant."

Staff's analysis is based on Key Observation Points or KOPs. KOPs are photographs of locations within the project area that are highly visible to the public—for example, travel routes; recreational and residential areas; and bodies of water as well as other scenic and historic resources.

Those photographs are taken to indicate existing conditions without the project and then modified to include a simulation of the project. Consequently, staff has a visual representation of the viewshed before and after a project is introduced and makes its analysis accordingly. Information about that analytical process follows.

Visual Resource Analysis Without Project

When analyzing KOPs of existing conditions without the project, staff considers the following conditions: visual quality, viewer concern, visibility, number of viewers, duration of view. Those conditions are then factored into an overall rating of viewer exposure and viewer sensitivity. Information about each condition and rating follows.

Visual Quality

An expression of the visual impression or appeal of a given landscape and the associated public value attributed to the resource. Visual quality is rated from *high* to *low*. A high rating is generally reserved for landscapes viewers might describe as picture-perfect.

Landscapes rated high generally are memorable because of the way the components combine in a visual pattern. In addition, those landscapes are free from encroaching elements, thus retaining their visual integrity. Finally, landscapes with high visual quality are visually coherent and harmonious when each element is considered as part of the whole. On the contrary, landscapes rated *low* are often dominated by visually discordant human alterations.

Viewer Concern

Viewer concern represents the reaction of a viewer to visible changes in the viewshed an area of land visible from a fixed vantage point. For example, viewers have a high expectation for views formally designated as a scenic area or travel corridor as well as for recreational and residential areas. Viewers generally expect that those views would be preserved. Travelers on highways and roads, including those in agricultural areas, are generally considered to have moderate viewer concerns and expectations.

However, viewers tend to have low-to-moderate viewer concern when viewing commercial buildings. And industrial uses typically have the lowest viewer concern. Regardless, the level of concern could be lower if the existing landscape contains discordant elements. In addition, some areas of lower visual quality and degraded visual character may contain particular views of substantially higher visual quality or interest to the public.

Visibility

Visibility is a measure of how well an object can be seen. Visibility depends on the angle or direction of views; extent of visual screening; and topographical relationships between the object and existing homes, streets, or parks. In that sense, visibility is determined by considering any and all obstructions that may be in the sightline—trees and other vegetation; buildings; transmission poles or towers; general air quality conditions such as haze; and general weather conditions such as fog.

Number of Viewers

Number of viewers is a measure of the number of viewers per day who would have a view of the proposed project. *Number of viewers* is organized into the following categories: residential according to the number of residences; motorist according to the number of vehicles; and recreationists.

Duration of View

Duration of view is the amount of time to view the site. For example, a high or extended view of a project site is one reached across a distance in two minutes or longer. In contrast, a low or brief duration of view is reached in a short amount of time—generally less than ten seconds.

Viewer Exposure

Viewer exposure is a function of three elements previously listed, *visibility*, *number of viewers*, and *duration of view*. Viewer exposure can range from a *low* to *high*. A partially obscured and brief background view for a few motorists represents a low value; and unobstructed foreground view from a large number of residences represents a high value.

Visual Sensitivity

Visual sensitivity is comprised of three elements previous listed, *visual quality*, *viewer concern*, and *viewer exposure*. Viewer sensitivity tends to be higher for homeowners or people driving for pleasure or engaged in recreational activities and lower for people driving to and from work or as part of their work.

Visual Resource Analysis with Project

Visual resource analyses with photographic simulations of the project involve the elements of contrast, dominance, view disruption, and visual change. Information about each element follows.

Contrast

Contrast concerns the degree to which a project's visual characteristics or elements — form, line, color, and texture — differ from the same visual elements in the existing landscape. The degree of contrast can range from *low* to *high*. A landscape with forms, lines, colors, and textures similar to those of a proposed energy facility is more visually absorbent; that is, more capable of accepting those characteristics than a landscape in which those elements are absent. Generally, visual absorption is inversely proportional to visual contrast.

Dominance

Dominance is a measure of (a) the proportion of the total field of view occupied by the field; (b) a feature's apparent size relative to other visible landscape features; and (c) the conspicuousness of the feature due to its location in the view.

A feature's level of dominance is lower in a panoramic setting than in an enclosed setting with a focus on the feature itself. A feature's level of dominance is higher if it is (1) near the center of the view; (2) elevated relative to the viewer; or (3) has the sky as a backdrop. As the distance between a viewer and a feature increases, its apparent size decreases; and consequently, its dominance decreases. The level of dominance ranges from *low* to *high*.

View Disruption

The extent to which any previously visible landscape features are blocked from view constitutes view disruption. The view is also disrupted when the continuity of the view is interrupted. When considering a project's features, higher quality landscape features can be disrupted by lower quality project features, thus resulting in adverse visual impacts. The degree of view disruption can range from *none* too *high*.

Visual Change

Visual change is a function of *contrast*, *dominance*, and *view disruption*. Generally, *contrast* and *dominance* contribute more to the degree of visual change than does *view disruption*.

APPENDIX VR-2

VISUAL RESOURCE GLINT AND GLARE IMPACT ASSESSMENT

Gregg Irvin, Ph.D.

INTRODUCTION

The Hidden Hills Solar Electric Generating(System (HHSGS) would be located on Old Spanish Highway, near the community of Charleston View and be would be located on approximately 3,277 acres (5.12 square miles) of privately owned land in Inyo County, California, adjacent to the Nevada border. The project site is approximately 18 miles south of Pahrump, Nevada, and approximately 45 miles west of Las Vegas, Nevada.

Each solar plant would use heliostats which are elevated mirrors guided by a tracking system mounted on a pylon to focus the sun's rays on a solar receiver steam generator (SRSG) atop a 750-foot tall solar power tower near the center of each solar field. In each solar plant, one Rankine-cycle steam turbine would receive steam from the SRSG (or solar boiler) to generate electricity. The solar field and power generation equipment would start each morning after sunrise and, unless augmented, would shut down when insolation[1] drops below the level required keeping the turbine online.

Each of the heliostat assemblies would be composed of two mirrors, each approximately 12 feet high by 8.5 feet wide with a total reflecting surface of 204.7 square feet. Each heliostat assembly would be mounted on a single pylon, along with a computer-programmed aiming control system that directs the motion of the heliostat to track the movement of the sun. The solar field for each solar plant would consist of approximately 85,000 heliostats.

ANALYSIS AND CONCLUSIONS

HELIOSTATS

Energy Commission staff has determined that the potential for a significant impact on Visual Resources from heliostat reflections would not exist for both ground based observers and airborne observers outside of the boundaries of the solar field project site during daytime conditions.

For ground-based observers the applicant has demonstrated through modeling that heliostat retinal irradiance and beam intensity (under worst case conditions) is eye safe. The heliostats are designed to reflect sunlight toward the solar receiver steam generator (SRSG) at the top of the tower and are programmed such that reflectivity would never be directed toward ground level viewers located outside of the project site. Locations on the ground outside the footprint of the plant will not receive any direct reflections of sunlight.

[1] Defined as "exposure to the sun's rays."

The effective implementation of traffic and transportation's recommended Condition of Certification **TRANS-9,** Heliostat Operations Positioning and Monitoring Plan (HPMP), will insure that significant precautionary measures have been applied to the planned heliostat control algorithms to reduce the probability of direct solar heliostat reflections to ground observers outside the boundaries of the solar field project site to a functional value of zero.

For airborne observers, i.e., pilots and passengers in aircraft in the surrounding airspace, there is the distinct potential (if not inevitable) for direct solar reflections from the heliostats. Only the population of heliostats which are in the standby position or in transit to a new position will have the potential to produce direct solar reflections on airborne observers. The irradiance of the heliostat reflections into the airspace will not exceed solar radiation concentrations above that of direct sunlight. Further, the exposure effect in producing a deleterious impact on the visual appearance of the project site will diminish as a function of distance from the heliostat field. The heliostat mirrors although planar (flat) are tensioned in their pylon mountings when installed to produce a slight concavity. This produces a slight focusing effect to improve the amount of solar energy received at the SRGS from each heliostat which will diverge beyond the standby ring range. Because of this divergence of the reflected light, the appearance to an airborne observer would not be that of a direct solar reflection (specular in appearance) but rather would appear as a diffuse and less bright source. Further, the appearance would become more and more visually diffuse and dimmer as a function of increasing distance/ altitude.

Transient exposure to divergent heliostat solar reflections will occur for airborne observers at certain geometries with respect to the solar field project site. Further such exposures will be relatively low in their probability of occurrence, and when present will be very transient in duration. Thus, any exposures will be brief and intermittent since the aircraft will be in motion with respect to the heliostats. Additionally, a sequence of multiple exposures from different heliostat reflections (a blinking effect as the aircraft passes through a sequence of heliostat beams) is possible for certain flight geometries.

The impact of heliostat reflections in producing glint and/or glare for airborne observers that would adversely affect the daytime view of the project and the surrounding area is considered as potentially moderate in effect but less than significant.

Once the project becomes operational, the visual impact of airborne exposure to diffuse heliostat solar reflections is unmitigable and therefore the probability of occurrence must be minimized. The effective implementation of staff-recommended Condition of Certification **TRANS-9,** Heliostat Operations Positioning and Monitoring Plan (HPMP), will insure that significant precautionary measures have been applied to the planned heliostat control algorithms to reduce the probability of diffuse solar heliostat reflections to airborne observers to the minimum extent possible.

SOLAR RECEIVER STEAM GENERATORS (SRSG):

The SRSG on the solar power towers will produce a sustained bright source of reflected light from the heliostats during daytime operations. Since the SRSGs are 'circular' (wrapping around the tower 360 degrees) and near the tower peak they will be highly visible from most vantage points and for many miles. Both ground-based and airborne

observers outside of the boundaries of the solar field project site will experience similar levels of perceived brightness. There is no doubt that the illuminated tower SRSGs will produce a most prominent and sustained visual signature during operations. The issue from a Visual Resources perspective is will the SRSGs produce sufficient glare and/or excessive perceived brightness to adversely affect the daytime views in the area. This is an essential question since there are essentially no realistic mitigating procedures for the tower SRSG luminance levels. Further, since the SRSGs are reflecting the heliostat solar reflections (i.e., the SRSGs are not an emitting light source) the apparent brightness will remain fairly constant over large changes in the viewing distance.

Although during nominal operations the SRSGs are approximately 3,000 times less luminous that the Sun, they are on the order of 80-90 times more luminous than the background sky. In terms of perceived brightness, the SRSGs are anticipated to appear at least 5 times brighter than the background sky. At these stated luminance levels and perceived brightness levels there would be some constant level of moderate glare. The principal anticipated project visual impact would result from glare of the SRSGs. As discussed in detail in the **Traffic and Transportation section, Appendix TT1 – Glint and Glare Safety Impact Assessment**, the SRSGs would comprise 130-foot-tall structures at the tops of the two 750-foot tall solar towers. The SRSGs would collect reflected energy from the project heliostat fields, resulting in extremely high temperatures and generation of bright illumination. As a result, the SRSGs would become intensely bright light sources, calculated by staff to have luminance on the order of 230,000 candelas ($cd/m^{2)}$

This level of luminance would be 32 times more luminous than the desert sky and be perceived as intensely bright to considerable distances. Noting that no such light source of spatial extent and luminance has been known to exist previously and therefore extensive data are nonexistent, staff estimates that the SRSGs would appear very bright to a distance of approximately 17 miles, and would potentially constitute a significantly disruptive source of discomfort glare to viewing distances of approximately 8.5 miles. At that distance the SRSGs would have a visual size of 1/6 degree (10 min arc), approximately 1/3 the size of the sun (1/2 degree or 30min arc). At 2.8 miles, the SRSGs would have the same visual size as the sun. Although the SRSGs would not be as bright as the sun, which is capable of causing physicaldamage to the eyes, the SRSGs would be exceptionally bright and be nearly constant in perceived brightness out to the 8.5 mile viewing distance. Beyond this distance perceived brightness would progressively decrease until perceived brightness becomes proportional to distance (log linear, Stevens' Power Law) at a visual subtense of approximately 5 min arc (1/12 deg) as size begins to transition to the limits of visual acuity.

This condition is met at a viewing distance of 16.9 miles. Up to this viewing distance of approximately 8.5 miles from the SRSGs, the glare from this level of brightness, being produced by a spatially extended source of of 230,000 cd/m^2 under nominal power generation conditions,would produce discomfort glare and visual disruption effects. Within this 8.5 mile radius, SRSG glare has also been considered to constitute strong contrast in the analysis of impacts under CEQA Criterion C.

Beyond an 8.5 mile viewing distance the SRSGs are still considered as a bright source in the visual field but, as a source of glare, and hence as visual disruption effects, would

be less disruptive than inside the 8.5 mile viewing distance. Importantly, the perceived brightness and glare effects from the SRSGs are not considered as visually disabling at any viewing distance.

When combined with the additional visual signature of the 'tee pee' effect produced during conditions of high humidity or elevated levels of suspended airborne particulate, the overall visual signature and it's prominence are substantially increased. Under these conditions, rather than the SRSGs in isolation producing the visual signature, the tower plus the enormous volume of the conic shaped 'tee-pee' visual signature will be present. Staff also concludes that the large visual extent, brightness and prominence of the overall visual signature of the tower area during these conditions creates an adverse impact in the daytime view within the viewing area.

Staff concurs with the visual resource analysis that the impacts of the visual change of the project will be significant and unavoidable with respect to visual quality at 6 of 7 KOPs. It is the magnitude of the visual impact that is the essential basis for concluding the significance of the adverse affect on the daytime view in the area. Once the project becomes operational, the visual impact of the SRSGs solar reflections is unmitigable.

FINDINGS OF FACT

Based on the evidence, staff finds and concludes as follows:

1. There will be no significant adverse impacts from heliostat reflections for both ground-based and airborne observers outside of the boundaries of the solar field project site during daytime conditions.

2. The visual impact of the Solar Receiver Steam Generators (SRSG) during power generation on visual resources is both significant and incapable of mitigation.

CONCLUSIONS OF LAW

Implementation of the Conditions of Certification for Traffic and Transportation, **TRANS-9**, Heliostat Operations Positioning and Monitoring Plan, will facilitate reducing the impact of heliostat reflections on visual resources to a minimum.

VISUAL RESOURCES

List of Comment Letters

		Visual Resources Comments?
1	Inyo County	X
2	Bureau of Land Management	
3	National Park Service	
4	The Nature Conservancy	
5	Amargosa Conservancy	X
6	Basin & Range Watch	X
7	Pahrump Paiute Tribe	X
8	Richard Arnold, Pahrump Paiute Tribe	
9	Big Pine Tribe of Owens Valley	
10	Intervener Cindy MacDonald	X
11	Intervener Center for Biological Diversity	
12	Intervener, Old Spanish Trail Association	
13	Applicant, BrightSource Energy, Inc.	X

Comment #	DATE	COMMENT TOPIC	RESPONSE
1	**July 17, 2012**	**Inyo County**	
1.2		Title 21- The County believes the idea of an Interpretive Center is a good start but under Title 21 additional mitigation aimed at reducing or off-setting the impacts to local residents is required. To that end, Resolution 2012-29 requires the construction of a community center.	Comment noted. Not required for Visual mitigation.
1.66		COC- The Applicant /owner shall provide a community center with parking lot.	Comment noted. Not required for Visual mitigation.

1.75a		Policy LU-1.14 (1.15) Buffers	Included in FSA LORS **Tables 2 and 6. VIS-2** includes perimeter screening.
1.86a		Goal VIS-1.1 Historical Character	Included in FSA LORS **Tables 2 and 6**. **VIS-6** partially mitigates for loss of scenic views.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
5	**July 21, 2012**	**The Amargosa Conservancy**	
5.9		Night-Lighted Towers will be ever-apparent and destroy dark sky views	Towers will not be lit at night; only FAA lighting will be in use.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
6	**July 23, 2012**	**Basin and Range Watch**	
6.10		BLM VRM Class 1 Review	See Figures VR-3 & 4 and discussion in Regional Setting.
6.11		More KOPs at higher elevations	KOPs are based on factors which preclude some locations.
6.12		KOPs at high elevations in Spring Mountains National Recreation Area.	Staff has created a draft simulation for FSA, VR Figure 26.

6.13		KOPs at elevations showing flash glare	Staff has created a draft simulation for FSA, VR Figure 26.
6.14		Flash Glare Events	Staff found no adverse impacts. See **TRANS-9**.
6.15		More KOPs at Stump Springs	Impacts were found to be significant at KOP 2.
6.16		Mitigation with Trees at Stump Springs	No feasible mitigation for KOP 2.
6.17		Visitor Center Hiding Facility	Scenic Resources Interpretive Area not intended to hide project facilities.
6.18a		KOPs at 5000 ft. in Nopah Range	KOPs are based on factors which preclude some locations.
6.18b		KOPs from High Elevations in Spring Mtns	Staff has created a draft simulation for FSA, VR Figure 26.

6.18c		Dark Sky & Night Lighting Simulations	**VIS-3** and **VIS-5** provide mitigation for lighting.
6.18d		More KOPs from Stump Springs	KOPs are based on factors which preclude some locations.
6.18e		Multiple Simulations of Flash Glare	Staff has created a draft simulation for FSA, VR Figure 26.
6.18f		Simulations of Construction Dust Plumes	Dust from construction activity is temporary.See **Air Quality** section.
6.18g		KOP of Dying Vegetation at Stump Springs Due to Water Drawdown.	KOPs are based on factors which preclude some locations.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
7	**July 23, 2012**	**Pahrump Paiute Tribe**	
7.1		Significant Impacts to Visual Landscape	Staff finds significant and adverse impacts at 6 of 7 KOPs.

Comment #	DATE	COMMENT TOPIC	RESPONSE
10	July 21, 2012	Intervener Cindy MacDonald -- pg. 17-1	
10.1		Since heliostats will be in the "safe position" at night (horizontal), what is the projected increase and/or magnification of light pollution in the area during times of full moons and how far will this illumination extend throughout the Pahrump Valley?	Lighting is only in evening for periodic washing of heliostats.
10.2		Will there be any visual "glow" from the power towers if the plant is operational after the sun sets? If so, what will it look like, what magnitude would it be, how far away will it be visually "disruptive" across the landscape and how long will this extend throughout the night?	Visual glow will subside at sundown…no night time glow from towers or heliostats would occur. Please see **Facility Design** for further discussion.
10.3		What are the visual resource category for the BLM land in California that surround the proposed project site?	See Figures VR-3 & 4 and discussion in Regional Setting.
10.4		Are there other ways that the applicant can "screen" the perimeter besides trees or other vegetation that won't be an attractant to birds, insects or other wildlife?	Fencing is provided for in **VIS-2** and provides some screening other than with plants.
10.5		Approximately how many of these non-native trees would be required to screen the perimeter and what would be their annual water requirements over the life of the project?	Landscape plans are submitted during compliance phase and water use will be calculated under the Water Efficient Landscape Ordinance. See **VIS-2**.
10.6		If native soils cause heliostats to shift, sink and/or collapse due to soil saturation, how will the applicant control glint and glare and prevent adverse visual effects?	Refer to **TRANS-9** and related analysis in TRANS & VR App. 2.
10.7		Is there any way through modeling to predict the worst-case scenario of the number of heliostat/mirror structures that could shift, sink and/or collapse due to soil saturation?	Refer to **TRANS-9** and related analysis in TRANS & VR App. 2.

10.8		Is the computer software that will control the heliostat/mirror assemblies capable of accounting for and/or adjusting heliostat/mirror assemblies in the event of they shift, sink and/or collapse?	Refer to **TRANS-9** and related analysis in TRANS & VR App. 2.
10.9		What are the potential adverse visual affects from glint and glare as a result of broken mirrors contained within the heliostat/mirror assemblies?	Refer to **TRANS-9** and related analysis in TRANS & VR App. 2.
10.10		Is there anyway to predict the degree of broken mirrors in the heliostat/mirror assemblies during normal operations?	Refer to **TRANS-9** and related analysis in TRANS & VR App. 2.
10.11		Does the computer software have the ability to control glint and glare positioning in the event mirrors in the heliostat/mirror assemblies are broken?	Refer to **TRANS-9** and related analysis in TRANS & VR App. 2.
10.12		What are the visual effects of broken mirrors and/or mirror shards that are littered on the ground? Obviously, if mirror shards fall straight down and lie flat on the ground, it would only be aesthetically displeasing. However, if they don't lie flat and lodge themselves at angles, what are the visual impacts and can they affect public safety by impacting motorists on the nearby Old Spanish Trail Highway?	Refer to **TRANS-9** and related analysis in TRANS & VR App. 2.
10.13		In the event a "catastrophic" storm event dislodges tens of thousands of mirrors, what would be the potential adverse impacts with respect to glint and glare from the broken and displaced mirrors?	Perimeter screening/fencing reduces the visual impacts.

10.12		Due to high level wind events and "gusts" known to occur in the area, what are the potential impacts of glint and glare resulting from broken mirrors, mirror fragments and mirror shards due to wind damage?	Refer to **TRANS-9** and related analysis in TRANS & VR App. 2.
Comment #	**DATE**	COMMENT TOPIC	**RESPONSE**
13	**July 23, 2012**	**Applicant, BrightSource Energy, Inc.**	
13.12		Page 4.13-3, Regional Setting, 3rd paragraph: The PSA states: "Visual Resources Figure 1 shows the relationship between the proposed project site and the wilderness and recreation areas described above and the national historic trail in the area. Figure 1 clearly shows the 'bowl' whose bottom is the project site and whose sides are made up of areas of high scenic quality. It is this high-quality scenic landscape which is the backdrop for the proposed industrial-scale development of HHSEGS." Figure 1 does not document the scenic quality of the project area landscape. Figure 1 only depicts roads, communities, jurisdictional boundaries, and the boundaries of designated wilderness and recreational areas, but does not identify scenic qualities of the landscape; therefore, "high quality scenic landscape" is an unwarranted conclusion to be drawn from this figure and it is not supported by substantial evidence. In addition, Figure 1 shows regional uses outside the viewshed of the project. For visual resource analysis purposes, areas outside the viewshed are irrelevant. "Industrial-scale" is a subjective and undefined term, which biases the PSA's analysis. The project is large-scale, but if it is to be compared to industry, the PSA should explain which "industry."	Wilderness Areas, National Forest and Recreation Areas are by their very nature areas of high scenic quality. The conclusions drawn by staff in this paragraph are supported by Visual Resources Figures 1 2, 3 and 4. "Industrial-scale" and likewise, "utility scale", are terms used in various media to describe large solar power generating facilities.

13.13		Page 4.13-3, Regional Setting, 4th paragraph: The PSA states: "The proposed project site is privately-owned land located in an area where most of the land is publicly-owned or managed by the Bureau of Land Management (BLM). The BLM lands surrounding the project site have been inventoried by the respective California and Nevada BLM field offices and both Visual Resource Inventory (VRI) and Visual Resource Management (VRM) classes have been applied." The accuracy of the above statements depends on the definition of the phrase "the area." The viewshed? The region outside the viewshed? The foreground, middleground, or background? It would be more accurate to state that "The proposed project site is privately-owned land. The land immediately adjacent to the project is privately owned land and BLM land. The land in middleground and background views of the project is a mix of BLM and private land." The project site, which is a triangular shape is bounded by BLM lands on one side. BLM lands do not "surround" the project site. A mix of BLM and private lands surround the Charleston View area.	The areas around the project site owned and managed by BLM referring to the area depicted in Figures 3 and 4. Staff has characterized it accurately as an area where most of the land is managed by BLM.
13.14		Page 4.13-4, Regional Setting, 3rd full paragraph: The PSA states: "Visual Resources Figure 3 shows the Visual Resource Inventory Classes for the BLM lands in the vicinity of the project area. Nearly 50 percent of the land shown in Figure 3 is Class I, areas of the highest scenic quality and viewer sensitivity. These Class I areas extend beyond the boundaries of the wilderness areas. The Class II areas are seen in both mountains and valleys adjacent to Class I areas and on the Pahrump Valley floor. Class III areas appear to be the smallest component of the areas shown in the figure. Class IV are found mostly in the Pahrump Valley. The figure demonstrates that, according to the BLM rating system, there is a generally a high degree of scenic quality in the vicinity of the project site."	Staff disagrees with the applicant's analysis of Figure 3.

13.15		Page 4.13-4, Regional Setting, 4th full paragraph: The PSA states: "Visual Resources Figure 4 shows the VRM classes assigned to the area in the most recent RMP. Note the significant migration of Class I areas to Class II, III and IV, and the significant downgrade of the valley floor and alluvial fans to Class III and IV. The only remaining Class I designations are the Nopah and Pahrump Valley Wilderness Areas. The two figures clearly illustrate the high degree of scenic quality that exists with the viewshed of the proposed project site."This statement is not supported by Visual Resource Figure 4. The Visual Resource Management classes shown on Visual Resource Figure 4 are not indicators of visual quality, but are rather indicators of the policy decisions BLM has made in developing its Resource Management Plan about how much visual change it has decided it will permit in specific areas. What Figure 4 shows is that the areas to the southeast, south, and west of the project site are private lands that are not under BLM jurisdiction, and where no visual resource management objectives have been assigned.	Policy decisions in the RMP allowed for more visual change to the landscape in areas where it was inventoried as Class I or II, the highest visual quality landscapes.
13.16		Page 4.13-11, Visual Resources Table 2 (Applicable Laws, Ordinances, Regulations, and Standards), LOCAL, Row 1 – Policy and Strategy Description: The PSA states: "The proposed project would be located in parcels currently designated as REC, Resort/Recreational and OSR, Open Space and Recreation." This is not correct. See Land Use section.	Removed from LORS Tables as it does not apply to Visual Resources.
13.17		Page 4.13-11, Visual Resources Table 2 (Applicable Laws, Ordinances, Regulations, and Standards), LOCAL, Row 2 – Policy and Strategy Description: The PSA states: "The County shall require landscaping to screen industrial uses." It is not clear that the County considers this an "industrial" use.	Industrial uses generally include power plants.

13.18		Page 4.13-11 Visual Resources Table 2 (Applicable Laws, Ordinances, Regulations, and Standards), LOCAL, Row 3 – Policy and Strategy Description: The PSA states: "The County shall require undergrounding of utility lines in new development areas…except where feasible for operational or financial reasons. Additional implementation measures are found in Table 4-4, page 4-44."It is not clear that this is considered to be a "new development area." This area has been subdivided and under development for decades.	Underground utility lines are preferred by the County.
13.19		Page 4.13-11, Visual Resources Table 2 (Applicable Laws, Ordinances, Regulations, and Standards), LOCAL, Row 4 – Policy and Strategy Description: The PSA states: "The County shall promote efficient water use by encouraging and enforcing water-conserving landscaping and other measures." This is not a Visual Resource LORS, although it mentions landscaping.	Landscape plans are reviewed by Visual Resources staff and submitted during compliance phase and are expected to comply with LORS. Visual Resources staff suggests the VR COCs that deal with landscape plans.
13.20		Page 4.13-11, Visual Resources Table 2 (Applicable Laws, Ordinances, Regulations, and Standards), LOCAL, Row 7 – Policy and Strategy Description: The PSA states: "The County shall consider the visual and environmental impacts associated with placement of regional conveyance corridors. Table 7-7, page 7-33, lists implementation measures." What is a conveyance corridor? Does the project propose one in the County?	Conveyance corridors refer to Canals, Pipelines and Transmission Cables, as stated in the Policy 7.8 heading.
13.21		Page 4.13-12, Visual Resources Table 2 (Applicable Laws, Ordinances, Regulations, and Standards), LOCAL, Row 10 – Policy and Strategy Description: The PSA states: "Within communities, building equipment shall be screened from public view." It is not clear that the Project is proposed "within a community" as that term is used in the ordinance.	Charleston View is a defined community in the Inyo County General Plan.

13.22		Page 4.13-12, Visual Resources Table 2 (Applicable Laws, Ordinances, Regulations, and Standards), LOCAL, Row 13 – Policy and Strategy Description: The PSA states: "Maximum height of buildings in OS Zone: Principal buildings 30 feet, accessory buildings 25 feet."This is not a Visual Resource LORS any more than other zoning code provisions that address the dimension, location, or appearance of structures.	Removed from LORS Tables as it does not apply to Visual Resources.
13.23		Page 4.13-12, Visual Resources Table 2 (Applicable Laws, Ordinances, Regulations, and Standards), LOCAL, Row 14 – Policy and Strategy Description, 1st bullet: The PSA states:"Potential adverse impacts may include scenic views which may be blocked or degraded, which may affect the attractiveness of the County for tourism. Other impacts may include light and glare. The County requires that adverse impacts are avoided or acceptably mitigated." This is not an Applicable LORS. This is a declaration in the ordinance, but not adopted as part of the County code.	Staff disagrees with applicant's assertion that the ordinance does not apply.
13.24		Page 4.13-15 A. Scenic Vista, 1st paragraph: The PSA states: "For the purposes of this analysis, a scenic vista is defined as a distant view of high pictorial quality perceived through and along a corridor or opening, or from a designated scenic area." This is a novel definition. The question should be, according to the CEQA guidelines: Is the project site located in a *designated* scenic vista, or has the County designated the project site as an important visual resource?	The CEQA checklist is a starting point, not an end point, and additional questions may be asked relevant to the project being analyzed. Staff maintains that views "from" a scenic resource, in this case Wilderness Areas, National Recreation Areas and National Historic Trails, are highly relevant to the visual resource analysis of this project. See also Ivanpah Solar Electric Generating Systems Final Decision, Findings of Fact, No. 7, page 28.

13.25		Page 4.13- 15 A. Scenic Vista, 2nd paragraph: The PSA states: "Yes. As seen in Visual Resources Figures 1 and 3, the project is surrounded by identified areas of high scenic value."An "identified area of high scenic value" is not a designated scenic vista.	Wilderness Areas, National Forest and Recreation Areas are by their very nature areas of high scenic quality.
13.26		Page 4.13- 15 A. Scenic Vista, 2nd paragraph: The PSA states: "Views of the Nopah Range and Wilderness Area, Kingston Range and Pahrump Valley Wilderness Area and Spring Mountains National Recreation Area, including the prominent Mt. Charleston, would all be significantly and adversely impacted by the project." A mere view of a mountain range is not a designated scenic vista. Moreover, there is no evidence to support this sweeping assertion. From which KOP in California does the project "significantly and adversely" impact a designated scenic viewpoint? Wilderness status protects the land that lies within the boundaries of the wilderness area, but there is no legal basis for presuming that this status provides for special treatment for views *toward* the wilderness area from locations outside of it.	See 13.25 above. Views of the Wilderness Areas, National Recreation Areas and Mount Charleston are impacted at KOPs 3, 4, 5 and 7.
13.27		Page 4.13 15 A. Scenic Vista, 2nd paragraph: The PSA states: "As described earlier, these areas were inventoried by the BLM as Classification 1, the highest scenic value that can be assigned. Views from these scenic resources will also	The applicant has misunderstood the reference to VRI Classification (Inventory) as VRM.

13.28		Page 4.13 15 A. Scenic Vista, 2nd paragraph: "as will some views from alignments of the Mormon and Old Spanish National Historic Trails." These "alignments" are not designated scenic vistas. An "alignment" is not a viewer. The relevant question is whether there are a significant number of viewers who are even aware of the alignment, if they will be present along this alignment, whether the project is visible from the alignment, and if so, how the views will be impacted	Number of viewers on the National Historic Trail alignment is unknown. Nevertheless, the views from the trail, whether viewers are motorists or on foot or horseback, will be impacted in a significant way, as seen in KOP 7.
13.29		Page 4.13 15 A. Scenic Vista, 3rd paragraph: The PSA states: "KOPs 5 and 7 clearly show the impact of the project on the existing scenic view of Mt. Charleston, a prominent landmark of importance in pre history and current times." On the contrary, these simulations make it clear that in these views, the project will not block or otherwise interfere with views toward Mount Charleston's peak or ridgeline. These KOPs are neither designated scenic vistas nor scenic roads. It is a mistake to equate a mere "visual disturbance" on a scenic view with a "substantial adverse effect" on a designated scenic vista.	KOPs 5 and 7 were chosen in consultation with Visual Resources staff (4-27-2011) to represent the views from the Nopah Wilderness Area and the Old Spanish National Historic Trail, in addition to the views of motorists or others.

13.30		Page 4.13-15 A. Scenic Vista, 4th paragraph: The PSA states: "KOP 3 manifests the negative impact of the project on the motorists' view of the highly scenic Nopah Range and Wilderness Area." The roadway from which this view is seen is not a designated scenic highway and does not qualify as a scenic vista. In addition, the standard for a finding of significant impact is substantial adverse impact, not negative impact. Comparison of the existing view with the simulation of the view as it would appear with the project in place indicates that the current view already contains modifications, and that the visual changes brought about by the project would not constitute a "substantial degradation."	Language changed to adverse.
13.31		Page 4.13-16 Project Site and Construction Laydown Area: The PSA states: "Construction activities at the project site and construction laydown area would substantially degrade the visual character or quality of the site and surrounding areas as viewed from KOPs 3, 4, 5 and 7, due in large part to the construction of the power towers." Construction activities are temporary. Can temporary impacts be substantial? If it has low visibility, see below, how does it substantially degrade the site?	Construction activities at the project site and construction laydown area would substantially degrade the visual character or quality of the site and surrounding areas as viewed from KOPs 3, 4, 5 and 7, due in large part to the construction of the power towers.

13.32		Page 4.13-16 Project Site and Construction Laydown Area, 4th paragraph: “Construction-related truck traffic would be entering and leaving the project by way of what is now known as Topaz Street, at the westernmost boundary of the project site, and would introduce activity into the views not currently seen. The laydown area, where much of the storage and assembly would occur, is approximately one mile north of Old Spanish Trail Highway, and therefore would have low visibility from KOP 3 and the road. The construction of the power towers will be highly visible from all vantage points and therefore produce the most significant visual impact of the project.” There is no KOP here. There is no assessment of the visual quality. The only activity is traffic, which already occurs at this location. Traffic does not constitute a “substantial degradation” of the visual quality of the site. Subject characterizations of visual impacts, such as this, which are not supported by a KOP analysis, should be deleted.	Staff disagrees with applicant's assertion that construction traffic and construction of a 750' power tower does not constitute a substantial degradation of the visual quality.

13.33		Page 4.13-16 and 17, Light or Glare, 1st paragraph: The PSA states: "Nighttime construction and security lighting would have the potential to produce glare or off-site light trespass. If bright exterior lights were not shielded or directed onsite, they could introduce significant light or glare to the vicinity, particularly for motorists on Old Spanish Trail Highway, as represented by KOP 3 and 5. This has the potential to cause distraction in the form of glare and confusion as to the light source origin for motorists, who are used to travelling along a fairly dark stretch of highway. Depending upon the project setbacks, without screening and lighting controls, the impact upon motorists on Old Spanish Trail Highway would be adverse and significant." The Staff Analysis should analyze the project as proposed. It is legally inappropriate to analyze the project without screening and lighting controls, when these features are proposed as part of the project. As a prelude to this discussion, there needs to be a clear statement of the kinds of nighttime lighting that will be installed at the site during the construction period and the extent to which it will be used. There will also be lighting at the laydown area and the heliostat construction area that will be on at night. The AFC analysis provides correct assessment of the impacts of the lighting at laydown and heliostat construction areas, which will be controlled and shielded, and which will be far from offsite viewers and screened to some degree by intervening desert vegetation.	Staff has analyzed the project as proposed. This is standard Energy Commission language. Applicant –proposed mitigation measures do not address nighttime construction lighting. (5.13-32). The FSA includes more direct language about mitigation for nighttime construction lighting.

13.34		Page 4.13-16 and 17, Light or Glare, 1st paragraph: The PSA states: "As the power towers are constructed, aviation safety lighting would need to be operational as the towers reach each successive level of lighting required by the FAA. In addition, cranes used in the project construction would also require aviation safety lighting." All true, but the cranes are temporary and not a distraction for motorists at distances of several miles.	Staff notes that Ivanpah Solar Electric Generating System (ISEGS), a power tower technology system previously analyzed and licensed by the Energy Commission, required FAA lighting. The FSA acknowledged the existence of FAA lighting during the operational phase and that staff was unaware of any thresholds for significance for FAA lighting. Staff determined for ISEGS that with all the other lighting controls in place, the FAA lighting would not likely constitute a significant impact. The Final Decision made Findings that the ISEGS nighttime lighting would be less than significant with implementation of the COC VIS-4. The ISEGS differs substantially from HHSEGS, however, in the height of the proposed towers and in the distance from the nearest residences or motorists. Therefore, the number of FAA lights and the proximity to sensitive viewers is greater for the HHSEGS project and constitutes an adverse impact.
13.35		Page 14.13-17, Light or Glare, 1st full paragraph: The PSA states: "The construction lighting and activity have the potential to create significant and unavoidable visual impacts on residents, motorists and other viewers." What other viewers? From which KOPs?	See previous paragraph in staff's PSA referencing KOPs 3 and 5.

13.36		Page 14.13-17, Light or Glare, 1st full paragraph: The PSA states: "There is no mitigation for reducing the visual impact of the construction and lighting of the power towers, and would remain a significant and unavoidable visual effect." The lighting associated with the construction of the power towers will be temporary and short-term in nature, it will not constitute a significant impact. Has construction lighting of the towers or construction period aviation safety lighting found to be significant on any other project?	ISEGS Findings of Fact relative to construction activities was that VIS-3 would reduce impacts to less than significant. VIS-3 was then deleted from the conditions and the project overall was found to have significant adverse visual impacts. The project required an override on the part of the Commission. ISEGS differs from HHSEGS in both the height of the towers and the proximity to nearby residents and motorists. Staff concludes that while lighting and construction activities would be temporary, the impacts during that period are unmitigable due to the size and placement of the facilities.
13.37		Page 14.13-17, Light or Glare, 2nd full paragraph: The PSA states: "Gas pipeline construction would occur primarily in Nevada on BLM-managed lands. Due to their temporary nature and low visibility, there would be no significant adverse impacts from construction of the pipelines." The FSA should not analyze impacts of project in Nevada.	Staff has appropriately analyzed impacts of the project componets in California on Nevada.
13.38		Page 14.13-17, Conclusion, 1st paragraph, last sentence: The PSA states: "The adoption of the conditions of certification noted herein will mitigate some of the visual impacts at ground level but there is no mitigation for the visual impacts during construction of the power towers." Because any light-related impacts that may occur related to the construction of the power towers will be temporary and short-term, they will be less than significant.	See staff response to 35 above.
13.39		Page 4.13-18, KOP 3, 1st paragraph, 2nd to last sentence: The PSA states: "The 17.5 acre campus-style environmental park will function primarily as a columbarium" Where did this term "environmental park" come from and what does it mean?	St. Therese Mission project documents and Inyo County Planning Department documents refer to St. Therese Mission as "an environmental park development on 17.5 acres…" . See document references below.

13.40		Page 4.13-18, Visual Sensitivity, 1st paragraph: The PSA states: "The view would be cohesive and highly scenic due to the panoramic nature of the horizon line formed by the Nopah Range were it not for the roadside elements in the foreground and construction activity in the middle ground." Therefore, the view is not cohesive or highly scenic. This is like saying it would be a sunny day if it were not for the overcast sky	The KOP was structured by the applicant in a such a way to include the foreground elements seen by both passing motorists and future visitors to the St. Therese Mission. This does not change the fact that the view is largely a panoramic and scenic one except for the static nature of the KOP.
13.41		Page 4.13-18, Visual Sensitivity, 1st paragraph, last sentence: The PSA states: "The overall scenic and panoramic view at KOP 3 creates moderate-high viewer concern for passing viewers." Why moderate to high? What is the basis for this statement? This statement is unsupported by substantial evidence.	KOP 3 is an amalgam of viewer types, from drivers to passengers to visitors to the future St. Therese Mission. KOP 3 features a panoramic view, visible to all types of viewers, but especially to motorists. Motorists who are local, rural or travelling to a vacation destination tend to have a higher sensitivity than commuters or those in industrial areas. Motorist in this area belong to the former categories and therefore have a moderate to high degree of sensitivity.
13.42		Page 4.13-19 and 20, Visual Change, 1st paragraph, last sentence: The PSA states: "But the towers do interrupt the highly scenic panoramic of the Nopah Range and Wilderness Area, therefore view disruption is moderate." Where overall viewer sensitivity is moderate and view disruption is moderate, does the CEC typically find the impact "substantially degrades" the visual quality of the site or the surroundings? Please explain the applicable thresholds of significance and how they are being applied in this case. Conclusory statements unsupported by substantial evidence, such as this, violate CEQA.	See Visual Resources Table 4 and Appendix VR-1 for an explanation of how staff makes these determinations. Viewer sensitivity is a measure taken prior to the introduction of the project and view disruption is a measure of the change the project brings to the view. There is no inconsistency here.
13.43		Page 4.13-20, 1st full paragraph: The PSA states: "This would create a potentially higher incidence of visual distraction from the motorist's perspective at KOP 3." Visual distraction or visual interest?	Staff does not characterize the introduction of two immense, 750' tall power towers with brightly glowing tops creating a halo of light into a rural, panoramic desert landscape as something of visual interest. Rather, it has the potential to be a distraction and irritant to drivers.

13.44		1. Page 4.13-20, 1st full paragraph: The PSA states: "If the sun were low in the horizon to the south (as in the winter months) or to the west (as in the summer months), the visual dominance and the potential view disruption of the scattering effect of light would add to the overall visual change, which under these circumstances would now both be characterized as high. This results in the overall visual change at KOP 3 as high." Please explain in the analysis how often and for how long are these circumstances expected to occur.	Staff doesn't feel additional anlysis of time extent is necessary.
13.45		Page 4.13-20, 2nd full paragraph: The PSA states: "The contrast and dominance of the project structures in the landscape as seen in the simulation are high and the view disruption of the Nopah Range is high. The overall visual change at KOP 3 is high." These characterizations are not reflected in KOP 3.	Staff disagrees.
13.46		Page 4.13-20 KOP 3 Summary, 1st paragraph: The PSA states: "Taking into account the moderate visual sensitivity and the high overall visual change, visual impacts at KOP 3 would remain significant even with mitigation. Views of the dominant power towers and bright solar receivers cannot be effectively screened." KOP 3 does not show high overall change in an already cluttered landscape. This conclusion does not take into account the effect of the continuing development of the Saint Therese Mission project on this view. With completion of the Mission's structures and landscaping of the parking lot and other areas of the Mission site, views from this KOP toward the solar towers will be substantially screened.	Staff disagrees. Staff has already identified the partial screening effect of the build out of St. Therese Mission.
13.47		Page 4.13-20 KOP 3 Summary, 1st paragraph: The PSA states: "Adoption of Condition of Certification VIS-6 will provide remedial mitigation for the loss of scenic views from KOP 3." KOP -3 is not a "scenic view." While another element is added to view, it is already degraded.	The KOP was structured by the applicant in a such a way to include the foreground elements seen by both passing motorists and future visitors to the St. Therese Mission. This does not change the fact that the view is largely a panoramic and scenic one except for the static nature of the KOP.

13.48		Page 4.13-20 and 21, KOP 4, 1st paragraph: The PSA states: "The community has uninterrupted views of Mount Charleston and the Spring Mountains, hence the name Charleston View." These views are interrupted by the structures and vegetation within the community.	The low profile of the structures and plantings in Charleston View do not impinge upon the current residents' view of an 11,918' peak and related mountain range.
13.49		Page 4.13-21, KOP 4, 1st partial paragraph: The PSA states: "The subdivision, laid out and permitted in the 1960s, never even began to approach its full build-out capacity." This is not relevant to visual resources.	Relevance to the discussion of visual resources is found in the background description of the community.
13.50		Page 4.13-21 Visual Sensitivity, 1st paragraph: The PSA states: "To the residents, who have chosen to live within this viewshed, it may be perceived as picture-postcard-like in its scenic value, and therefore of high quality. Other than the low-profile buildings and scattered plantings, there is little to obstruct the view, which is highly visible from the treeline above and down the linear corridor of Silver Street." This is a subjective characterization. Some residents may perceive this area as "picture-postcard-like." Other residents, such as those who have abandoned vehicles and artifacts on their property, may not share this	Comment noted.
13.51		Page 4.13-21 Visual Sensitivity, 1st paragraph: The PSA states: "Census counts the population in the vicinity of Charleston View as 68. Therefore the number of permanent viewers is moderately high." The question is not the number of viewers in the community, but the number of viewers at this KOP. It would be wrong to attribute all residents to this KOP, since some residents may not have this viewpoint from their residence. Has the Staff previously characterized the 68 residential viewers as moderately high?	See Footnote 14 in PSA (15 in FSA) which explains how staff measures numbers of residents.

13.52		Page 4.13-22 Visual Change, 1st paragraph: The PSA states: "The introduction of the structures for the HHSEGS facility into the view at KOP 4 dramatically alters the nature of the view from rural and highly scenic to highly industrial." The analysis does not support the conclusion that KOP 4 is highly scenic. And, as explained previously, "industrial" is a subjective and undefined term.	Introduction of a power plant into a rural, desert landscape is reasonably described as a change to an industrial landscape.
13.53		Page 4.13-22 Visual Change, 1st paragraph: The PSA states: "The industrial gray tone of the tower and the bright white solar receiver on top are in marked contrast from the low-key, natural desert palette." The use of the descriptor "industrial" for the gray tone of the solar towers is prejudicial. The flat gray color of the solar towers will be neutral, and will not necessarily be inconsistent with the colors of the natural desert palette.	Gray tones are characteristic of power plants and industrial facilities.
13.54		Page 4.13-22 Visual Change, 2nd paragraph: The PSA states: "The two 750-foot towers with their luminescent solar receiver caps dominate the landscape so completely that it will be hard to imagine the unbroken, highly scenic quality of the existing view." The view is not highly scenic. The view is from a rural desert community without existing aesthetic controls. The description of change in view should be objective and the SA should not intermingle subjective viewer perception into the analysis.	Staff has provided a comparison for the reader to other large structures in the project vicinity.

13.55		Page 4.13-22 KOP 4 Summary, 1st paragraph: The PSA states: "Adoption of Condition of Certification VIS-6 will provide remedial mitigation for the loss of scenic views the change in the character of the view from KOP 4." How is this remedial?	The Scenic Resources Interpretive Area's primary function as identified in VIS-6 is to educate and inform the public about the visual resources in the area adversely impacted by the project. VIS-6 as drafted in the PSA included an opportunity for the applicant to highlight the technology in use as part of that educational outreach. The loss of scenic resources and non-conformance with LORS are the primary reasons for the mitigation, not the project technology as described in the applicant's comment. The education component makes it remedial, even though it does not provide mitigation to reduce impacts to less than significant.
13.56		Page 4.13-22 KOP 4 Summary, 1st paragraph: The PSA states: "The planting of trees, however, does not provide complete mitigation for the visual impact of the towers. Therefore, the visual impacts would remain significant and unavoidable." The relevant question is not whether there is complete mitigation. The question is whether with the proposed mitigation, the project as mitigated will substantially degrade the view from KOP 4. The answer is no.	Staff disagrees.
13.57		Page 4.13-23, Visual Sensitivity, 2nd paragraph: The PSA states: "The Old Spanish Trail Highway snaking through the valley and the broad expanse of sky and mountains with ample vegetation is a picture-postcard quality scene of high visual quality and has a high degree of visibility." This is a subjective characterization of the visual sensitivity. The adjectives are highly "value" laden—a "snaking" highway, "broad expanses," "ample" vegetation, "picture postcard" are all terms which impair the objectivity of the analysis.	A visual resource analysis, by its very nature, must use descriptive language to describe the scene for the reader.

13.58		RE: KOP-5 What, if any, recreational use of the portion of the Nopah Wilderness falls within the potential viewshed of the Project? This is not a KOP from the solitude of the wilderness. This is a KOP from a road.	KOP 5, like several others, was chosen for a dual purpose: to portray both the view from the road and from the wilderness area. Correspondence from the applicant, dated 4-29-11, following a pre-filing site visit to determine KOP locations, indicates agreement that because of the similarity of the view from VP-6 and VP-7, that VP-6 from the Nopah Wilderness Area would not be used as a KOP in the AFC. Staff further refers the applicant to the AFC, p. 5.13-4, where the KOP is described as "this view is also generally representative of views that would be seen by any visitors to the lower slopes of the eastern front of the Nopah Range Wilderness Area".
13.59		Page 4.13-24, 1st paragraph: The PSA states: "At a speed of approximately one mile per minute, the project's power towers will be in full view of the motorist for nearly five minutes, which is considered a high view duration. Likewise for the recreationist, who is hiking, or camping, possibly enjoying the solitude of the view, the duration would be high." There is no hiking or camping here and no solitude roadside.	The KOP, like several others, was chosen for a dual purpose: to portray both the view from the road and from the wilderness area. In a correspondence dated 4-29-11, following a pre-filing site visit to determine KOP locations, indicates agreement that because of the similarity of the view from VP-6 and VP-7, that VP-6 from the Nopah Wilderness Area would not be used as a KOP in the AFC.
13.60		Page 4.13-24 Visual Change, 1st paragraph, 6th sentence: The PSA states: "The smooth gray concrete towers capped with a radiant solar generator do not blend in with the natural hues of the desert floor, mountains and sky." On the contrary, the neutral gray color of the solar towers will be generally compatible with the color of the desert soils and under hazy and dusty atmospheric conditions, will readily blend into the backdrop.	A "radiant solar generator" does not blend in with the natural hues of the desert floor, mountains and sky.

13.61		Page 4.13-25, Visual Sensitivity, 2nd paragraph: The PSA states: "Viewers at this location are locals traversing the two-track path in their four-wheel drive vehicles and recreationists." Why is it assumed the viewers are "locals" or recreationists? Is there any objective data regarding the type or number of viewers at this location?	It is a reasonable assumption that the viewers are locals or recreationists based upon staff observation, the location of the track and the lack of data available from BLM or other sources.
13.62		Page 4.13-25 and 26, Visual Sensitivity, 2nd paragraph: The PSA states: "Recreationalists would naturally have a higher degree of viewer concern, as they would be traveling more slowly and taking in the surroundings, including the panoramic view as shown in KOP 7 as well as the views to and within the Pahrump Valley Wilderness Area." This statement assumes a use different than off-road vehicle users. What is that use?	Recreationalists might be hikers or equestrians following the identified segment of the Old Spanish Trail.
13.63		"….The publication of this auto tour may have the effect of increasing visitorship to the off-road trails and sites along the route in the future, thereby increasing the viewer concern." This is not relevant to this KOP and should be deleted.	As the KOP is representative of both the Old Spanish/Mormon Trail and views from the Pahrump Valley Wilderness (another dual-purpose KOP), it is relevant to note that there may be an increased degree of interest in the future and a higher number of viewers due to the publication of the BLM auto-tour.

13.64		Page 4.13-26, Visual Sensitivity, 3rd full paragraph: The PSA states: "This is borne out as the KOP represents both the view from a wilderness area as well as from a point on a national historic trail, where viewer concern should be higher than average." It is not in the wilderness and, if it is on a historic trail, it should not be disclosed here. While this KOP may be on federally managed (BLM) lands, it is far from the boundaries of the wilderness.	The applicant participated in field-selecting the KOP in conjunction with staff, identifying the trail track using GPS coordinates and agreeing to use the KOP as representative of both the Old Spanish/Mormon Trail alignment as shown on NPS documents, Delorme Maps and the applicant's own VR Figures 5.13-1, DR 32-1 and Figure DR 37-1, and as a nearby representation of the view from the Pahrump Valley Wilderness. These discussions took place with staff on April 27, 2011, while in the process of selecting KOPs for the AFC. Please refer to Data Response 32 which describes the KOP 7 in detail, including, "it is intended to represent the view ...of recreational users who might travel to the Pahrump Valley Wilderness Area...the new KOP (7) would also represent a view on the alignment of the Old Spanish National Trail".
13.65		Page 4.13-26, Visual Change, 1st paragraph: The PSA states: "Were the towers and related facilities closer to the viewer, the dominance would be high." They are not "closer," however. This is another example of the PSA assuming hypothetical circumstances ('were the towers closer") in order to find an impact, even if there is no substantial evidence to support such a conclusion.	Sentence removed in discussion of Visual Change KOP 7.
13.66		Page 4.13-27, KOP 7 Summary, 1st paragraph: The PSA states: "Adoption of Condition of Certification VIS-6 will provide remedial mitigation for the loss of scenic views from KOP 7." As above. How is this remedial?	The Scenic Resources Interpretive Area's primary function as identified in **VIS-6** is to educate and inform the public about the visual resources in the area adversely impacted by the project. It is also offered as mitigation for non-compliance with Inyo County LORS.
13.67		Page 4.13-34, 1st full paragraph: The PSA states: "During operation, the proposed project has the potential to introduce light offsite to the roadway and surrounding properties, and up-lighting to the nighttime sky. If bright exterior lights were unshielded and lights not directed onsite they could introduce significant nighttime light to the vicinity."	This is standard Energy Commission language for light and glare analysis.

13.68		Page 4.13-34, 3rd full paragraph: The PSA states: "The addition of the aviation safety lighting will substantially alter the nighttime appearance of the project area and will be prominently featured in the night sky due to the height of the towers and the number of lights required by the towers' size." This is not correct.	18 FAA lights will be highly visible at night.
13.69		Page 4.13-34, 3rd full paragraph: The PSA states: "The applicant indicates there will be eighteen FAA warning lights on each tower. Once the project becomes operational, the visual impact of the federally required aviation safety lighting is unmitigable, and therefore would be significant." As indicated previously, the required FAA aviation safety lighting will affect only a small area of the night sky, leaving most of the sky unaffected, and they will have no effect on ambient lighting conditions in the surrounding area or on the ability of viewers in the area to see the stars and planets. Thus, the impacts of this lighting would be less than significant.	Staff notes that Ivanpah Solar Electric Generating System ISEGS) is a power tower technology system previously analyzed and licensed by the Energy Commission. The FSA acknowledged the existence of FAA lighting during the operational phase and that staff was unaware of any thresholds for significance for FAA lighting. Staff found for ISEGS that with all the other lighting controls in place, the FAA lighting would not likely constitute a significant impact. The Final Decision made Findings that the ISEGS nighttime lighting would be less than significant with implementation of the COC VIS-4. The ISEGS differs substantially from HHSEGS, however, in the height of the proposed towers and in the distance from the nearest residences or motorists. Therefore, the number of FAA lights and the proximity to sensitive viewers is greater for the HHSEGS project.
13.70		Page 4.13-35, CUMULATIVE IMPACTS AND MITIGATION (Generally) As discussed in General Comments, the cumulative impacts analysis should not address projects in Nevada, nor projects outside the viewshed.	Staff disagrees.
13.71		Page 4.13-36 Visual Resources Table 5 – Projects Considered in the Cumulative Impacts Analysis: The PSA should address only projects in California and only projects in the viewshed.	Staff disagrees.

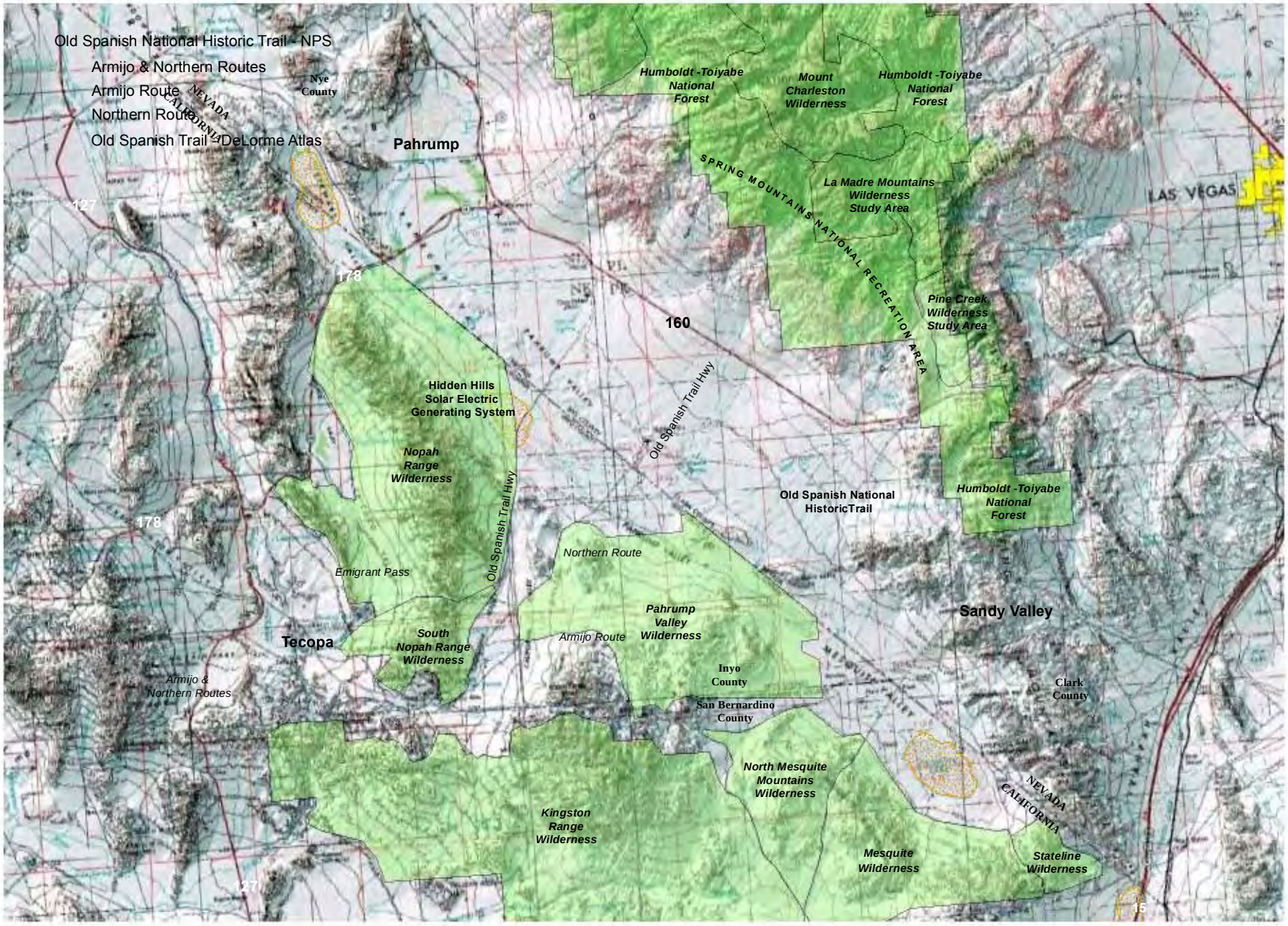
13.72		Page 4.13-40 Visual Resources Table 6 – Compliance with Applicable Laws, Ordinances, Regulations, and Standards, Local, Row 1 (Inyo County General Plan, Goals and Policies…), Consistency Determination column: "No" Would the Staff position if adopted, be cured by the GPA and rezoning or would a LORS override be required?	A General Plan Amendment would likely change this to "consistent"
13.73		Page 4.13-41 Visual Resources Table 6 – Compliance with Applicable Laws, Ordinances, Regulations, and Standards, Local, Row 4 (Inyo County Zoning Code Chapter 18.12.OS (Open Space)), Policy and Strategy Description column: The PSA states: "Maximum height of buildings in OS Zone: Principal buildings 30 feet, accessory buildings 25 feet." This is not a visual LORS.	Removed from LORS Tables

References for # 39 above:

St. Therese Mission Project Brief, 2010.
Inyo County Planning Department Notice of Determination, June 23, 2010
Inyo County Planning Department, Draft Mitigated Negative Declaration, Conditional Use Permit #2010-02/St. Therese Mission
Inyo County Planning Department, Appendix G, CEQA Initial Study & Environmental Checklist Form, CUP #2010-02 St. Therese Mission
Department of Fish & Game, CEQA Filing Fee No Effect Determination Form, 5/28/2010

VISUAL RESOURCES - FIGURE 1

Hidden Hills Solar Electric Generating System (HHSEGS) - Trails, Recreation and Wilderness Areas in the Project Vicinity

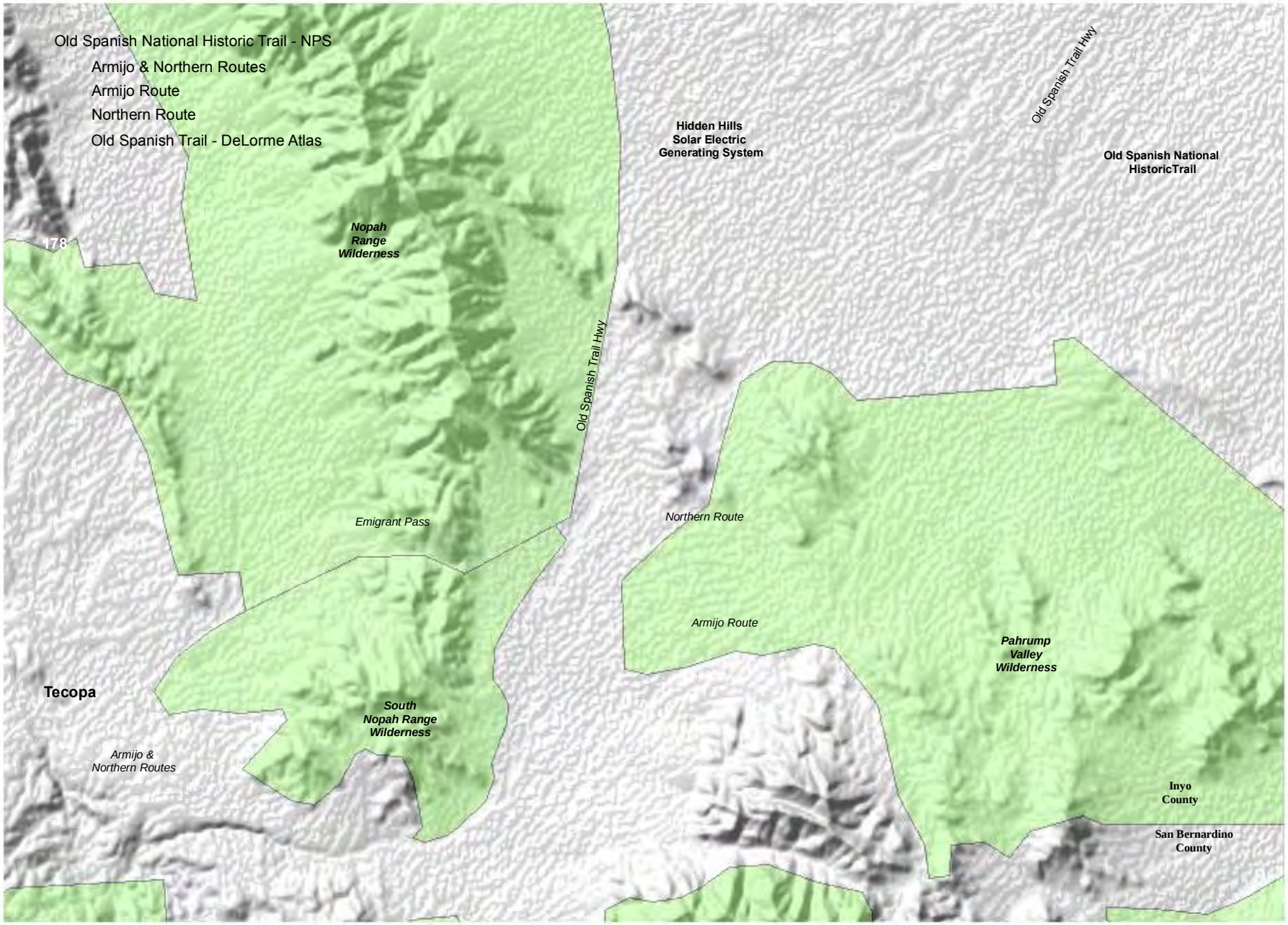


CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL, MultiNet, DeLorme Atlas, National Park Service

VISUAL RESOURCES - FIGURE 2

Hidden Hills Solar Electric Generating System (HHSEGS) - HistoricTrails in the Project Vicinity

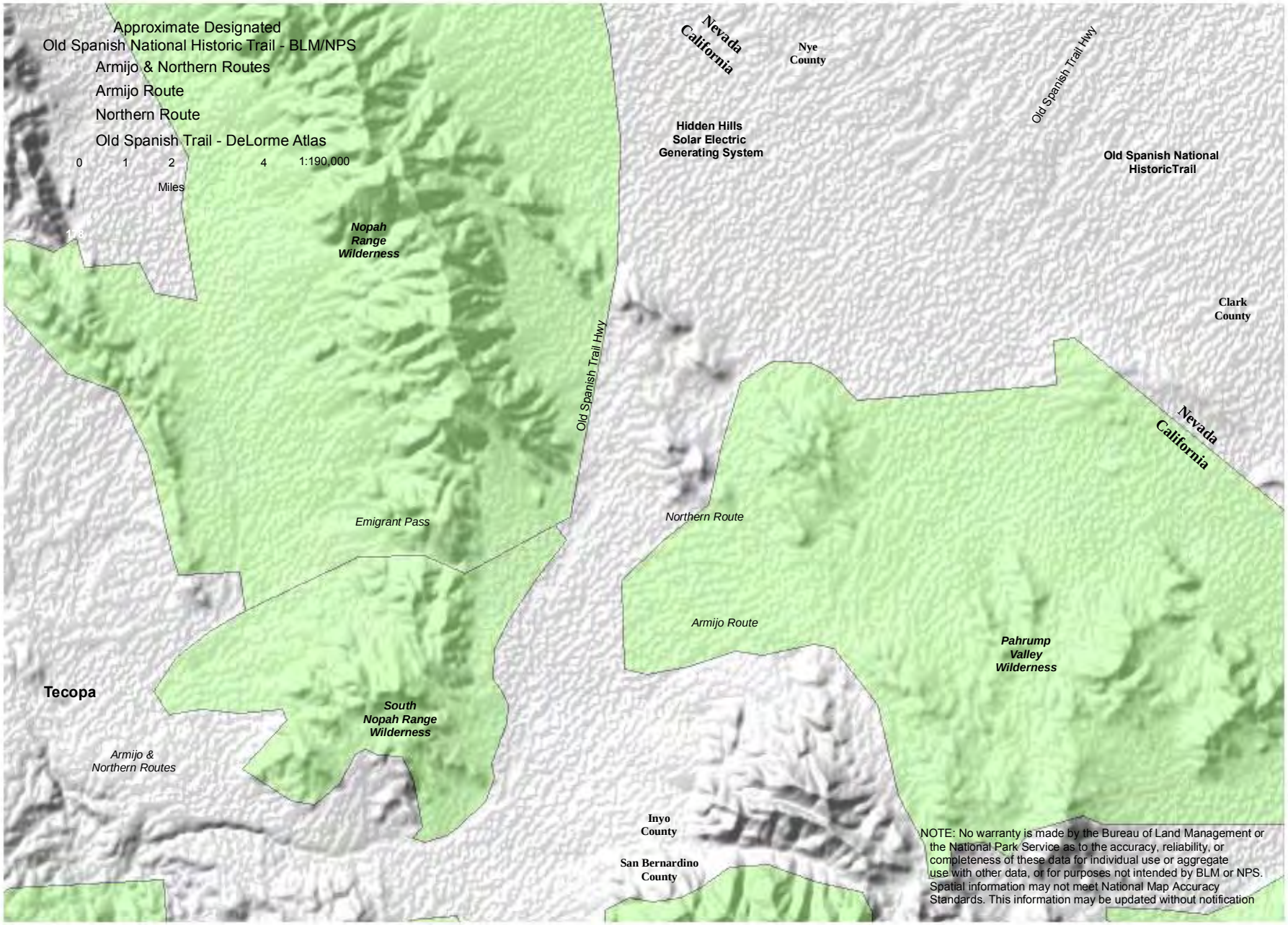


CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL, MultiNet, DeLorme Atlas, National Park Service

VISUAL RESOURCES - FIGURE 2

Hidden Hills Solar Electric Generating System (HHSEGS) - HistoricTrails in the Project Vicinity

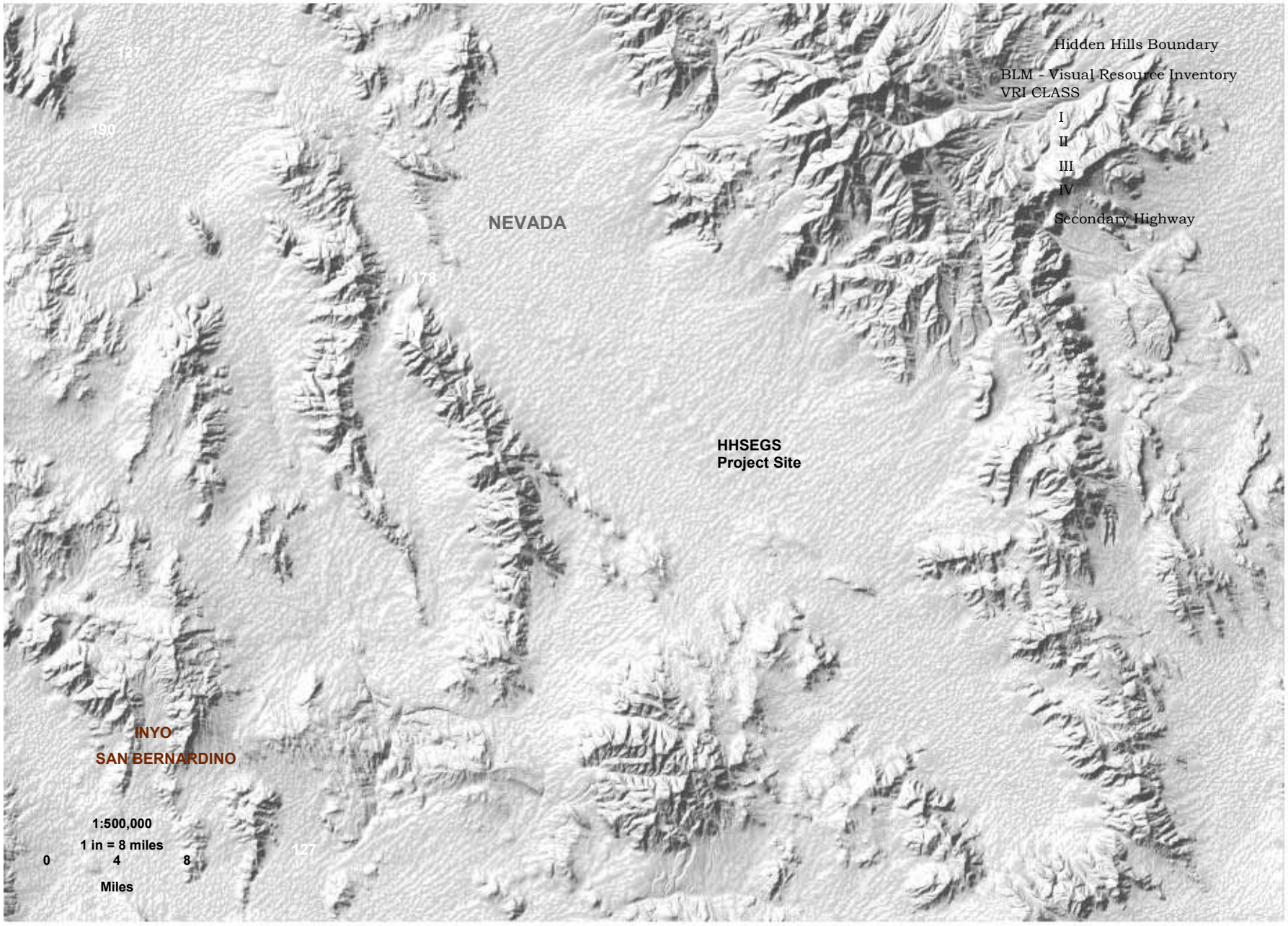


CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL, MultiNet, DeLorme Atlas, Bureau of Land Management/National Park Service

VISUAL RESOURCES - FIGURE 3

Hidden Hills Solar Electric Generating System (HHSEGS) - BLM Visual Resource Inventory

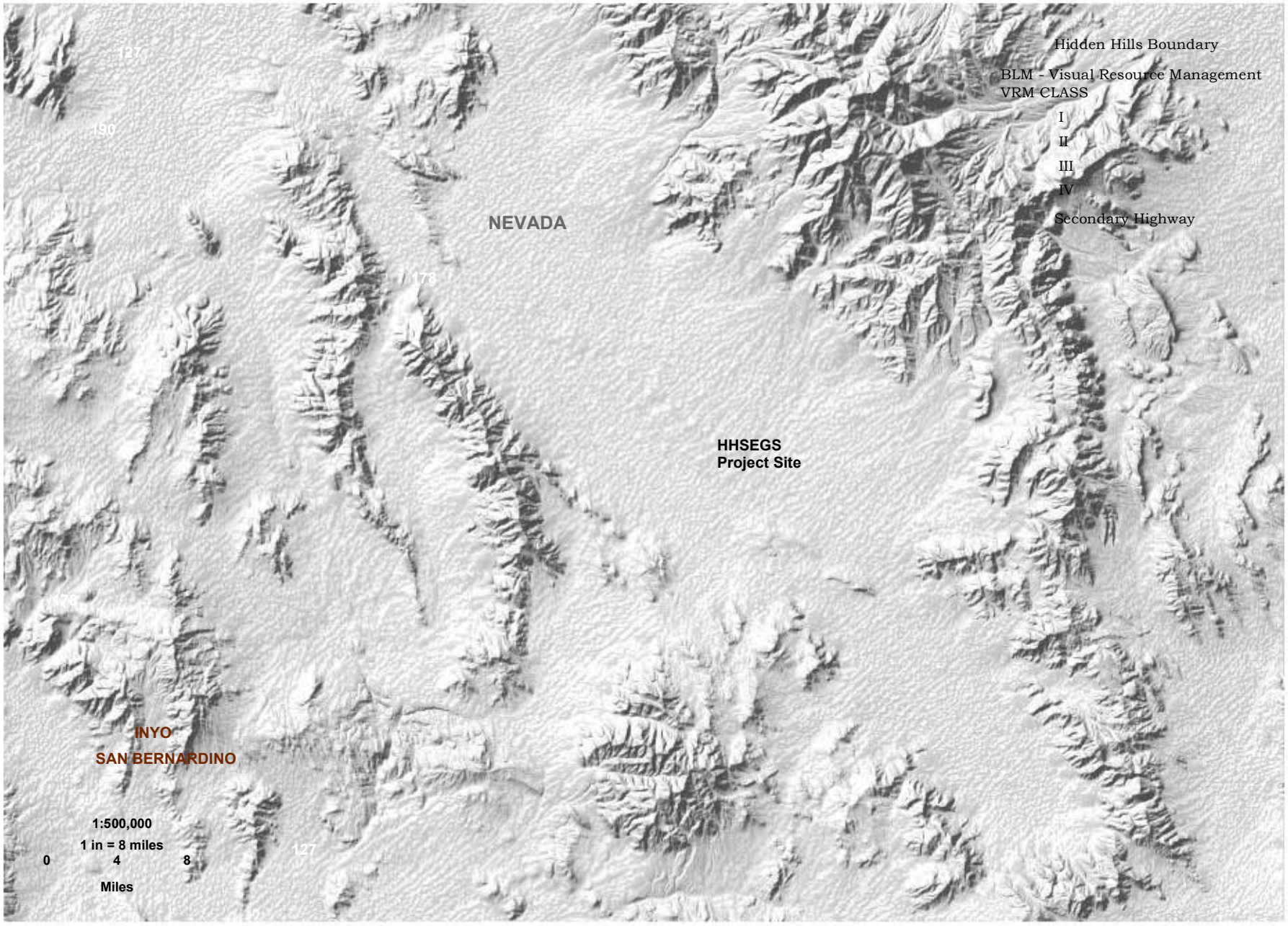


CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: BLM Visual Resource Management

VISUAL RESOURCES - FIGURE 4

Hidden Hills Solar Electric Generating System (HHSEGS) - BLM Visual Resource Management



CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: BLM Visual Resource Management

VISUAL RESOURCES - FIGURE 5

Hidden Hills Solar Electric Generating System (HHSEGS) - Landscape Character Photo

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Staff Photo

VISUAL RESOURCES - FIGURE 6

Hidden Hills Solar Electric Generating System (HHSEGS) - Landscape Character Photo

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Staff Photo

VISUAL RESOURCES - FIGURE 7

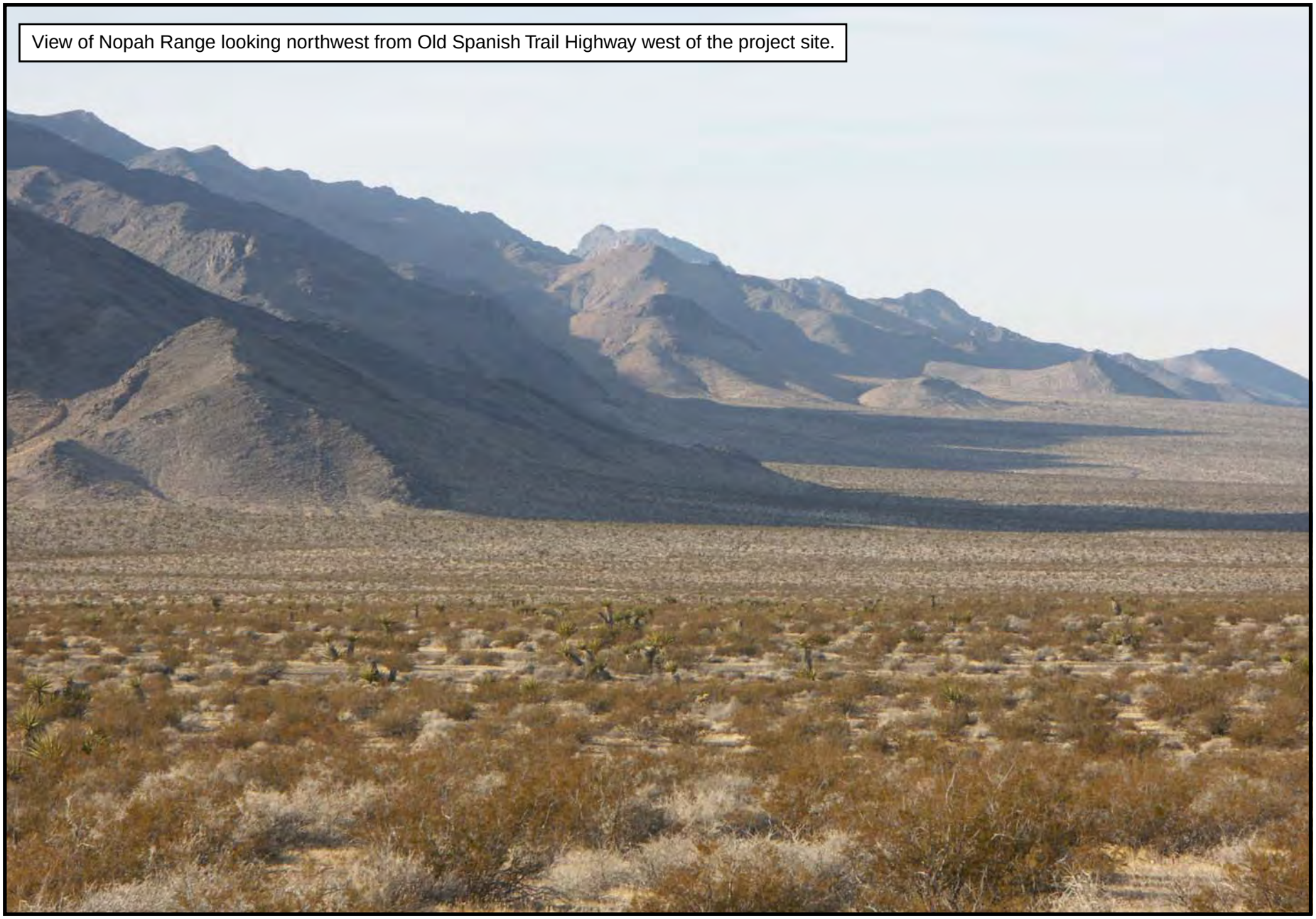
Hidden Hills Solar Electric Generating System (HHSEGS) - Landscape Character Photo

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Staff Photo

VISUAL RESOURCES - FIGURE 8

Hidden Hills Solar Electric Generating System (HHSEGS) - Landscape Character Photo

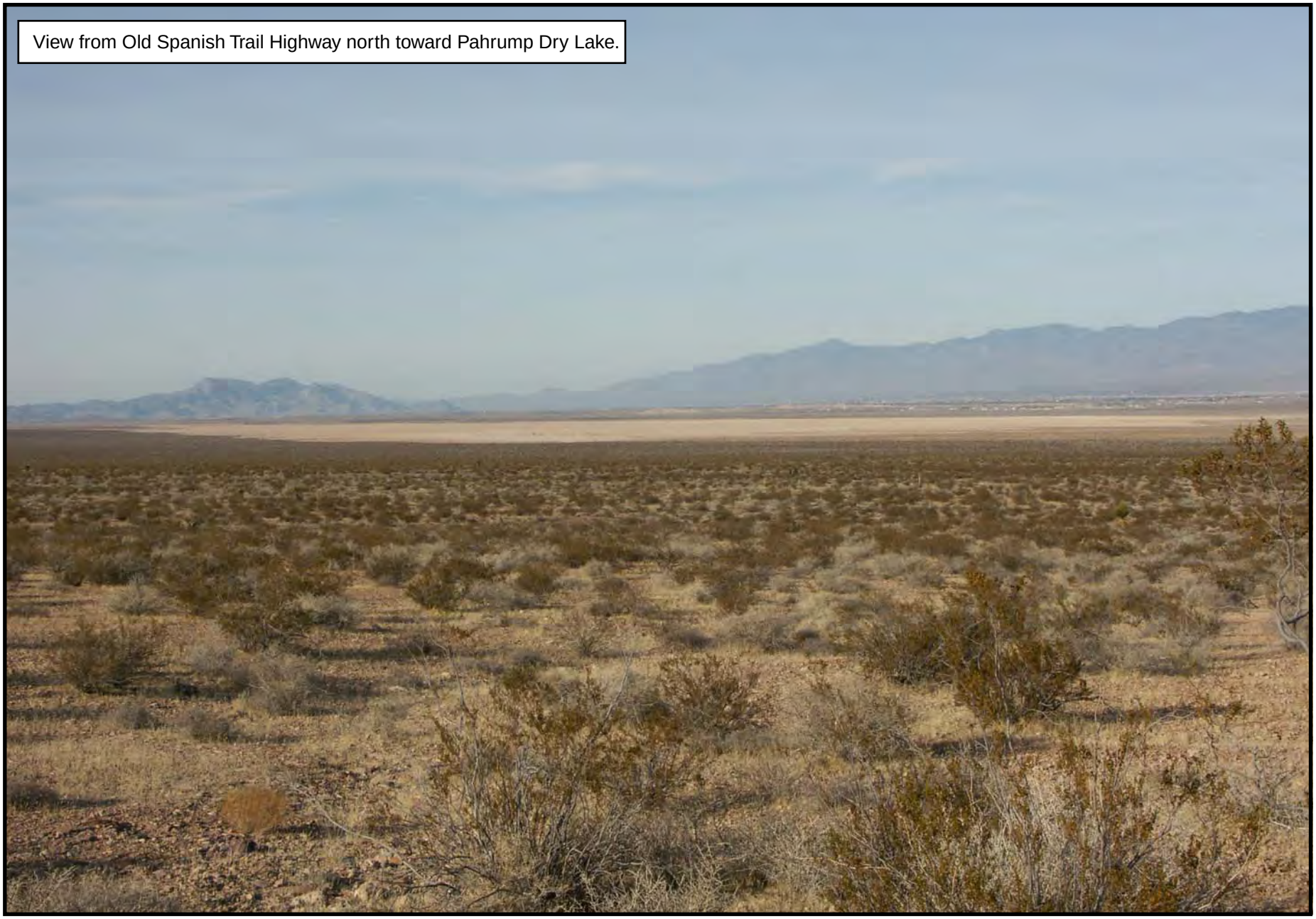


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Staff Photo

VISUAL RESOURCES - FIGURE 9

Hidden Hills Solar Electric Generating System (HHSEGS) - Landscape Character Photo



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Staff Photo

VISUAL RESOURCES - FIGURE 10

Hidden Hills Solar Electric Generating System (HHSEGS) - Landscape Character Photo

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Staff Photo

VISUAL RESOURCES - FIGURE 11

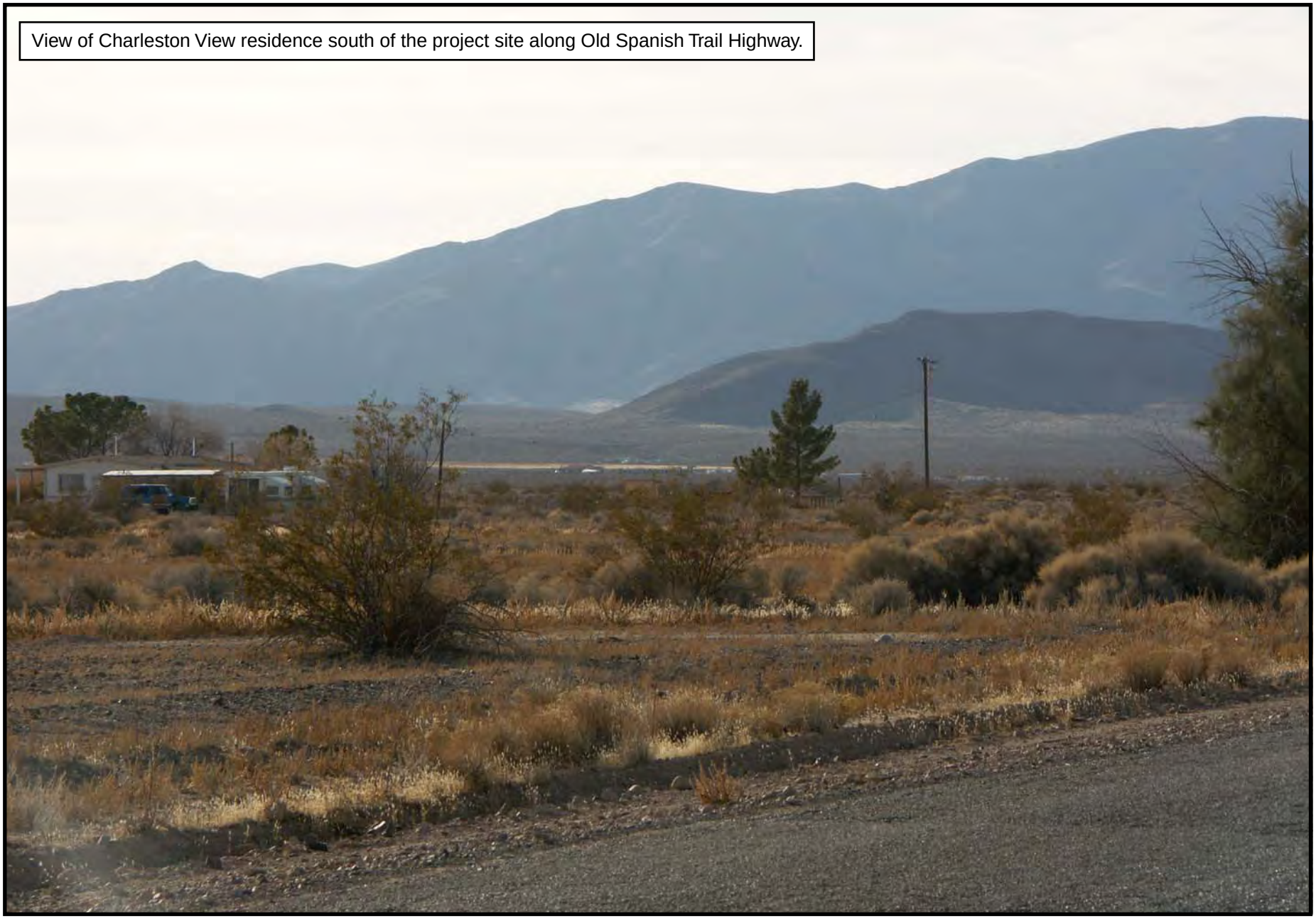
Hidden Hills Solar Electric Generating System (HHSEGS) - Landscape Character Photo

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Staff Photo

VISUAL RESOURCES - FIGURE 12

Hidden Hills Solar Electric Generating System (HHSEGS) - Landscape Character Photo



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Staff Photo

VISUAL RESOURCES - FIGURE 13

Hidden Hills Solar Electric Generating System (HHSEGS) - Landscape Character Photo

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Staff Photo

VISUAL RESOURCES - FIGURE 14

Hidden Hills Solar Electric Generating System (HHSEGS) - Landscape Character Photo

View of existing transmission poles along Old Spanish Trail Highway in the vicinity of the project site.

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Staff Photo

VISUAL RESOURCES - FIGURE 14
Hidden Hills Solar Electric Generating System (HHSEGS) - Landscape Character Photo

View from Nevada Highway 160 Westbound looking toward the project site.

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: Staff Photo

VISUAL RESOURCES - FIGURE 15

Hidden Hills Solar Electric Generating System (HHSEGS) - Landscape Character Photo

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Staff Photo

VISUAL RESOURCES - FIGURE 16

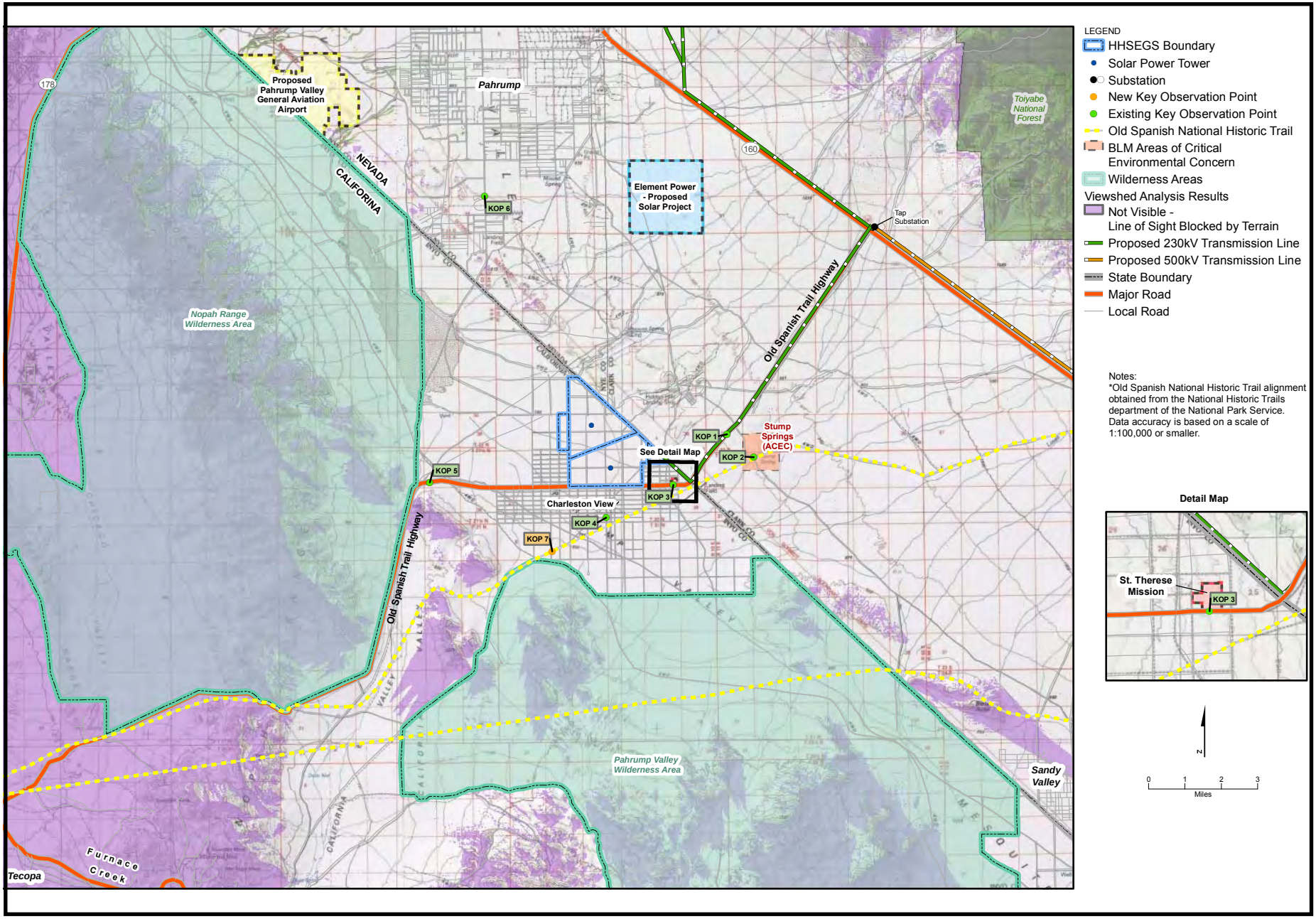
Hidden Hills Solar Electric Generating System (HHSEGS) - Landscape Character Photo

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Staff Photo

VISUAL RESOURCES - FIGURE 17

Hidden Hills Solar Electric Generating System (HHSEGS) - Location of Key Obervation Points



VISUAL RESOURCES

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: DR 32-1

VISUAL RESOURCES - FIGURE 18a

Hidden Hills Solar Electric Generating System (HHSEGS) - KOP 1. Existing view toward the project site from Old Spanish Trail Highway traveling southbound, 1.75 miles northeast of the project site.

VISUAL RESOURCES

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SOURCE: AFC Figure 5.13-2A

VISUAL RESOURCES - FIGURE 18b

Hidden Hills Solar Electric Generating System (HHSEGS) - KOP 1. Simulated view toward the project site from Old Spanish Trail Highway traveling southbound, 1.75 miles northeast of the project site.

SOURCE:Supplemental Data Response Set Two, Figure 5.13-2B R1

VISUAL RESOURCES - FIGURE 19a

Hidden Hills Solar Electric Generating System (HHSEGS) - KOP 2. Existing view toward the project site from Stump Springs ACEC.

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: AFC Figure 5.13-3A

VISUAL RESOURCES - FIGURE 19b

Hidden Hills Solar Electric Generating System (HHSEGS) - KOP 2. Simulated view toward the project site from Stump Springs ACEC.

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE:Supplemental Data Response Set Two, Figure 5.13-3B R1

VISUAL RESOURCES - FIGURE 20a

Hidden Hills Solar Electric Generating System (HHSEGS) - KOP 3. Existing view toward the project site from the front of the proposed St. Therese Mission project.

SOURCE: AFC Figure 5.13-4A

VISUAL RESOURCES - FIGURE 20b

Hidden Hills Solar Electric Generating System (HHSEGS) - KOP 3. Simulated view toward the project site from the front of the proposed St. Therese Mission project.

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Supplemental Data Response Set Two, Figure 5.13-4B R1

VISUAL RESOURCES - FIGURE 20c

Hidden Hills Solar Electric Generating System (HHSEGS) - KOP 3. Simulated view toward the project site from the front of the proposed St. Therese Mission project, showing visual effect of Dust/Paticulates

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Figure DR155-1

VISUAL RESOURCES - FIGURE 21a

Hidden Hills Solar Electric Generating System (HHSEGS) - KOP 4. Existing view toward the project site from the rural residential community of Charleston View (aka Calvada Springs).

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: AFC Figure 5.13-5A

VISUAL RESOURCES - FIGURE 21b

Hidden Hills Solar Electric Generating System (HHSEGS) - KOP 4. Simulated view toward the project site from the rural residential community of Charleston View (aka Calvada Springs).

SOURCE:Supplemental Data Response Set Two, Figure 5.13-5B R1

VISUAL RESOURCES - FIGURE 22a

Hidden Hills Solar Electric Generating System (HHSEGS) - KOP 5. Existing view toward the project site from Old Spanish Trail Highway traveling eastbound, 3.8 miles west of the project site.

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SOURCE: AFC Figure 5.13-6A

VISUAL RESOURCES - FIGURE 22b

Hidden Hills Solar Electric Generating System (HHSEGS) - KOP 5. Simulated view toward the project site from Old Spanish Trail Highway traveling eastbound, 3.8 miles west of the project site.

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Supplemental Data Response Set Two, Figure 5.13-6B R1

VISUAL RESOURCES - FIGURE 23a

Hidden Hills Solar Electric Generating System (HHSEGS) - KOP 6. Existing view toward the project site from the rural residential area closest to the project site within the community of Pahrump.

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: AFC Figure 5.13-7A

VISUAL RESOURCES - FIGURE 23b

Hidden Hills Solar Electric Generating System (HHSEGS) - KOP 6. Simulated view toward the project site from the rural residential area closest to the project site within the community of Pahrump.

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Supplemental Data Response Set Two, Figure 5.13-7B R1

VISUAL RESOURCES - FIGURE 24a

Hidden Hills Solar Electric Generating System (HHSEGS) - KOP 7. Existing view toward the project site from Garnet Road, 1.75 miles south of Tecopa Road.

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Data Response Set Two, Figure DR 32-2 R2A and R2B

VISUAL RESOURCES - FIGURE 24b

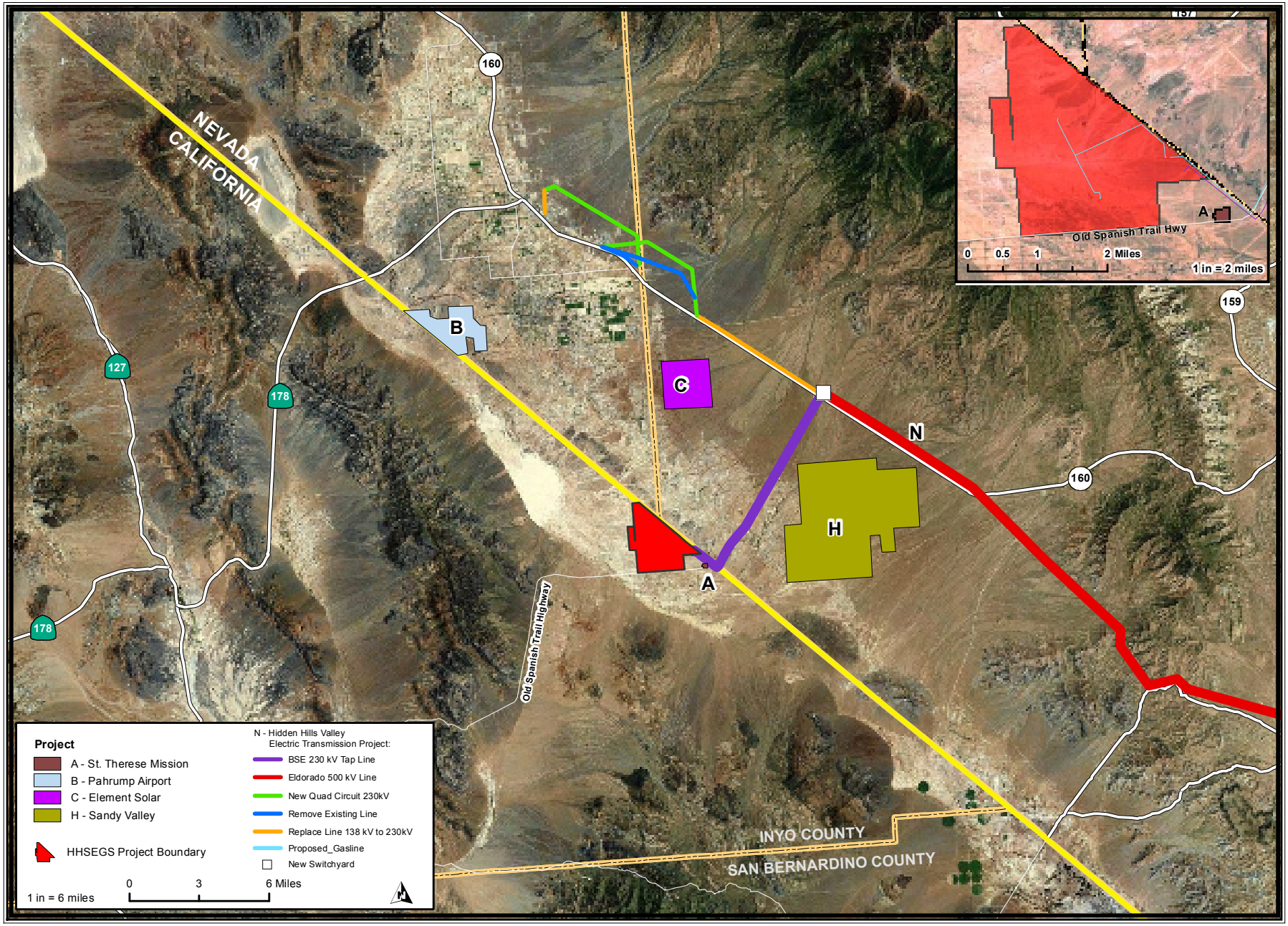
Hidden Hills Solar Electric Generating System (HHSEGS) - KOP 7. Simulated view toward the project site from Garnet Road, 1.75 miles south of Tecopa Road.

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Data Response Set Two, Figure DR 32-2 R2A and R2B

VISUAL RESOURCES - FIGURE 25

Hidden Hills Solar Electric Generating System (HHSEGS) - Cumulative Projects within the viewshed of HHSEGS



CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: BLM Southern Nevada District - Renewable Energy in Southern Nevada, BLM California - Renewable Energy Priority Projects, and Los Angeles Department of Water and Power.

VISUAL RESOURCES - FIGURE 26
Hidden Hills Solar Electric Generating System (HHSEGS) - Bonanza Peak Trail

View toward HHSEGS Project Site from Bonanza Trail

CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: Basin & Range Watch (July 21, 2012), USGS & National Geographic TOPO, and US Road - ESRI (2010).

WASTE MANAGEMENT

Testimony of Ellie Townsend-Hough, REA

SUMMARY OF CONCLUSIONS

Management of the nonhazardous and hazardous waste generated during construction and operation of the Hidden Hills Solar Electric Generating System (HHSEGS) would not result in any significant adverse impacts, and would comply with applicable waste management laws, ordinances, regulations, and standards, provided that the measures proposed in the Application for Certification and staff's proposed conditions of certification are implemented.

INTRODUCTION

This Final Staff Assessment (FSA) presents an analysis of issues associated with wastes generated from the proposed construction and operation of the HHSEGS. The technical scope of this analysis encompasses solid wastes generated during facility construction and operation. Management and discharge of wastewater is addressed in the **Soils and Surface Water** section of this document. Additional information related to waste management may also be covered in the **Worker Safety/Fire Protection** and **Hazardous Materials Management** sections of this FSA.

The objectives of the Energy Commission staff's waste management analysis are to ensure that:

- The management of project wastes would be in compliance with all applicable laws, ordinances, regulations, and standards (LORS). Compliance with LORS ensures that material generated during the construction and operation of the proposed project would be managed in an environmentally safe manner.
- The disposal or diversion of project materials would not result in significant adverse impacts to existing waste disposal or diversion facilities.
- Upon project completion, the site is managed in such a way that project materials/wastes and waste constituents would not pose a significant risk to humans or the environment.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The following federal, state, and local environmental laws, ordinances, regulations, and standards have been established to ensure the safe and proper management of both solid and hazardous wastes in order to protect human health and the environment. Project compliance with the various LORS (shown in **WASTE MANAGEMENT Table 1**) is a major component of staff's determination regarding the significance and acceptability of the HHSEGS with respect to management of waste.

WASTE MANAGEMENT Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
Title 42, United States Code, §§ 6901, et seq. Solid Waste Disposal Act of 1965 (as amended and revised by the Resource Conservation and Recovery Act of 1976, et al.)	The Solid Waste Disposal Act, as amended and revised by the Resource Conservation and Recovery Act (RCRA) et al., establishes requirements for the management of solid wastes (including hazardous wastes), landfills, underground storage tanks, and certain medical wastes. The statute also addresses program administration, implementation, and delegation to states, enforcement provisions, and responsibilities, as well as research, training, and grant funding provisions. RCRA Subtitle C establishes provisions for the generation, storage, treatment, and disposal of hazardous waste, including requirements addressing: • generator record keeping practices that identify quantities of hazardous wastes generated and their disposition; • waste labeling practices and use of appropriate containers; • use of a manifest when transporting wastes; • submission of periodic reports to the United States Environmental Protection Agency (U.S. EPA) or other authorized agency; and • corrective action to remediate releases of hazardous waste and contamination associated with RCRA-regulated facilities. RCRA Subtitle D establishes provisions for the design and operation of solid waste landfills. RCRA is administered at the federal level by U.S. EPA and its 10 regional offices. The Pacific Southwest regional office (Region 9) implements U.S. EPA programs in California, Nevada, Arizona, and Hawaii.
Title 42, United States Code, §§ 9601, et seq. Comprehensive Environmental Response, Compensation and Liability Act	The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), also known as Superfund, establishes authority and funding mechanisms for cleanup of uncontrolled or abandoned hazardous waste sites, as well as cleanup of accidents, spills, or emergency releases of pollutants and contaminants into the environment. Among other things, the statute addresses: • reporting requirements for releases of hazardous substances; • requirements for remedial action at closed or abandoned hazardous waste sites and brownfields; • liability of persons responsible for releases of hazardous substances or waste; and • requirements for property owners/potential buyers to conduct “all appropriate inquiries” into previous ownership and uses of the property to 1) determine if hazardous substances have been or may have been released at the site and 2) establish that the owner/buyer did not cause or contribute to the release. A Phase I Environmental Site Assessment is commonly used to satisfy CERCLA’s “all appropriate inquiries” requirements.
Title 40, Code of Federal Regulations (CFR),	These regulations were established by U.S. EPA to implement the provisions of the Solid Waste Disposal Act and RCRA (described above). Among other things, the regulations establish the criteria for classification

Subchapter I – Solid Wastes	of solid waste disposal facilities (landfills), hazardous waste characteristic criteria and regulatory thresholds, hazardous waste generator requirements, and requirements for management of used oil and universal wastes. • Part 246 addresses source separation for materials recovery guidelines. • Part 257 addresses the criteria for classification of solid waste disposal facilities and practices. • Part 258 addresses the criteria for municipal solid waste landfills. • Parts 260 through 279 address management of hazardous wastes, used oil, and universal wastes (i.e., batteries, mercury-containing equipment, and lamps). U.S. EPA implements the regulations at the federal level. However, California is an authorized state so the regulations are implemented by state agencies and authorized local agencies in lieu of U.S. EPA.
Title 49, CFR, Parts 172 and 173 Hazardous Materials Regulations	U.S. Department of Transportation established standards for transport of hazardous materials and hazardous wastes. The standards include requirements for labeling, packaging, and shipping of hazardous materials and hazardous wastes, as well as training requirements for personnel completing shipping papers and manifests. Section 172.205 specifically addresses use and preparation of hazardous waste manifests in accordance with Title 40, CFR, and section 262.20.
State	
California Health and Safety Code, Chapter 6.5, §§ 25100, et seq. Hazardous Waste Control Act of 1972, as amended	This law creates the framework under which hazardous wastes must be managed in California. The law provides for the development of a state hazardous waste program that administers and implements the provisions of the federal RCRA program. It also provides for the designation of California-only hazardous wastes and development of standards (regulations) that are equal to or, in some cases, more stringent than federal requirements. The California Environmental Protection Agency (Cal/EPA), Department of Toxic Substances Control (DTSC) administers and implements the provisions of the law at the state level. Certified Unified Program Agencies (CUPAs) implement some elements of the law at the local level.
Title 22, California Code of Regulations (CCR), Division 4.5 Environmental Health Standards for the Management of Hazardous Waste	These regulations establish requirements for the management and disposal of hazardous waste in accordance with the provisions of the California Hazardous Waste Control Act and federal RCRA. As with the federal requirements, waste generators must determine if their wastes are hazardous according to specified characteristics or lists of wastes. Hazardous waste generators must obtain identification numbers, prepare manifests before transporting the waste off site, and use only permitted treatment, storage, and disposal facilities. Generator standards also include requirements for record keeping, reporting, packaging, and labeling. Additionally, while not a federal requirement, California requires that hazardous waste be transported by registered hazardous waste transporters. The standards addressed by Title 22, CCR include: • Identification and Listing of Hazardous Waste (Chapter 11, §§

	66261.1, et seq.) • Standards Applicable to Generators of Hazardous Waste (Chapter 12, §§ 66262.10, et seq.) • Standards Applicable to Transporters of Hazardous Waste (Chapter 13, §§ 66263.10, et seq.) • Standards for Universal Waste Management (Chapter 23, §§ 66273.1, et seq.) • Standards for the Management of Used Oil (Chapter 29, §§ 66279.1, et seq.) • Requirements for Units and Facilities Deemed to Have a Permit by Rule (Chapter 45, §§ 67450.1, et seq.) The Title 22 regulations are established and enforced at the state level by DTSC. Some generator standards are also enforced at the local level by CUPAs.
California Health and Safety Code, Chapter 6.11 §§ 25404–25404.9 Unified Hazardous Waste and Hazardous Materials Management Regulatory Program (Unified Program)	The Unified Program consolidates, coordinates, and makes consistent the administrative requirements, permits, inspections, and enforcement activities of the six environmental and emergency response programs listed below. • Aboveground Storage Tank Program • Business Plan Program • California Accidental Release Prevention (CalARP) Program • Hazardous Material Management Plan / Hazardous Material Inventory Statement Program • Hazardous Waste Generator / Tiered Permitting Program • Underground Storage Tank Program The state agencies responsible for these programs set the standards for their programs while local governments implement the standards. The local agencies implementing the Unified Program are known as CUPAs. Inyo County Department Hazardous Materials Division is the area CUPA. Note: The Waste Management analysis only considers application of the Hazardous Waste Generator/Tiered Permitting element of the Unified Program. Other elements of the Unified Program may be addressed in the **Hazardous Materials Management** and/or **Worker Safety/Fire Protection** analyses sections.
Title 27, CCR, Division 1, Subdivision 4, Chapter 1, §§ 15100, et seq. Unified Hazardous Waste and Hazardous Materials Management Regulatory Program	While these regulations primarily address certification and implementation of the program by the local CUPAs, the regulations do contain specific reporting requirements for businesses. • Article 9 – Unified Program Standardized Forms and Formats (§§ 15400–15410). • Article 10 – Business Reporting to CUPAs (§§ 15600–15620).

Public Resources Code, Division 30, §§ 40000, et seq. California Integrated Waste Management Act of 1989.	The California Integrated Waste Management Act of 1989 (as amended) establishes mandates and standards for management of solid waste. Among other things, the law includes provisions addressing solid waste source reduction and recycling, standards for design and construction of municipal landfills, programs for county waste management plans, and local implementation of solid waste requirements. Also, cities and counties are required by this law to divert 50 percent of their waste from disposal. Finally, material that is exported out of state is still allocated back to the jurisdiction of origin in California.
Assembly Bill (AB) 341 (Chesbro) Chapter 476, Statutes of 2011	California State Measure AB 341 would make a legislative declaration that it is the policy goal of the state that not less than 75 percent of solid waste generated be source reduced, recycled, or composted by the year 2020. The bill was approved by the Governor October 5, 2011 and filed with Secretary of State October 6, 2011. AB 341 expands recycling to businesses and apartment buildings and requires the state to develop programs to recycle three quarters of the waste we generate. This bill requires a business, defined to include a commercial or public entity, which generates more than four cubic yards of commercial solid waste per week or is a multifamily residential dwelling of five units or more to arrange for recycling services, on and after July 1, 2012.
Title 24, CCR, Part 11 2010 Green Building Standards Code (CalGreen)	The code is established to reduce construction waste, make buildings more efficient in the use of materials and energy, and reduce environmental impact during and after construction. Effective January 1, 2011, in jurisdictions without a Construction and Demolition (C&D) ordinance requiring the diversion of 50 percent of construction waste, the owners/builder of newly constructed buildings within the covered occupancies will be required to develop a waste management plan and divert 50 percent of the construction waste materials generated during the project.
Title 14, CCR, Division 7, § 17200, et seq. California Integrated Waste Management Board	These regulations further implement the provisions of the California Integrated Waste Management Act and set forth minimum standards for solid waste handling and disposal. The regulations include standards for solid waste management, as well as enforcement and program administration provisions. • Chapter 3 – Minimum Standards for Solid Waste Handling and Disposal. • Chapter 3.5 – Standards for Handling and Disposal of Asbestos Containing Waste. • Chapter 7 – Special Waste Standards. • Chapter 8 – Used Oil Recycling Program. • Chapter 8.2 – Electronic Waste Recovery and Recycling.
California Health and Safety Code, Division 20, Chapter 6.5, Article 11.9, §25244.12, et seq.	This law was enacted to expand the state's hazardous waste source reduction activities. Among other things, it establishes hazardous waste source reduction review, planning, and reporting requirements for businesses that routinely generate more than 12,000 kilograms (~ 26,400 pounds) of hazardous waste in a designated reporting year. The review and planning elements are required to be done on a four-year cycle, with

Hazardous Waste Source Reduction and Management Review Act of 1989 (also known as SB 14).	a summary progress report due to DTSC every fourth year.
Title 22, CCR, § 67100.1 et seq. Hazardous Waste Source Reduction and Management Review.	These regulations further clarify and implement the provisions of the Hazardous Waste Source Reduction and Management Review Act of 1989 (noted above). The regulations establish the specific review elements and reporting requirements to be completed by generators subject to the act.
Title 22, CCR, Chapter 32, §67383.1 – 67383.5	This chapter establishes minimum standards for the management of all underground and aboveground tank systems that held hazardous waste or hazardous materials, and are to be disposed, reclaimed or closed in place.
Title 27, CCR , division 2, Subdivision 1, Chapter 3, Subchapter 4,	This regulation establishes that alternative daily cover (ADC) and other waste materials beneficially used at landfills constitutes diversion through recycling, and requires the California Integrated Waste Management Board to adopt regulations governing ADC.
California Porter-Cologne Water Quality Control Act of 1952: California Water Code, Division 7, Title 23, CCR, Division 3, Chapter 9	Requires adequate protection of water quality by appropriate design, sizing and construction of erosion and sediment controls.
State of Nevada Code of Regulation – Nevada Administrative Code (NAC) Section 444.440 – 444.645	Collection and disposal of solid waste regulations NAC 444.5705 “Class I site” defined. (NRS 444.560**)** Class I site” means a disposal site which: 1. comprises at least one municipal solid waste landfill unit including all contiguous land and structures, other appurtenances and improvements on the land used for the disposal of solid waste; and 2. Is not a Class II or Class III site. NAC 444.571 “Class II site” defined. **(**NRS 444.560**)** “Class II site” means a disposal site: 1. Which is comprised of at least one municipal solid waste landfill unit; 2. Which accepts less than 20 tons of solid waste per day on an annual average; 3. For which there is no evidence of contamination of groundwater originating from the site; 4. Which serves a community that has no other practicable alternatives for waste management; and 5. Which is located in an area which annually receives no more than 25 inches of precipitation, The term includes all contiguous land and structures, other appurtenances and improvements on the land used for the disposal of solid waste.

	NAC 444.5715 Class III site" defined. **(**NRS 444.560**)** "Class III site" means a disposal site which accepts only industrial solid waste.
NAC Sections 444.965 – 444.976	Hazardous Waste regulations
Local	
Policies	
Construction & Demolition (C&D) Debris Diversion Program (Inyo County Code, Title 7, Chapter 7.11)	All construction, demolition, and renovation projects within Inyo County, for which a building permit is required, shall comply with this requirement if they exceed eighteen cubic yards per day of generated construction and demolition debris.

SETTING

Proposed Project

The proposed HHSEGS will consist of two solar fields and associated facilities that will generate a total net output of 500 megawatts (MW). Solar Plant I will be located on approximately 1,483 acres. Solar Plant II will occupy approximately 1,510 acres. A 103-acre common area will consist of an administration building, warehouse, and maintenance complex and onsite switchyard. The temporary construction laydown area and parking will occupy 180 acres. The temporary construction laydown area in addition to the entire HHSEGS site would total 3,277 acres. All of these project components are located within California. The Nevada Office of the U.S. Bureau of Land Management will provide a detailed environmental impact analysis of the transmission line and the 32.4 mile natural gas pipeline alignments, most of which are in Nevada (HHSG 2011a, page5.14-1).

The 3,277-acre project site is adjacent to the Nevada border and encompasses 172 undeveloped vacant parcels on privately owned land in Inyo County, California. The project is located along the northwest corner of Tecopa Road (also known as Old Spanish Trail Highway) and Gold Street in Inyo County. U.S. Geological Survey Topographical maps and historical aerial photographs show the undeveloped project site with graded dirt roads (in a north-south and east-west grid pattern) and vacant land, except for a former orchard area along Tecopa Road (HHSG 2011a, page 5.14-7).

Each solar plant will generate 250 MW net output for a total output of 500 MW. Each plant will use 85,000 heliostat mirror arrays, a Rankine-cycle non-reheat steam turbine, a solar receiver steam generator (SRSG), two natural-gas boilers, an air cooled condenser, associated auxiliary equipment, and a partial dry-surface air cooler (for auxiliary equipment cooling). Rows of heliostats (mirrors) would be used to concentrate solar energy on the SRSG located near the top of 750-foot distributed power tower, which converts water to steam. Steam from the SRSG will be routed via the main steam pipe to the Rankine-cycle steam turbine generator where the steam's energy is converted to electrical energy. Each solar plant will include a natural gas-fired auxiliary boiler used to augment the solar operation when solar energy diminishes, during transient cloudy conditions and as a startup boiler

during the morning startup cycle, and a nighttime preservation boiler used to maintain system temperatures overnight. Steam condensing will be provided by air-cooled condensers. Groundwater will be treated in an onsite treatment system for use as boiler make-up water and to wash the heliostat mirror arrays.

Construction activities associated with the HHSEGS Project would produce a variety of mixed nonhazardous wastes, such as soil, wood, metal, concrete, etc. Waste would be recycled, where practical, and non-recyclable waste would be deposited in a Nevada Class III landfill licensed to accept such waste. The hazardous waste generated during this phase of the project would consist of used oils, universal wastes, solvents, and empty hazardous waste materials containers (HHSG 2011a, § 5.14.2.1). Universal wastes are hazardous wastes that contain mercury, lead, cadmium, copper, and other substances hazardous to human and environmental health. Examples of universal wastes are batteries, fluorescent tubes, and some electronic devices. Hazardous waste will be disposed of in either a California or Nevada hazardous waste landfill.

Operation and maintenance of the project and associated facilities would generate a variety of wastes, including hazardous wastes. All operational wastes produced at HHSEGS would be properly collected, treated (if necessary), and disposed of at an appropriate waste facility. Wastes include process and sanitary wastewater, nonhazardous waste and hazardous waste, both liquid and solid. A septic system for sanitary wastewater would be located at the administration building/operations and maintenance area, located between Solar I and II (HHGS 2011a, page. 2-12). Each solar plant and the administration complex (located in the common area) will include a septic tank and leach field system for sanitary water streams. A thermal evaporator system will be used to reduce the volume of the process wastewater stream or stormwater streams that cannot be recycled back to the service water tank. The reject from the thermal evaporator will be trucked offsite for disposal at an approved facility (further discussion of waste water can be found in the **Water Supply** section of this **FSA**).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

This waste management analysis addresses: a) existing soil contamination on the project site associated with prior activities on or near the project site; and b) the impacts from the generation and management of wastes during demolition of existing structures and during project construction and operation.

a) For any site in California proposed for the construction of a power plant, the applicant must provide documentation about the nature of any potential or existing releases of hazardous substances or contamination at the site. If potential or existing releases or contamination at the site are identified, the significance of the release or contamination would be determined by site-specific factors, including, but not limited to: the amount and concentration of contaminants or contamination; the proposed use of the area where the contaminants/contamination is found; and any potential pathways for workers, the public, or sensitive species or environmental areas to be exposed to the contaminants. Any unmitigated contamination or releases of hazardous substances that pose a risk to human

health or environmental receptors would be considered significant by Energy Commission staff.

As a first step in documenting existing site conditions, the Energy Commission's power plant site certification regulations require that a Phase I Environmental Site Assessment (ESA) be prepared[1] and submitted as part of an application for certification. The Phase I ESA is conducted to identify any conditions indicative of releases or threatened releases of hazardous substances at the site and to identify any areas near the site that are known to be contaminated (or a source of contamination).

The Phase I ESA is conducted by a qualified environmental professional. It includes inquiries into past uses and ownership of the property, former hazardous substance releases and/or hazardous waste disposal at the site and within a certain distance of the site, visual inspection of the property, and making observations about the potential for contamination and possible areas of concern. After conducting all necessary file reviews, interviews, and site observations, the environmental professional provides findings about the environmental conditions at the site. In addition, since the Phase I ESA does not include sampling or testing, the environmental professional may give an opinion about the potential need for any additional investigation. Additional investigation may be needed, for example, if there were significant gaps in the information available about the site, an ongoing release is suspected, or to confirm an existing environmental condition.

If additional investigation is needed to identify the extent of possible contamination, a Phase II ESA may be required. The Phase II ESA usually includes sampling and testing of potentially contaminated media to verify the level of contamination and the potential for remediation at the site.

In conducting its assessment of a proposed project, Energy Commission staff review the project's Phase I ESA and work with the appropriate oversight agencies, as necessary, to determine if additional site characterization work is needed and if any mitigation is necessary at the site to ensure protection of human health and the environment from any hazardous substance releases or contamination identified.

b) Regarding the management of project-related wastes generated during demolition, construction and operation, staff reviews the applicant's proposed solid and hazardous waste management methods and determines if the methods proposed are consistent with the LORS identified for waste disposal and recycling. The federal, state, and local LORS represent a comprehensive regulatory system designed to protect human health and the environment from impacts associated with management of both non-hazardous and hazardous wastes. Absent any unusual circumstances, staff considers project compliance with LORS to be sufficient to ensure that no significant impacts would occur as a result of project waste management.

   Staff then reviews the capacity available at off-site treatment and disposal sites and determines whether or not the proposed power plant's waste would have a significant

[1] Title 20, California Code of Regulations, section 1704(c) and Appendix B, section (g)(12)(A). Note that the Phase I ESA must be prepared according to American Society for Testing and Materials protocol or an equivalent method agreed upon by the applicant and the Energy Commission staff.

impact on the volume of waste a facility is permitted to accept. Staff uses a waste volume threshold equal to 10 percent of a disposal facility's remaining permitted capacity to determine if the impact from disposal of project wastes at a particular facility would be significant.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Existing Site Conditions and Potential for Contamination

HHSEGS would be constructed in Inyo County on approximately 3,277 acres of privately owned land, of which 3,097 acres would be permanently disturbed. The project consists of 172 parcels of undeveloped land, with the exception of a small orchard. The project site is located along the northwest corner of the intersection of Tecopa Road (also known as "Old Spanish Trail Highway") and Gold Street in Inyo County. The project site is in the Pahrump Valley, which is situated in the southern portion of the Great Basin within the Basin and Range geomorphic province. Pahrump Valley is bordered by mountain ranges and adjoining valleys (HHSG 2011a, Volume II, ESA).

The Pahrump Valley groundwater basin is located beneath a northwest-trending valley which is located in southeastern Inyo County, California and southwestern Nye County Nevada. The primary source of recharge for the basin is the Spring Mountains in Nevada. The static water level occurs at approximately 100 to 150 feet below grade in the vicinity of the subject property (HHSG 2011a, Appendix 5.14A).

A Phase I Environmental Site Assessment (ESA) was conducted by Ninyo and Moore Geotechnical and Environmental Consultants for the proposed HHSEGS site. The July 5, 2011 ESA report states that the assessment did not identify any recognized environmental conditions associated with the proposed project site. The assessment was completed in accordance with the American Society for Testing and Materials Standard Practice E 1527-05 for ESAs (HHSG 2011a, Appendix 5.14A). A Recognized Environmental Concern (REC) is the presence or likely presence of any hazardous substances or petroleum products on a property under the conditions that indicate an existing release, past release, or a material threat of a release of any hazardous substance or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property.

The following items were observed on site. (See **WASTE MANAGEMENT FIGURES 1** and **2**):

- Small orchard (**Figure 2**)
- Trash piles of solid waste (**Figure 1**)
- Six groundwater wells, five of the wells have no down hole pumps installed, four of the wells are open to the surface, one well is located in the former orchard area and has a downhole submersible pump (**Figure 2**)
- Two 4,000-gallon aboveground fire water storage tanks (**Figure 2**)

The small, abandoned orchard is located in the south-central portion of the project site along Tecopa Road, and is approximately 10 acres in size. The orchard's operation began around

1980 and ceased in 1999. Most of the orchard area was used for growing peaches. Melons may have also been grown on a portion of the property. There are no buildings or structures on or around the orchard. There is an old well located on the south side of the property, near Tecopa Road (CH2 2011e, Data Request 38) that was one of two test wells for a February, 2012 Groundwater Pump Test (CH2 2012l, Data Response Set 2A-3) as well as a September, 2012 Supplemental Groundwater Pump Test (CH2 2012kk, Data Response, Set 2A-4).

Staff spoke with the Inyo and Mono County Agricultural Commissioner who stated that there is no registered use of pesticides or herbicides associated with the orchard (Milovich 2011). A staff person at the California Department of Pesticides confirmed that the use of organochlorine pesticides stopped in the late seventies. Also the use of lead arsenates stopped in the 1950s (Smith 2012). Since the orchard began operation in 1980 after the use of organochlorine pesticides was banned, county records do not show there has been any documented use of pesticides at the site, and the area of orchard activity was relatively small. Staff believes the potential impacts to workers and the environment is low. Although the potential is low, staff has included Condition of Certification **WASTE-1** which would require that an experienced and qualified professional engineer or professional geologist be available for consultation during site characterization, soil grading or soil excavation to determine appropriate actions to be taken in the event contaminated soil is encountered.

Construction Impacts and Mitigation

Construction of the proposed power plant and associated facilities would last approximately 29 months and generate both nonhazardous and hazardous wastes in solid and liquid forms (HHSG 2011a, page 2-2). Before construction can begin, the project owner would be required to develop and implement a Construction and Demolition (C & D) Debris Plan and implement a Construction Waste Management Plan.

Non-Hazardous Wastes

Approximately 7.5 tons of non-hazardous waste will be generated from packing materials, waste concrete, insulation and empty nonhazardous chemical containers. Twenty-four tons of metal will also be generated from welding/cutting operations, packing materials, and empty nonhazardous chemical containers (HHSG 2011a, page 5.14-10). All non-hazardous wastes would be recycled to the extent possible and non-recyclable wastes would be collected by a licensed hauler and disposed in a solid waste disposal facility, in accordance with Title 14, California Code of Regulations, section 17200 et seq. The non-hazardous waste that cannot be recycled from the HHSEGS will be disposed in a Nevada Class III landfill licensed to accept the waste (Nevada Administrative Code (NAC) Section 444.5715).

The State of Nevada is sparsely populated. The two metropolitan areas of Reno (Washoe County) and Las Vegas (Clark County) are served by large municipal solid waste landfills that account for 90 percent of all solid waste generated in the state. Landfills in Nevada are managed by three regional health districts: the Southern Nevada Health District is the solid waste management authority for Clark County; the Washoe County Health District is the solid waste management authority for Washoe County; and, the Nevada State Department of Environmental Protection is the waste authority for the remaining areas of the state (Handzo, 1/27/12). The two largest landfills (Apex in southern Nevada and Lockwood in the north)

receive about 90 percent of all the waste disposed. Reflecting the State's unprecedented population growth, the amount of solid waste disposed in Nevada has steadily increased. The importation of solid waste to Nevada has also increased significantly in recent years, gaining 700 percent for the period 1993 to 2005. Moreover, the probability for waste importation to Nevada remains high, as existing and potential new landfills become positioned to accept larger amounts of imported waste[2].

State of Nevada nonhazardous Class I and Class II solid waste municipal waste landfills accept municipal solid waste, including construction and demolition and some industrial waste (C&D). Class I landfills accept greater than 20 tons per day of solid waste, and Class II landfills can accept less than 20 tons per day of waste. Class III landfills, defined by Nevada Administrative Code (NAC) 444.731 are allowed to accept industrial waste. Class III landfills do not accept municipal solid waste or regulated hazardous waste.

California Department of Resources Recycling and Recovery (now CalRecycle formerly California Integrated Waste Management Board (CIWMB)) is California's authority on recycling, waste reduction, and product reuse. CalRecycle plays an important role in the stewardship of California's vast resources and promotes innovation in technology to encourage economic and environmental sustainability. Under the authority of the Integrated Waste Management Act, CalRecycle requires jurisdictions such as Inyo County to divert 50 percent of their waste from landfill disposal. Jurisdictions select and implement the combination of waste prevention, reuse, recycling, and composting programs that best meet the needs of their community while achieving the diversion requirements of the Act. SB 1016, Wiggins (Chapter 343 Statutes of 2008), introduced a per capita disposal measurement system that measures the 50 percent diversion requirement using a disposal measurement equivalent.

Each city, county or regional agency responsible for waste management must prepare and implement a CalRecycle-approved waste diversion planning document (such as a Source Reduction and Recycling Element (SRRE) or a countywide regional agency Integrated Waste Management Plan) and submit an annual report to CalRecycle summarizing its progress in reducing solid waste as required by Public Resource Code, section 41821 while implementing the plan. Inyo County has provided Cal Recycle with a SRRE and an Integrated Waste Plan. The SRRE sets forth the County's basic strategy for management of solid waste generated within its borders, with emphasis on implementation of the SRRE. Inyo County's construction and demolition (C&D) program, waste generation totals, recycling and disposal are incorporated in their SRRE.

The Inyo County Public Works Building and Safety Department (ICBS) notifies Inyo County Integrated Waste Management (IWM) when an application for a construction or demolition project is submitted. Projects that generate more than eighteen cubic yards of construction waste are required to participate in Inyo County's C & D program. Inyo County will report the results of the C & D program to CalRecycle in their annual reports. Also the county would be

[2] http://ndep.nv.gov/bwm/swmp/swp01.htm

required to report, to CalRecycle, the amount of waste material disposed of outside of the county.

The HHSEGS project owner plans to export construction waste to Nevada. According to Title 14, California Code of Regulations (CCR) Section 18808.9, a public contract hauler who exports solid waste from California shall provide the county that the waste originated from with a report of the total volume of solid waste exported from each jurisdiction. The hauler shall identify the name of the disposal site and the state, county, or other authorized jurisdiction to which the waste was sent. Adoption of Condition of Certification **WASTE-2** would ensure that the applicant complies with the County's Monitoring and Diversion of Construction and Demolition Debris Ordinance (County Code, Title 7, Chapter 7.11) and reports to Inyo County and the Energy Commission the type and volume of waste that will be transported out of California.

To facilitate proper management of project construction wastes, staff also proposes Condition of Certification **WASTE-2** requiring the project owner to develop and implement a Construction Waste Management Plan. This condition would require the applicant to identify the type and volume of waste, and waste disposal and recycling methods to be used during construction of the facility. It would also require the applicant to provide reports pursuant to CCR 18808.9. Staff believes that compliance with proposed Condition of Certification **WASTE-2** would ensure the applicant's compliance with the County Code Title 7, Chapter 7.11, CalGreen Code requirements, Title 14, California Code of Regulations, section 18808.9, and that all project construction wastes are managed appropriately.

Non-hazardous liquid wastes would also be generated during construction, including sanitary wastes, dust suppression drainage, and equipment wash water. Process wastewater will be treated onsite and recycled for use at each of the two plants. The applicant is proposing to use an evaporator system for their process wastewater. A thermal evaporator system will be used to reduce the volume of the process wastewater or stormwater that cannot be recycled back to the service water tank. The reject from the thermal evaporator will be trucked offsite for disposal at an approved facility, and domestic wastewater will be disposed in a septic tank and an onsite leach field. Therefore, no industrial wastewater or sewer pipeline is proposed to be constructed. No pipeline is needed because reject wastewater and septic tank waste would both be trucked offsite (see the **Water Supply** and **Soils and Surface Water** sections of this document for more information on the management of project wastewater). Table 5.14-2 of the Application for Certification estimates that there will be 200,000 to 400,000 gallons of passivating and chemical cleaning fluid waste used for pipe cleaning and flushing. There is also a note in the AFC that the fluid will be sampled, and if the fluid is clean, the fluid will be discharged to the surrounding area for dust control.

Hazardous Wastes

Hazardous wastes that would likely be generated during construction include solvents, waste paint, oil absorbents, used oil, oily rags, batteries, cleaning wastes, spent welding materials, and empty hazardous material containers (HHSG 2011a, Table 5.14-2). The amount of waste generated would be minor if handled in the manner identified in the AFC (HHSG 2011a, § 5.14.4.1.1). Hazardous waste generators must obtain identification numbers, prepare manifests before transporting the waste off site, and use only permitted treatment, storage,

and disposal facilities in accordance with Title 22, California Code of Regulations, Division 4.5, Chapter 12, and Section 66262.12.

The project owner would be required to obtain a unique hazardous waste generator identification number for the site prior to starting construction, pursuant to proposed Condition of Certification **WASTE-3.** Although the hazardous waste generator number is determined based on site location, both the construction contractor and the project owner/operator could be considered the generator of hazardous wastes at the site. The majority of the hazardous waste will be recycled.

Absent any unusual circumstances, staff considers project compliance with laws, ordinances, regulations and standards (LORS) to be sufficient to ensure that no significant impacts would occur as a result of project hazardous waste management activities.

Operation Impacts and Mitigation

The proposed HHSEGS would generate non-hazardous and hazardous wastes in both solid and liquid forms under normal operating conditions. Table 5.14-3 of the AFC (HHSG 2011a) gives a summary of the operation waste streams, expected waste volumes and generation frequency, and management methods proposed.

Non-Hazardous Solid Wastes

Operation of the project is expected to generate 240 tons per year of non-hazardous waste, including routine maintenance wastes (such as used air filters, spent deionization resins, sand and filter media) as well as domestic and office wastes (such as office paper, newsprint, aluminum cans, plastic, and glass). All non-hazardous wastes would be recycled, to the maximum extent possible, and non-recyclable wastes would be regularly transported off site to a Nevada solid waste disposal facility (HHSG 2011a, § 5.14.4.1.2).

Before operations can begin, the project owner should be required to develop and implement an Operation Waste Management Plan pursuant to proposed Condition of Certification **WASTE-4**. This would facilitate proper management of project operation wastes by requiring the applicant to identify the type and volume of waste, and waste disposal and recycling methods to be used, during operation of the facility. It would also require the applicant to provide reports pursuant to Title 14, Cal. Code of Regulations, Section 18808.9. Reporting in accordance with the proposed operation waste management plan would also provide the necessary information for Inyo County to demonstrate compliance with their IWMP as discussed above.

Non-Hazardous Liquid Wastes

Non-hazardous liquid wastes would be generated during facility operation and are discussed in the **Soils and Surface Water** section of this document.

Hazardous Wastes

The project owner/operator would be considered the generator of hazardous wastes at the site during facility operations. Therefore, the project owner's unique hazardous waste generator identification number, obtained prior to construction in accordance with proposed

Condition of Certification **WASTE-3**, would be retained and used for the management of hazardous liquid wastes generated during facility operation.

The generation of hazardous liquid wastes expected during routine project operation includes used hydraulic fluids, oils, greases, oily filters and rags, cleaning solutions and solvents, and batteries. In addition, spills and unauthorized releases of hazardous liquid materials or hazardous wastes may generate contaminated soils or materials that may require corrective action and management as hazardous waste. Proper hazardous materials handling and good housekeeping practices would help keep spilled wastes to a minimum. However, to ensure proper cleanup and management of any contaminated soils or waste materials generated from hazardous materials spills, staff proposes Condition of Certification **WASTE-5**, which would require the project owner/operator to report, clean up, and remediate as necessary, any hazardous materials spills or releases in accordance with all applicable federal, state, and local requirements. More information on hazardous material management, spill reporting, containment, and spill control and countermeasures plan provisions for the project are provided in the **Hazardous Materials Management** section of the **FSA**.

Less than one ton per year of hazardous wastes would be generated during the 20-year anticipated operation of the HHSEGS facility, with source reduction and recycling of wastes implemented whenever possible. The hazardous wastes would be temporarily stored on site, transported off site by licensed hazardous waste haulers, and recycled or disposed of at authorized disposal facilities in accordance with established standards applicable to generators of hazardous waste (Title 22, Cal. Code of Regulations, §§ 66262.10 et seq.). Should any operations waste management-related enforcement action be taken or initiated by a regulatory agency, the project owner would be required by proposed Condition of Certification **WASTE-6** to notify the Compliance Project Manager (CPM) whenever the owner becomes aware of any such action.

Impact on Existing Waste Disposal Facilities

Non-Hazardous Wastes

The HHSEGS facility will generate nonhazardous solid waste that will add to the total waste generated in Inyo County, California. During construction of the proposed project, approximately 1,867 cubic yards of solid waste will be generated, and approximately 1,600 cubic yards[3] per year will be produced during operation. Non-hazardous waste will not be disposed in California. The solid waste landfill closest to the project site is the Tecopa Landfill. The Tecopa Landfill is currently unstaffed and does not have the infrastructure to accept waste from the HHSEGS project. Waste will be disposed in Nevada, however, the project is located in California and recycling and disposal is under the authority of CalRecycle. Solid waste from the project will be disposed of in Nye or Clark County Nevada in a Nevada Class III landfill (HHSG 2011a, page 5.14-18).

CalRecycle implements programs that are designed to increase public participation in all aspects of diverting waste from landfill disposal, including waste reduction, reuse, recycling,

[3] The waste volume estimates for solid/non-hazardous waste are staff generated numbers based on approximately 300 pounds per cubic yard (HHSEGS Tables 5.14-2 and Table 5.14-3). Staff used 202 gallons per cubic yard for liquid waste, and 50 lbs per cubic foot (for sludge) as conversion factors. See http://www.calrecycle.ca.gov/lgcentral/library/dsg/apndxi.htm

and composting, as well as promoting the safe disposal of waste that cannot be diverted. Public Resources Code, sections 41750-41770 require counties to prepare and submit to CalRecycle a county integrated waste management plan (CIWMP). The CIWMP outlines how the county manages its waste and discusses waste management problems they may face. It also provides an overview of the actions that have and will be taken to achieve compliance in accordance with Public Resources Code, section 41780.The CIWMP includes the Source Reduction and Recycling Element (SRRE) discussed above, a Household Hazardous Waste Element (HHWE) and Non-Disposal Facility Element (NDFE). For enforcement purposes, jurisdictions are evaluated on the effectiveness of their SRRE.

Once a California jurisdiction adopts a SRRE, it must implement the SRRE to the best of its ability. The jurisdiction can update the SRRE through CalRecycle's electronic annual reporting system at any time as diversion programs need to be modified. (Vargas 2012).

To help CalRecycle determine whether a jurisdiction is taking the appropriate steps to implement its SRRE, the jurisdiction submits an annual report to CalRecycle. The annual report includes the jurisdiction's program information and per capita disposal information. The per capita disposal data is derived from the statewide disposal reporting system. CalRecycle requires the county to report to the disposal reporting system all waste disposed in the county pursuant to Title 14, Cal. Code of Regulations, sections 18800-18814.11. The disposal data is compiled for each jurisdiction to measure if the jurisdiction has met its 50 percent equivalent diversion requirement (Vargas 2012).

CalRecycle reviews each jurisdiction's annual report information and conducts site visits to verify program implementation. Depending on the particular review cycle of the jurisdiction, CalRecycle staff review the jurisdiction's progress toward implementation of its SRRE, as well as its overall achievement of the 50 percent diversion requirement.

If implementation of a jurisdiction's CalRecycle-approved SRRE does not result in 50 percent solid waste diversion, CalRecycle may do one of the following:

- Decide that, even though the waste diversion requirement has not been met, the jurisdiction's program implementation efforts are sufficient to warrant "good-faith effort" status; or
- Place the jurisdiction under a compliance order (Pub. Resources Code, §41825).

A compliance order issued by CalRecycle at a public hearing leads to the creation of a local implementation plan (LIP). The LIP outlines specific steps and a schedule of deadlines which will bring the jurisdiction into compliance with the Integrated Waste Management Act.

When a jurisdiction fails to implement the conditions of its compliance order, CalRecycle conducts a penalty hearing to determine whether to exercise its authority under Public Resources Code, section 41850 to fine the jurisdiction up to $10,000 per day.

Inyo County submits an annual report that is reviewed by CalRecycle at a minimum of every four years to determine if it is meeting the 50 percent diversion requirement and implementing its programs. Because of the potential negative impact on Inyo County's 50 percent equivalent per capita disposal rate during the construction of the HHSEGS, staff

recommends the applicant should be required to comply with Condition of Certification **WASTE-2.** This would require the applicant to submit the necessary reports for compliance with Inyo County's Monitoring and Diversion of Construction and Demolition Debris Program and demonstrate that they have met the construction waste diversion requirements of 50 percent pursuant to the CalGreen Code[4]. The CPM, after receiving comments from the County, shall determine with the applicant if the plan is diverting recyclables to the maximum extent feasible. The applicant shall then divert all materials from the solid waste stream that can reasonably be diverted for alternate uses and required as a condition of the project's building permit.

WASTE MANAGEMENT Table 2 presents details of five non-hazardous (Class III) waste disposal facilities that could potentially take the non-hazardous construction and operation wastes that could be generated but not diverted by the HHSEGS Project facility. These Class III landfills are located in Nevada. The remaining capacity for the five landfills combined is approximately 30 million cubic yards. The total amount of non-hazardous waste generated from project construction and operation after the material has been diverted to the maximum extent feasible would contribute less than one percent of the available landfill capacity. Staff finds that disposal of the solid wastes generated by HHSEGS facility can occur without significantly impacting the capacity or remaining life of any of these facilities.

Hazardous Wastes

WASTE MANAGEMENT Table 2 displays information on the landfills in California: the Buttonwillow Landfill in Kern County, and the Kettleman Hills Landfill in King's County. The Kettleman Hills facility also accepts Class II and Class III wastes. Kettleman Hills and Buttonwillow landfills have a combined excess of 15 million cubic yards of remaining hazardous waste disposal capacity, with up to 33 years of combined remaining operating lifetime (HHSG 2011a, page 5.14-.3).

Hazardous wastes generated during construction and operation would be recycled to the extent possible and practical. Those wastes that cannot be recycled would be transported off site to a permitted treatment, storage, or disposal facility. Less than 100 cubic yards of construction hazardous waste, and less than 100 cubic yards per year of operation hazardous waste would be generated from the HHSEGS facility. The total amount of hazardous wastes generated by the HHSEGS project would consume less than one percent of the remaining permitted capacity. Therefore, impacts from disposal of HHSEGS generated hazardous wastes would also have a less than significant impact on the remaining capacity at Class I landfills.

CUMULATIVE IMPACTS AND MITIGATION

The CEQA Guidelines (Cal. Code Regs., tit. 14, § 15355) define cumulative effects as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts."

The proposed project would not make a significant contribution to regional impacts related to new development and growth (see the **Socioeconomics** section of this **FSA**). The waste

4. http://www.calrecycle.ca.gov

management impacts of the proposed project, in combination with past, present and reasonably foreseeable projects in the area would not be cumulatively considerable as long as the applicant recycles to the maximum extent feasible the material generated during construction and operation and implements its recycling plans.

WASTE MANAGEMENT Table 2
Local and Regional Landfills

Landfill	Location	Permitted Capacity	Remaining Capacity	Estimated Closure Date
Nonhazardous	County	Cubic yards	Cubic yards	
Pahrump Valley	Nye, NV	2.5 million	N/A	2032
Republic Apex Regional	Clark, NV	6.0 million	4.8	2175
Republic Cheyenne Transfer Station	Clark, NV	N/A	N/A	N/A
Wells Cargo	Clark, NV	40.88 million	25 million	2050
US Ecology Beatty	Nye, NV	1.66 million	1 million	2020
Hazardous Waste Facilities				
US Ecology Beatty	Nye, NV	1.66 million	1 million	2020
Chemical Waste Management-Kettleman	Kings, CA	10 million*	6 million*	2044
Clean Harbors Buttonwillow	Kern, CA	14.3 million	9.2 million	2040

Source: Data Response 1D-4, Data Response 135., Table 5.14-4R3
*CalRecycle Solid Waste Information System (SWIS) facility directory 3/28/12

As proposed, the amount of non-hazardous and hazardous wastes generated during construction and operation of the HHSEGS facility would add to the total quantity of waste generated in the State of California. Project non-hazardous wastes would be generated in modest quantities, approximately 1,867 cubic yards of solid waste during construction, and 1,600 cubic yards per year during operation (HHSG 2011a, page 5.14-18). Waste recycling would be employed wherever practical, and sufficient capacity is available at several treatment and disposal facilities to handle the volumes of wastes that would be generated by the project. The five Class III landfills listed in the Table 2 have a remaining capacity of approximately 30 million cubic yards. Less than 100 cubic yards of construction hazardous waste, and less than 100 cubic yards per year of operation hazardous waste would be generated from the HHSEGS facility. Table 2 also shows that approximately 15 million cubic yards of landfill capacity is available in the Class I landfills. Bob Coyle, Vice President of Government Affairs, Republic Services of Southern Nevada, confirmed[5] that over 2.2 million

[5] Phone conversation between staff and Mr. Coyle on March 14, 2012

tons of waste was disposed in Clark County Nevada landfills in 2010. The proposed HHSEGS facility's contribution is insignificant and would be less than one percent of Nevada's waste generation.

One project, the St. Therese Mission, exists in the immediate vicinity of the project site. There are also three future foreseeable projects located in Nevada, near the proposed project site, including the Element Solar project, the Sandy Valley Solar project (located approximately 7 miles east), and the Pahrump Airport, which is approximately 10 miles north (see **Cumulative Effects Figure 2**). There is no landfill capacity for disposal of commercial or industrial waste in Inyo County. Future foreseeable projects would also be required to recycle to the maximum extent feasible and dispose of waste in neighboring states. No projects have been identified in the project vicinity that would create significant cumulative waste management impacts when considered together with HHSEGS.

COMPLIANCE WITH LORS

Energy Commission staff concludes that the proposed HHSEGS facility would comply with all applicable LORS regulating the management of hazardous and non-hazardous wastes during both facility construction and operation. The applicant will also comply with Conditions of Certification **WASTE-1** through **6**; these conditions require waste management and construction and demolition plans.

The applicant is required to recycle and/or dispose hazardous and non-hazardous wastes at facilities licensed or otherwise approved to accept the wastes. Because of the potential negative impact on Inyo County's 50 percent equivalent per capita disposal rate during the construction of the HHSEGS, CalRecycle will require that the applicant participate in Inyo County's Monitoring and Diversion of Construction and Demolition Debris Program. This will include the applicant providing a construction and operation waste management plan that would require approval by the Energy Commission's CPM and review by Inyo County. The project owner should also submit a plan to the CPM and Inyo County as to how it will divert, to the maximum extent feasible, the recyclable materials that are generated during operation at the facility (total materials generated are estimated to be 1,600 cubic yards per year).

The county shall determine with the applicant if the plan is diverting recyclables to the maximum extent feasible. The applicant shall then divert all materials from the solid waste stream that can reasonably be diverted based upon their approved plans (Vargas 2012). Because hazardous wastes would be produced during both project construction and operation, the HHSEGS facility would be required to obtain a hazardous waste generator identification number from U.S. EPA. The HHSEGS facility would also be required to properly store, package, and label all hazardous waste; use only approved transporters; prepare hazardous waste manifests; keep detailed records; and appropriately train employees, in accordance with state and federal hazardous waste management requirements.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Please see **Appendix 1** for Waste Management Preliminary Staff Assessment (PSA) Response to Comments.

The County of Inyo Integrated Waste Management's letter dated January 11, 2012, (received by staff February 2012, INYO 2012b) stated that the Tecopa Landfill located in Inyo County was not available for disposal of non-hazardous construction or operation solid waste. The Tecopa Landfill is not staffed and does not have the infrastructure to accept the quantity of solid waste proposed by HHSEGS. The HHSEGS applicant will dispose of construction and operation waste in a Nevada landfill.

The letter also stated that an additional cost increase of $52,000 per year would be needed for additional municipal solid waste collection and disposal due to the influx of construction workers potentially residing in the area surrounding the Hidden Hills project site. However, there is some uncertainty concerning the exact cost of recovery required from the impact of additional waste generated by constructions workers. Inyo County staff continues to discuss with the applicant the potential impacts of incoming construction workers on a number of county services, and the issue was the primary focus of the May 9, 2012 Issues Resolution Workshop in Sacramento and discussed at the PSA Workshop held June 14, 2012 in Pahrump, Nevada. While the applicant's recent (CH2 2012jj, filed October 1, 2012) peak workforce estimate assumptions were over twice those initially assumed, Staff's **Socioeconomic** analysis continues to show that no additional housing, temporary or otherwise, will be needed as a result of HHSEGS construction and operation. Moreover, there is enough available housing in the area to accommodate those workers who temporarily relocate closer to the project site during construction.

CalRecycle has provided information concerning Inyo County and their compliance with state regulations. CalRecycle provided substantial pertinent information on state LORS and requirements that would be associated with the HHSEGS project. Conditions of Certification **WASTE-2** and **WASTE-3** take into account CalRecycle Integrated Waste Management Plan objectives.

CONCLUSIONS

Consistent with the three main objectives for staff's waste management analysis (as noted in the Introduction section of this analysis), staff provides the following conclusions:

1) Based on its review of the applicant's proposed waste management procedures, staff concludes that project wastes would be managed in compliance with all applicable waste management LORS from both California and Nevada, recycled to the maximum extent feasible, and follows their waste management plans. Staff notes that both construction and operation wastes would be characterized and managed as either hazardous or non-hazardous waste. All non-hazardous wastes would be recycled to the maximum extent feasible, and non-recyclable wastes would be collected by a licensed hauler and disposed of at a permitted solid waste disposal facility. Hazardous wastes would be accumulated onsite in accordance with accumulation time limits (90,180, 270, or 365 days depending on waste type and volumes generated), and then properly manifested, and transported to and disposed of at a permitted hazardous waste management facility by licensed hazardous waste collection and disposal companies.

However, to help ensure and facilitate ongoing project compliance with LORS, staff proposes Conditions of Certification **WASTE-1** through **6**. These conditions would require the project owner to do all of the following:

- Ensure the project site is investigated and any contamination identified is remediated, as necessary, with appropriate professional and regulatory agency oversight (**WASTE-1**).
- Comply with local and state waste recycling and diversion requirements (**WASTE-2**).
- Obtain a hazardous waste generator identification number (**WASTE-3**).
- Ensure that all spills or releases of hazardous substances are reported and cleaned up in accordance with all applicable federal, state, and local requirements (**WASTE-5**),
- Prepare a Construction and Operation Waste Plan that details the types and volumes of waste to be generated and how wastes would be managed, recycled, and/or disposed of after generation (**WASTE-2** and **WASTE-4**).
- Report any waste management-related LORS enforcement actions and how violations would be corrected (**WASTE-6**).

2) Although the ESA established that there were no RECs, potentially contaminated soil could be encountered during excavation activities at the project site or the linear facilities and staff is concerned that the environment and/or human health could be potentially exposed to unforeseen contaminates. To ensure that the project site is investigated and remediated, as necessary, and to reduce any impacts from prior or future hazardous substance or hazardous waste releases at the site to a level of insignificance, staff proposes Conditions of Certification **WASTE-1** and **WASTE-6.** These conditions would require the project owner to ensure that the project site is investigated and remediated as necessary; demonstrate that project wastes are managed properly; and ensure that any future spills or releases of hazardous substances or wastes are properly reported, cleaned up, and remediated as necessary. Therefore, staff concludes that construction and operation of the proposed HHSEGS Project would not result in contamination or releases of hazardous substances that would pose a substantial risk to human health or the environment.

3) Regarding impacts of project wastes on existing waste disposal facilities, staff uses a waste volume threshold equal to ten (10) percent of a disposal facility's remaining capacity to determine if the impact from disposal of project wastes at a particular facility would be significant. The existing available capacity for the three Class III landfills that may be used to manage nonhazardous project wastes exceeds 53 million cubic yards. The total amount of nonhazardous wastes generated from construction and operation of the proposed HHSEGS Project would consume less than 1 percent of the remaining landfill capacity. Therefore, disposal of project generated non-hazardous wastes would have a less than significant impact on Class III landfill capacity.

In addition, the two Class I disposal facilities that could be used for hazardous wastes generated by the construction and operation of the HHSEGS project have a combined remaining capacity in excess of 10 million cubic yards. The total amount of hazardous wastes generated by the HHSEGS project would consume less than 1 percent of the remaining permitted capacity. Therefore, impacts from disposal of HHSEGS generated hazardous wastes would also have a less than significant impact on the remaining capacity at Class I landfills.

4) Staff has reviewed **Socioeconomics Figure 1** which shows the environmental justice population is not greater than fifty percent within a six-mile radius of the proposed **HHSEGS**. Energy Commission staff has not identified any significant adverse direct or cumulative **Waste Management** impacts resulting from the construction or operation of the proposed project, including impacts to the environmental justice population. Therefore, there is no **Waste Management** environmental justice issue related to this project, as there is no disproportionately high and adverse human health or environmental effects on any population, including minority or low-income populations.

PROPOSED FINDINGS OF FACT

Based on the evidence, we propose the following findings of fact:

1. Applicant's Phase I Environmental Site Assessment (ESA) for the site and linear corridors did not identify any recognized environmental conditions (RECs).

2. The HHSEGS project will generate a number of hazardous and non-hazardous wastes during construction and operation,

3. All hazardous and non-hazardous wastes generated in association with project construction and operation will be recycled, reused or remediated to the maximum extent practical.

4. Project-related wastes that cannot be recycled, reused or remediated will be disposed of in appropriate landfills for hazardous and non-hazardous wastes.

5. Disposal of project-related hazardous and non-hazardous wastes at appropriate landfill sites will not result in significant adverse impacts to the capacity or remaining operation life of any of the noted existing facilities.

6. The conditions of certification set forth below and in the **Water Supply** and **Soils and Surface Water** sections of this **FSA**, along with the HHSEGS project design measures, will ensure that the HHSEGS project will reduce potential project related waste management impacts to less than significant levels.

7. With implementation of the conditions of certification listed below, the HHSEGS project will comply with all applicable LORS related to waste management.

8. Disposal of project wastes will not result in any significant direct, indirect or cumulative impacts on existing waste disposal facilities.

PROPOSED CONDITIONS OF CERTIFICATION

WASTE-1 The project owner shall provide the resume of an experienced and qualified professional engineer or professional geologist, who shall be available for consultation during site characterization (if needed), excavation, and grading activities, to the CPM for review and approval. The resume shall show experience in remedial investigation and feasibility studies.

The professional engineer or professional geologist shall be given full authority by the project owner to oversee any earth moving activities that have the potential to disturb contaminated soil, and to determine appropriate actions to be taken.

Verification: At least 30 days prior to the start of site mobilization, the project owner shall submit the resume to the CPM for review and approval.

WASTE-2 The project owner shall prepare a Construction Waste Management Plan for all wastes generated during construction of the facility, and shall submit the plan to the CPM for review and approval. The plan shall contain, at a minimum, the following:

- a description of all construction waste streams, including projections of frequency, amounts generated, and hazard classifications;
- management methods to be used for each waste stream, including temporary on-site storage, housekeeping and best management practices to be employed, treatment methods and companies providing treatment services, waste testing methods to assure correct classification, methods of transportation, disposal requirements and sites, and recycling and waste minimization/source reduction plans;
- a method for collecting weigh tickets or other methods for verifying the volume of transported and or location of waste disposal; and,
- a method for reporting to demonstrate project compliance with construction waste diversion requirements of 50 percent pursuant to the CalGreen Code and Construction and Demolition Ordinance Inyo County Code, Title 7, Chapter 7.11.

Verification: The project owner shall submit the Construction Waste Management Plan to Inyo County for review and the CPM for review and approval no less than 30 days prior to the initiation of construction activities at the site.

The project owner shall also document in each monthly compliance report (MCR) the actual volume of wastes generated and the waste management methods used during the year; provide a comparison of the actual waste generation and management methods used to those proposed in the original Construction Waste Management Plan; and update the Construction Waste Management Plan, as necessary, to address current waste generation and management practices.

WASTE-3 The project owner shall obtain a hazardous waste generator identification number from the United States Environmental Protection Agency prior to generating any hazardous waste during construction and operations.

Verification: The project owner shall keep a copy of the identification number on file at the project site and provide documentation of the hazardous waste generation and notification and receipt of the number to the CPM in the next scheduled MCR after receipt of the number. Submittal of the notification and issued number documentation to the CPM is only needed once unless there is a change in ownership, operation, waste generation, or waste characteristics that requires a new notification to USEPA. Documentation of any new or revised hazardous waste generation notifications or changes in identification number shall be provided to the CPM in the next scheduled compliance report.

WASTE-4 The project owner shall prepare an Operation Waste Management Plan for all wastes generated during operation of the facility and shall submit the plan to the CPM for review and approval. The plan shall contain, at a minimum, the following:

- a detailed description of all operation and maintenance waste streams, including projections of amounts to be generated, frequency of generation, and waste hazard classifications;
- management methods to be used for each waste stream, including temporary on-site storage, housekeeping and best management practices to be employed, treatment methods and companies providing treatment services, waste testing methods to assure correct classification, methods of transportation, disposal requirements and sites, and recycling and waste minimization/source reduction plans;
- information and summary records of conversations with the local Certified Unified Program Agency and the Department of Toxic Substances Control regarding any waste management requirements necessary for project activities. Copies of all required waste management permits, notices, and/or authorizations shall be included in the plan and updated as necessary;
- a detailed description of how facility wastes will be managed and any contingency plans to be employed in the event of an unplanned closure or planned temporary facility closure; a detailed description of how facility wastes will be managed and disposed of upon closure of the facility; and,
- an explanation to the CPM and Inyo County demonstrating how they will divert operation material to the maximum extent feasible.

Verification: The project owner shall submit the Operation Waste Management Plan to the CPM for approval no less than 30 days prior to the start of project operation. The project owner shall submit any required revisions to the CPM within 20 days of notification from the CPM that revisions are necessary.

The project owner shall also document in each annual compliance report (ACR) the actual volume of wastes generated and the waste management methods used during the year; provide a comparison of the actual waste generation and management methods used to those proposed in the original Operation Waste Management Plan; and update the

Operation Waste Management Plan, as necessary, to address current waste generation and management practices.

WASTE-5 The project owner shall ensure that all spills or releases of hazardous substances, hazardous materials, or hazardous waste are documented and cleaned up and that wastes generated from the release/spill are properly managed and disposed of in accordance with all applicable federal, state, and local requirements. The project owner shall document management of all unauthorized releases and spills of hazardous substances, hazardous materials, or hazardous wastes that are in excess of EPA's reportable quantities (RQ), that occur on the project property or related linear facilities during construction and on the property during operation. The documentation shall include, at a minimum, the following information:

- location of release;
- date and time of release;
- reason for release; volume released;
- how release was managed and material cleaned up;
- amount of contaminated soil and/or cleanup wastes generated;
- if the release was reported;
- to whom the release was reported;
- release corrective action and cleanup requirements placed by regulating agencies;
- level of cleanup achieved; actions taken to prevent a similar release or spill; and,
- disposition of any hazardous wastes and/or contaminated soils and materials that may have been generated by the release.

Verification: A copy of the unauthorized release/spill documentation shall be provided to the CPM within 30 days of the date the release was discovered.

WASTE-6 Upon becoming aware of any impending waste management-related enforcement action by any local, state, or federal authority related to the HHSEGS, the project owner shall notify the CPM of any such action taken or proposed to be taken against the project itself, or against any waste hauler or disposal facility or treatment operator with which the owner contracts.

Verification: The project owner shall notify the CPM in writing within 10 days of becoming aware of an impending enforcement action. The CPM shall notify the project owner of any changes that will be required in the way project-related wastes are managed.

REFERENCES

CEC 2011e – California Energy Commission/M. Monasmith (tn: 62595) Data Request Set 1A. 10/17/2011

CEC 2011f – California Energy Commission/M. Monasmith (tn: 62786) Data Request Set 1B (#51-76). 11/04/2011

CEC 2011g – California Energy Commission/M. Monasmith (tn: 62911) Data Requests, Set 1C. 11/17/2011

CEC 2011h – California Energy Commission/M. Monasmith (tn: 63062) Data Request Set 1D. 12/06/2011

CEC 2011r – California Energy Commission/M. Monasmith (tn: 62873) Photos of 10-27-11 Field Trip and 11-3-11 Site Visit. 11/10/2011

CEC 2011t – California Energy Commission/M. Monasmith (tn: 62811) Revised Data Request Set 1B. 11/07/2011

CEC 2012a – California Energy Commission/M. Monasmith (tn: 63340) Data Requests Set 2A. 01/09/2012

CEC 2012b – California Energy Commission/M. Monasmith (tn: 63390) Data Requests Set 2B. 01/17/2012

CEC 2012c – California Energy Commission/M. Monasmith (tn: 63392) Status Report #1. 01/17/2012

CEC 2012d – California Energy Commission/L. Worrall (tn: 63485) Report of Conversation with J. Orr, Local 525. 01/23/2012

CEC 2012e – California Energy Commission/E. Townsend-Hough (tn: 63487) ROC with J. Hanzo re: Waste Management. 01/27/2012

CEC 2012f – California Energy Commission/M. Monasmith (tn: 63540) Data Requests Set 2C. 02/03/2012

CH2 2011c – CH2MHill/J. Carrier (tn: 62913) Applicant's Data Responses, Set 1A. 11/16/2011

CH2 2011d – CH2MHill/J. Carrier (tn: 63056) Applicant's Data Responses, Set 1B. 12/05/2011

CH2 2011e – CH2MHILL/J. Carrier (tn: 62057) Applicant's Attachment DR20-1 Omitted from Data Response Set 1A. 12/05/2011

CH2 2011f – CH2MHill/J. Carrier (tn: 63168) Applicant's Data Responses, Set 1C. 12/19/2011

CH2 2011g – CH2MHILL/J. Carrier (tn: 63259) Supplemental Data Response 1A. 12/30/2011

CH2 2011h – CH2MHILL/J. Carrier (tn: 63262) Supplemental Data Response 1B-2. 12/30/2011

CH2 2012a – CH2MHill/J. Carrier (tn: 63310) Applicant's Data Responses, Set 1D. 01/06/2012

CH2 2012b – CH2MHill/M. Finn (tn: 63425) Applicant's Data Responses, Set 1D-2. 01/20/2012

CH2 2012c – CH2MHill/J. Carrier (tn: 63499) Applicant's Data Responses, Set 1B-3. 01/31/2012

CH2 2012d – CH2MHill/J. Carrier (tn: 63635) Applicant's Data Response, Set 2A. 02/09/2012

CH2 2012e – CH2MHill/J. Carrier (tn: 63661) Applicant's Data Response, Set 2B. 02/16/2012

CH2 2012f – CH2MHill/J. Carrier (tn: 63792) Applicant's Data Response, Set 1D-4. 02/24/2012

CH2 2012g – CH2MHill/M. Finn (tn: 63961) Applicant's Data Response Set 1B-4 E-Copy. 3/5/2012

CH2 2012h– CH2MHill/M. Finn (tn: 63966) Applicant's Data Response Set 2C. 3/5/2012

CH2 2012i – CH2MHill/J. Carrier (tn: 64052) Applicant's Data Response Set 2A-2. 3/8/2012

CH2 2012j – CH2MHill/ M. Finn (tn: 64163) Applicant's Data Response Set 1B-5. 3/15/2012

CH2 2012k – CH2MHill/J. Carrier (tn: 64364) Applicant's Data Response Set 1C-2. 3/23/2012

CH2 2012l – CH2MHill/M. Finn (tn: 64505) Applicant's Data Response Set 2A-3. 3/30/2012

CH2 2012m – CH2MHill/J. Carrier (tn: 64509) Applicant's Data Response Set CBD-1. 3/30/2012

CH2 2012n – CH2MHill/J. Carrier (tn: 64513) Applicant's Data Response Set 1D-5. 3/30/2012

CH2 2012o – CH2MHill/J. Carrier (tn: 64579) Applicant's Data Response Set 1A-2. 3/30/2012

CH2 2012p – CH2MHill/J. Carrier (tn: 64558) Supplemental Data Response, Set 2, Boiler Optimization Plan and Design Change. 4/2/2012

CH2 2012q – CH2MHill/J. Carrier (tn: 63792) Applicant's Data Response, Set 2D – E Copy. 4/2/2012

CH2 2012jj – CH2MHill/J. Carrier (tn: 67434) Applicant's Updated Workforce Analysis. 10/01/2012

CH2 2012kk– CH2MHill/J. Carrier (tn: 67576) Applicant's Data Response 141-2 – Long-term Aquifer Performance Test. 10/05/2012

ESH 2012b – Ellison, Schneider & Harris/ Samantha G. Pottenger (tn: 63560) Applicants Response to Staff Data Request #146. 02/06/2012

HHSG 2011a – BrightSource Energy/J. Woolard (tn: 61756) Application for Certification, Volume 1 & 2. 08/5/2011

HHSG 2011b – BrightSource Energy/C. Jensen (tn: 62125) Supplement to AFC for HHSEGS. 09/07/2011

HHSG 2011c – BrightSource Energy/C. Jensen (tn: 62322) AFC Supplement B. 09/23/2011

INYO 2012b – Inyo County/K. Carunchio (tn: 63719) Inyo County Letter regarding Preliminary Estimates for the Fiscal Impacts of the Construction and Operation. HHSEGS. 02/16/2012

INYO 2012e – Inyo County/J. Hart (tn: 64136) Inyo County Letter to BrightSource Energy. 3/9/12

Milovich 2011 – California Energy Commission/E. Townsend-Hough. ROC with George Milovich, Inyo & Mono Agricultural Commissioner. 12/13/2011.

Smith 2012.-. – California Energy Commission/E. Townsend-Hough. ROC with Cliff Smith, California Department of Pesticides.

Vargas 2012 – California Energy Commission/E. Townsend-Hough. Written comments from Melissa Vargas, Supervising Integrated Waste Management Specialist I, CalRecycle 03/16/12.

WASTE MANAGEMENT

List of Comment Letters

		Traffic & Transportation Comments?
1	Inyo County	**X**
2	Bureau of Land Management	
3	National Park Service	
4	The Nature Conservancy	
5	Amargosa Conservancy	
6	Basin & Range Watch	
7	Pahrump Paiute Tribe	
8	Richard Arnold, Pahrump Piahute Tribe	
9	Big Pine Tribe of Owens Valley	
10	Intervenor Cindy MacDonald	**X**
11	Intervenor Center for Biological Diversity	
12	Intervenor, Old Spanish Trail Association	
13	Applicant, BrightSource Energy, Inc.	**X**

Comment #	**DATE**	**COMMENT**	**RESPONSE**
1	**July 17, 2012**	**Inyo County**	
1.8		…the County objects to using any private lands within Inyo county for mitigation purposes.	No Comment
1.11O		The response to the County's estimate of waste management costs seems superficial at best, concluding that "at this time, the staff believes that no additional costs will be incurred by the County for this project". As far as we can tell, this belief is based on the fact that housing conditions at Ivanpah were such that no additional waste management costs were induced. Furthermore it was stated that Ivanpah is very close to Primm, which has a large supply of transient housing with considerable vacancies available in housing, and infrastructure capable of handling waste generated by additional residents.	Staff acknowledges the county's comments, however, **Socioeconomics** staff's analysis suggests that no additional housing will be needed during the project construction and additional municipal waste services will not be required.

1.111		As we read it, the position ascribed to the staff in the Socioeconomic and Fiscal Impact Report authored by Dr. McCann, is that it is just too early to tell whether additional waste disposal services will be required during the construction or operation of the project. If and when the need for such facilities and costs arise as a result of the project, how will the County go about getting a determination that these costs are necessary for health and safety? Secondly, assuming that the need for such facilities is self-evident, who will be judged to be responsible for paying these costs, and will that judgment be enforced.	Staff acknowledges the county's comments, however, **Socioeconomics** staff's analysis suggests that no additional housing will be needed during the project construction and additional municipal waste services will not be required.
Comment #	**DATE**	**COMMENT**	**RESPONSE**
10	**July 21, 2012**	**Intervenor Cindy MacDonald**	
10.1	18.1, #1 (page 18-1)	What are the applicable LORS regarding waste disposal requirements for industrial zones in the Inyo County General Plan or related zoning laws and/or ordinances?	Construction & Demolition (C&D) Debris Diversion Program (Inyo County Code, Title 7, Chapter 7.11)
10.2	18.1, #2 (page 18-1)	Do California and/or Inyo County allow industrial facilities to discharge waste that could potentially seep into underground water tables residing below the proposed project site?	There are no wastes from the Hidden Hills Project that would/could seep in to the underground water table if the applicant followed all California and Inyo County regulations. Also, refer to **Hazardous Materials** and **Soils and Surface Water** sections of this **FSA.**
10.3	18.1, #3 (page 18-1)	If so, are there any restriction on what can be discharged into leach fields and under what authority (LORS) are these restrictions established?	Please refer to the **Soils and Surface Water** section of this **FSA**.

10.4	18.2, #1 (page 18-2)	What waste disposal system is going to be utilized for the proposed HHSEGS, septic tanks with leach fields or septic tanks without leach fields that require sanitary wastes to be disposed of offsite?	Please refer to the **Soils and Surface Water** section of this **FSA**.
10.5	18.2, #2 (page 18-2)	If the septic tank/leach field system is utilized, what are the impacts of discharging this waste into the surrounding environment such as soils and above local water tables?	Please refer to the **Soils and Surface Water** section of this **FSA**.
10.6	18.2, #3 (page 18-2)	Since no detailed description or critical analysis has yet to occur regarding the engineering and design element of the pipe and drainage systems in relation to the septic tank/leach field waste disposal systems, how can the CEC Staff and/or public know if hazardous wastes and semi-hazardous wastes can potentially be disposed of and discharged into the surrounding environment via the septic tank/leach field system?	Please refer to the **Soils and Surface Water** section of this **FSA**.
10.7	18.2, #4 (page 18-3)	What data is available that can confirm no hazardous or semi-hazardous materials will be disposed of via the septic tank/leach system?	Please refer to the **Soils and Surface Water** section of this **FSA**.
10.8	18.2, #5 (page 18-3)	Where is the engineering design description in the AFC project data (or subsequent documents) that clearly depicts the septic tank/leach field systems will only be connected to toilets, showers, and sinks associated exclusively with domestic type waste disposal?	Please refer to the **Soils and Surface Water** section of this **FSA**.
10.9	18.2, #6 (page 18-3)	If the septic tank/leach field system is utilized, what mitigation measures can be used to prevent potential soils and underground water systems from being effected by cumulative waste discharges over the life of the proposed project?	Please refer to the **Soils and Surface Water** section of this **FSA**.

10.10	18.2, #7 (page 18-3)	Would Staff recommend as a Condition of Certification, the allowance of onsite septic tanks but eliminate the connected leach fields to ensure the applicant would have to dispose of all wastes offsite versus allowing wastes to seep into local soils and groundwater over the life of the project?	Please refer to the **Soils and Surface Water** section of this **FSA**.
10.11	18.3, #1 (page 18-4)	What is the percentage of increases for solid and hazardous waste generated by the proposed project compared to currently generated solid and hazardous wastes within a six-mile radius of the proposed project's vicinity?	It is estimated that HHSEGS will generate approximately 280 tons of solid waste (non-hazardous waste) during construction and about 240 tons per year from operation. The total non-hazardous waste landfilled in Inyo County in 2010 was 24,303 tons. The percentage using the most conservative number is 1.2 percent of the amount of non-hazardous waste disposed of in Inyo County in 2010. The nearest Class III landfill is over 20 miles from the western boundary of the Hidden Hills project site. There will be approximately 4 tons per year of hazardous waste generated and disposed for the project. This would be 0.77 percent of the total of the remaining Class I waste capacity in California. The nearest Class I landfill is 320 miles away. Note that the percentage for hazardous material is very low is also extremely conservative, the figure does not take into account that 90% of the material will be recycled.

10.12	18.3, #2 (page 18-4)	Based on a site specific analysis of generated wastes resulting from the proposed project should it be approved compared to currently existing generated wastes within a six-mile radius of the proposed project, would the CEC staff still find impacts of solid and hazardous wastes increases less than significant?	Staff believes that there are no significant or potentially significant issues surrounding solid or hazardous waste disposal from the Hidden Hills project in either California or Nevada. The majority of non-residential, non-hazardous waste is from county road work and is disposed of in Inyo County landfills.
10.13	18.4, #1 (page 18-5)	What is the cumulative significance of continuing to place undue burdens on the State of Nevada to fulfill California's waste disposal obligations for the projects it approves?	Staff believes that there are no significant or potentially significant cumulative issues surrounding solid or hazardous waste disposal from the Hidden Hills project in either California or Nevada.

10.14	18.4, #2 (page 18-5)	If the proposed project is approved, it can potentially cause cumulative growth inducing impacts to the area, none of which can be serviced by Inyo County or the State of California. At what point will California take responsibility for the wastes generated in this area and develop adequate infrastructure components to address the areas needs?	Staff believes that there are no significant or potentially significant issues surrounding solid or hazardous waste disposal from the Hidden Hills project in either California or Nevada. The majority of non-residential, non-hazardous waste is from county road work and is disposed in Inyo County landfills. CalRecycle has a Local Assistance and Market Development Program to assist counties with landfill and recycling needs.
10.15	18.5, #1 (page 18-7)	Based on the identified issues surrounding site access in relation to adequate roadways and California Vehicle Code, Section 31303, is the only viable disposal site for hazardous wastes located in Nevada?	The nearest Class I landfill, Kettleman City, that is available for disposal is 320 miles away therefore, Nevada is the most convenient area to dispose of hazardous waste.

10.16	18.5, #2 (page 18-7)	What are the fiscal impacts to Inyo County for continually having to pay Nevada for infrastructure service support such as the utilization of Nevada sites for hazardous waste disposal?	Staff does not know what the cost is to dispose of waste in Nevada. However, where waste from Inyo county is disposed will not change because of the Hidden Hills project. The disposal of hazardous waste is not free and will be paid for in both California and Nevada. The state of California has two hazardous waste landfills. The nearest Class I landfill to the project site is 320 miles away.
10.17	18.5, #3 (page 18-7)	Are Nevada LORS comparable and/or equivalent to California LORS requirements for hazardous waste disposal?	Yes, and when/if a regulation is more stringent in California as compared to Nevada, Nevada adopts the California regulation when it comes to disposal.
10.18	18.5, #4 (page 18-7)	Are there any identified jurisdictional issues between Nevada hazardous waste LORS and California hazardous waste LORS that cannot be resolved?	Staff is not aware of any jurisdictional issues between California and Nevada that are not resolved.
10.19	18.5, #5 (page 18-7)	What jurisdiction, if any, does the CEC have regarding ensuring Nevada is willing to accept all Conditions of Certification for waste disposal should the proposed project be approved?	None, all of the conditions of certification are written for California. Staff worked with Nevada regulators to verify which Nevada regulations will effect the HHSEGS project prior to writing the Preliminary Staff Assessment. Nevada landfills have indicated that they would be willing to accept project wastes.
10,.20	18.5, #6 (page 18-7)	Will the CEC staff do a complete review of Nevada hazardous materials LORS and initiate pre-project approval agreements with all relevant agencies to ensure that hazardous waste will be adequately and appropriately disposed of?	Staff worked with Nevada regulators to verify which Nevada regulations will effect the HHSEGS project prior to writing the Preliminary Staff Assessment.

10.21	18.6, #1 (page 18-8)	Given the complexity surrounding solid and hazardous waste disposal generated by the proposed project in relation to the lack of infrastructure for waste disposal in the project vicinity, does the CEC Staff consider the necessary negotiations, resolutions, mitigation measures, regulatory efforts and fiscal impacts to be a significant disadvantage of siting the proposed project at this location?	Staff believes that there are no significant or potentially significant issues surrounding solid or hazardous waste disposal from the Hidden Hills project in either California or Nevada. The majority of non-residential, non-hazardous waste is from county road work and is disposed in Inyo County landfills.
10.22	18.6, #2 (page 18-8)	Does the CEC Staff believe that all significant and potentially significant issues surrounding solid and hazardous waste disposal can be successfully resolved prior to project approval or will these issues only be vetted during the development and approval of the Operation Waste Management Plan?	Staff believes that there are no significant or potentially significant issues surrounding solid or hazardous waste disposal from the Hidden Hills project in either California or Nevada.
10.23	18.7, #1 (page 18-9)	Can the CEC know about the potential inclusion of temporary worker housing at or near the proposed project site and not include any data, analysis, potential impact discussions or proposed mitigation measures under CEQA equivalency requirements- and still approve the siting of the proposed project?	Staff's **Socioeconomics** analysis shows that no additional housing, temporary or otherwise will need to be constructed as a result of project construction and operation. There is enough available housing in the area to accommodate those workers who temporarily relocate closer to the project site during construction.
10.24	18.7, #2 (page 18-9)	Should temporary worker housing be utilized on or near the proposed project site, what is the maximum number of units that would be authorized and what would be their corresponding waste disposal needs?	Staff's **Socioeconomics** analysis shows that no additional housing, temporary or otherwise will need to be constructed as a result of project construction and operation. There is enough available housing in the area to accommodate those workers who temporarily relocate closer to the project site during construction.
10.25	18.7, #3 (page 18-9)	Was the unresolved issue of municipal waste generation ever discussed at either workshop held on June? If so, what were the details of that discussion, what did it cover, what impacts were identified, what volume of waste were projected from temporary construction worker influx, and costs were associated with this waste disposal?	The issue of municipal waste was not discussed at the workshop. It was determined that no additional housing, temporary or otherwise will need to be constructed as a result of project construction and operation. There is enough available housing in the area to accommodate those workers who temporarily relocate closer to the project site during construction.

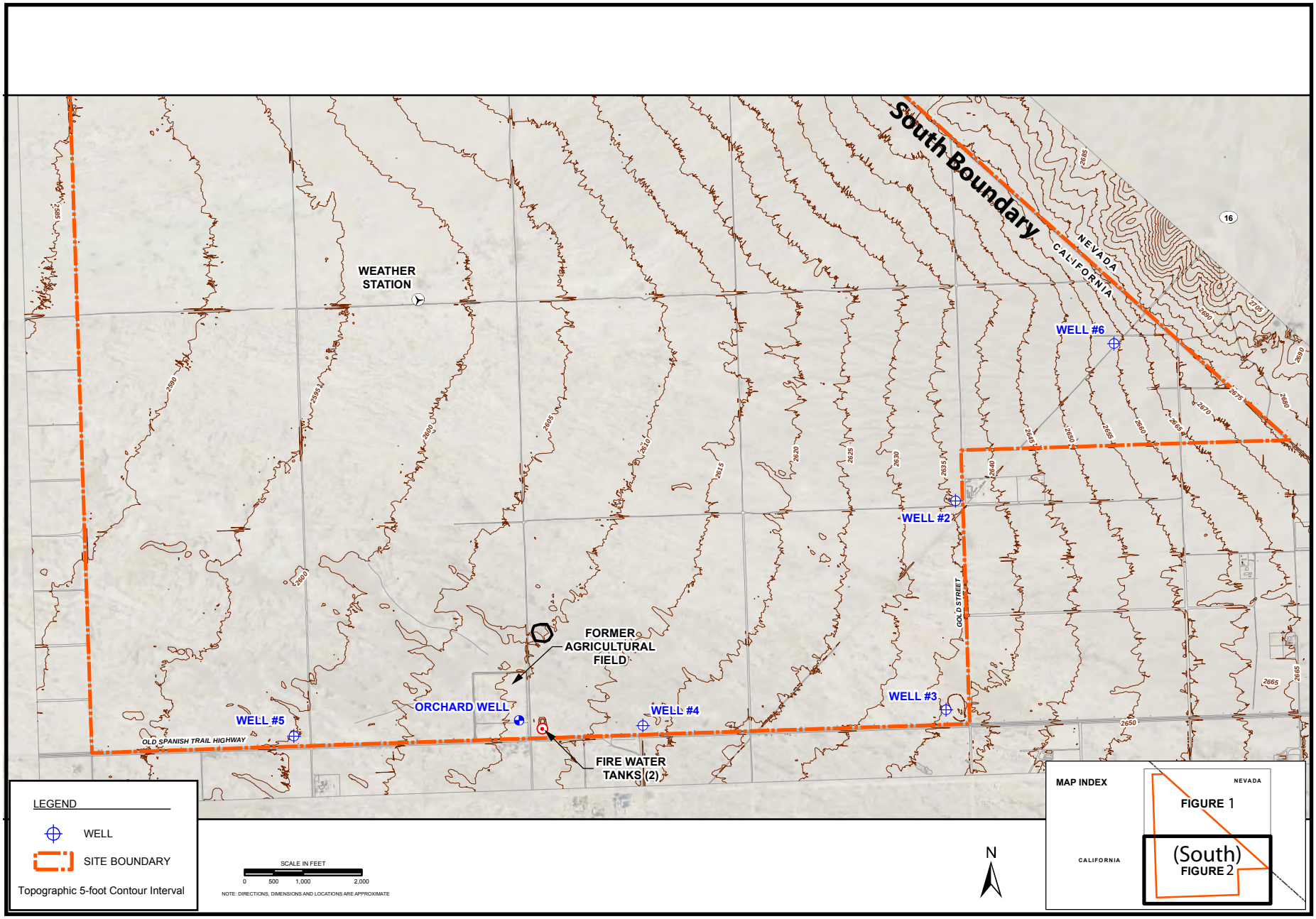
10.26	18.8, #8 (page 18-10)	How can the 200,000 to 400,000 gallons of recycled water be counted on for dust control if its discharge depends on the fluid sample levels of contamination.	The water would have to be disposed in the proper facility if contaminated. See **Soils and Surface Water** for additional information.
10.27	18.8, #9 (page 18-10)	What happens to this recycle water if fails to register as clean? How will it be disposed of?	See **Soils and Surface Water** Condition of Certification **SOILS-6**
10.28	18.9, #10 (page 18-10)	Will the applicant just dilute the recycled water until it registers as clean? If so how much additional water would this require?	Please refer to the **Soils and Surface Water** section of this **FSA**.
10.29	18.8, #11 (page 18-10)	If the fluid samples fail to register as clean and the applicant dilutes it with additional water until it can register as clean enough for discharge, isn't the same amount of non-clean chemicals being discharged into the environment? If so, what is the cumulative affect of this discharge to soil, water and biological resources over the life of the proposed project?	Please refer to the **Soils and Surface Water** section of this **FSA**.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
13	**July 23, 2012**	**Applicant, BrightSource Energy, Inc. -**	
13.1		Correct acreage number (not 3,900)	3,900 acres was a typo, correct acreage number of 3,277 appears on page 5-14.7 of **FSA**
13.2		Page 4.14-5, Table 1 LORS, Title 24, CCR, Part 11 2010 Green building Standards Code (CalGreen): suggest that this LORS be deleted because Inyo County has a local construction and demolition (C&D) debris diversion ordinance that achieves the same objective of diversion of 50 percent of construction water from Landfills. The CalGreen code only applies if there is no local ordinance.	There is no diversion percentage specified in the Inyo County ordinance.

13.3		Page 4.14-6, Table 1 LORS, Title 8, CCR Section 1529 and 5208: Suggest that this LORS be deleted, as this applies to existing facilities that need to be demolished that have asbestos-containing materials. It should not apply to the HHSEGS because there are no existing structures at the site that need to be demolished.	Staff concurs and has made the requested change.
13.3		Page 4.14-6, Table 1 LORS, Title 8, CCR Section 1529 and 5208: Suggest that this LORS be deleted, as this applies to existing facilities that need to be demolished that have asbestos-containing materials. It should not apply to the HHSEGS because there are no existing structures at the site that need to be demolished.	Staff concurs and has made the requested change.
13.4		Page 4.14-8, 2nd paragraph, 2nd sentence: According to the State of Nevada, Class I and II landfills can also accept non-hazardous non-recyclable waste. Suggest that sentence be reworded as follows: Waste would be recycled, where practical, and non-recyclable waste would be deposited in a Nevada Class III licensed to accept such waste.	Staff concurs and has made the requested change.
13.5		Page 4.14-11, Construction Impacts and Mitigation, Nonhazardous Waste, 1st paragraph, last sentence: Suggest that the sentence be reworded as follows: The non-hazardous waste that cannot be recycled from the HHSEGS will be disposed in a Nevada Class III landfill licensed to accept the waste (Nevada Administrative Code (NAC) Section 444.5715).	Staff concurs and has made the requested change.

13.6		Page 4.14-17, 2nd paragraph, 4th sentence: Suggest revising the sentence as follows: The CPM, after receiving comments from the County, shall determine with the applicant if the plan is diverting recyclables to the maximum extent feasible.	Staff concurs and has made the requested change.
13.7		Page 4.14-22 Conclusion #4: Please revise	Staff concurs and has made the requested change.
13.8		Pages 4.14-22, Conclusions #5: suggest deletion of conclusion No. 5. Waste that will be generated onsite by the project is already covered by the waste management analysis. No new residences are foreseen as part of the project so no other increase in waste generation is anticipated beyond what is already described in the analysis.	Staff concurs and has made the requested change.
13.9		Page 4.14-23, Finding of Fact #9: suggests deletion of this statement, as it is not a finding of fact: The project owner will work with Inyo County and Energy commission staff to determine what ~~mitigation~~ measures, if any, should be proposed in the Final Staff Assessment to <u>address potential</u> ~~help off set expected~~ impacts to county services, <u>if any</u>, including municipal solid waste disposal.	Staff deleted the statement

WASTE MANAGEMENT - FIGURE 2

Hidden Hills Solar Electric Generating System (HHSEGS) -Site Plan (South)



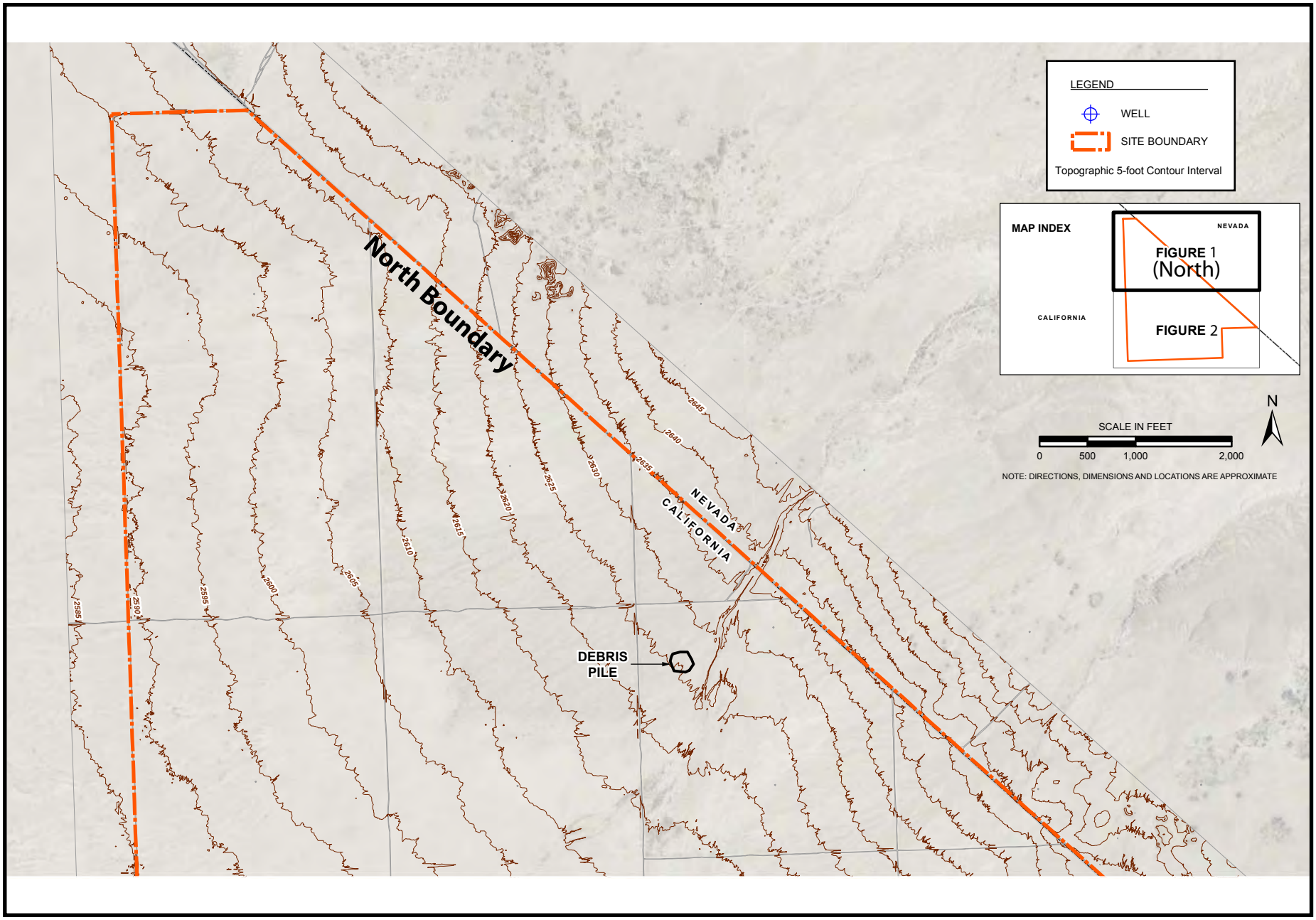
WASTE MANAGEMENT

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: SOURCE: AFC Volume II, Phase I, Environmental Site Assessment, Appendix 5.14A, Fig. 3, July 5, 2011 by Ninyo & Moore.

WASTE MANAGEMENT - FIGURE 1

Hidden Hills Solar Electric Generating System (HHSEGS) -Site Plan (North)



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: AFC Volume II, Phase I, Environmental Site Assessment, Appendix 5.14A, Fig. 3, July 5, 2011 by Ninyo & Moore.

WASTE MANAGEMENT

WATER SUPPLY

Testimony of Mike Conway, John Fio, Gus Yates, CHG, and Paul Marshall, CHG

INTRODUCTION AND SUMMARY OF CONCLUSIONS

This assessment analyzes the potential impacts on groundwater resources by the proposed Hidden Hills Solar Electric Generating System (HHSEGS). Refer to the **Soil and Surface Water** section of this Preliminary Staff Assessment for a detailed analysis of the potential impacts on water quality and hydrology.

Energy Commission staff evaluated the potential impacts to: local groundwater supplies, local well owners, groundwater dependent habitats, and compliance with all applicable laws, ordinances, regulations and standards (LORS) and state policies. Staff concludes that construction and operation of the proposed HHSEGS project would increase groundwater consumption in an over-drafted groundwater basin. The project could potentially have significant cumulative impacts to the groundwater basin and direct impacts to local groundwater supplies and biological resources. However, these impacts may be mitigated to levels that are less than significant if the mitigation measures proposed in the Application for Certification (AFC) and staff's proposed conditions of certification are implemented. Additionally, the project would comply with applicable LORS and state policies if such mitigation measures are implemented.

Based on the assessment of the proposed Hidden Hills Solar Electric Generating System (HHSEGS), Energy Commission staff concludes that:

1. The proposed project would exacerbate overdraft conditions in the Pahrump Valley groundwater basin. **WATER SUPPLY-1** would require the proposed project to mitigate for its groundwater use by offsetting it with groundwater pumping reductions that would constitute a real water savings for the basin. Such mitigation could only be effective if pumping reductions are associated with a real pumping history and could not be replaced by other unused water rights.

2. Potential project impacts must be consistent with those analyzed. Staff thus proposes Condition of Certification **WATER SUPPLY-2** which limits the applicant's water use and **WATER SUPPLY-3,** which requires the applicant to construct and report well-related information in accordance with appropriate LORS and install metering devices to ensure accurate reporting of water use.

3. The proposed project pumping could exacerbate water level declines in the project vicinity. To prevent such declines from becoming significant impacts, staff proposes a monitoring plan: **WATER SUPPLY-4** monitors groundwater conditions for potential impacts on existing neighboring wells, groundwater dependent vegetation, the Stump Spring Area of Critical Environmental Concern (ACEC), and groundwater quality. The monitoring is designed to prevent potential impacts to groundwater dependent vegetation, among the other concerns noted above, and therefore also compliments conditions recommended in the **Biological Resources** section. **WATER SUPPLY-5** mitigates for pumping induced drawdown impacts in existing wells. **WATER SUPPLY-6** recommends a plan to monitor land subsidence as a

result of declining water levels and aquifer dewatering that potentially may occur as a result of pumping.

4. Given the lack of evidence for a hydraulic connection, the relatively large intervening distance (about 20 miles), and uncertainty in potential flow barriers and permeability contrasts within the subsurface it would be speculative to conclude that project pumping would adversely affect the Amargosa River. There is no available data that identifies groundwater flow paths or confirms a hydraulic connection between PVGB and the Amargosa River, so the water consumed by project pumping may or may not be a source of inflow to the Amargosa River. Although staff concludes that a significant impact due to project pumping is unlikely, **WATER SUPPLY-1** which requires an offset of project water use in the PVGB would ensure there is likely no net overall change in subsurface outflow from the PVGB that might affect the Amargosa River.

5. Staff recommends Condition of Certification **WATER SUPPLY-7**, which would require the applicant to obtain a permit to operate a non-transient, non-community water system with the Inyo County Environmental Health Department at least sixty (60) days prior to commencement of construction at the site. This condition would ensure that the applicant meets all provisions of Title 22, Section 3 to provide a suitable domestic water supply.

With implementation of the Conditions of Certification listed below, the proposed HHSEGS project would comply with all applicable LORS, and would not result in any unmitigated significant impacts related to water supply resources.

LAWS, ORDINANCES, REGULATION, AND STANDARDS (LORS)

The following federal, state, and local environmental LORS in **WATER SUPPLY Table 1** listed for the HHSEGS project and similar facilities require the best and most appropriate use and management of groundwater resources. Additionally, the requirements of these LORS are specifically intended to protect human health and the environment. Actual project compliance with these LORS is a major component of staff's determination regarding the significance and acceptability of the HHSEGS project with respect to the use and management groundwater resources.

WATER SUPPLY Table 1
Laws, Ordinances, Regulations, and Standards

Federal LORS	
-	-
State LORS	
California Constitution, Article X, Section 2	This section requires that the water resources of the state be put to beneficial use to the fullest extent possible and states that the waste, unreasonable use or unreasonable method of use of water is prohibited.
California Water Code Section 13240, 13241, 13242, 13243, & Water Quality Control Plan for the Lahontan Region (Basin Plan)	The Basin Plan establishes water quality objectives that protect the beneficial uses of surface water and groundwater in the Region. The Basin Plan describes implementation plans and other control measures designed to ensure compliance with statewide plans and policies and provides comprehensive water quality planning. The following chapters are applicable to determining appropriate control measures and cleanup levels to protect beneficial uses and to meet the water quality objectives: Chapter 2, Present and Potential Beneficial Uses; Chapter 3, Water Quality Objectives, and the sections of Chapter 4, Implementation, entitled "Requirements for Site Investigation and Remediation," "Cleanup Levels," "Risk Assessment," "Stormwater Problems and Control Measures," Erosion and Sedimentation," "Solid and Liquid Waste Disposal to Land," and "Groundwater Protection and Management."
California Code of Regulations, Title 23, Division 3, Chapter 30	This chapter requires the submission of analytical test results and other monitoring information electronically over the internet to the SWRCB's Geotracker database.
State Water Resources Control Board 2003-003-DWQ	This general permit applies to the discharge of water to land that has a low threat to water quality. Categories of low threat discharges include piping hydrostatic test water.
California Code of Regulations, Title 22	Title 22, Division 4, Chapter 15 specifies Primary and Secondary Drinking Water Standards in terms of Maximum Contaminant Levels (MCLs). These MCLs include total dissolved solids (TDS) ranging from a recommended level of 500 milligrams per liter (mg/l), an upper level of 1,000 mg/l and a short term level of 1,500 mg/l. Other water quality MCLs are also specified, in addition to MCLS specified for heavy metals and chemical compounds.
California Safe Drinking Water Act	Requires public water systems to obtain a Domestic Water Supply Permit. The California Safe Drinking Water Act requires public water systems to obtain a Domestic Water Supply Permit. Public water systems are defined as a system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out the year. California Department of Public Health (CDPH) administers the Domestic Water Supply Permit program, and has delegated issuance of Domestic Water Supply Permits for smaller public water systems in Inyo County to the County. Under the Inyo County Code Title 3, 5.15-6 Division 3, Chapter 6, Public Water Supply Systems, the County Department of Environmental Services monitors and enforces all applicable laws and orders for public water systems with less than 200 service connections. The proposed project would likely be considered a non-transient, non-community water system.
California Code of Regulations, Title 20,	The regulations under Quarterly Fuel and Energy Reports (QFER) require power plant owners to periodically submit specific data to

Division 2, Chapter 3, Article 1	the California Energy Commission, including water supply and water discharge information.
Local LORS	
Inyo County General Plan	The General Plan includes water resources related goals and implementation measures to protect water resources from overutilization, degradation, and export. Applies to project use of groundwater.
Inyo County Code Title 14, Chapter 14.28	This chapter of the county code defines what is required of water well owners and operators in Inyo County. This chapter requires that well owners pay permit fees to the county for well construction permit review, meet county well construction specifications, and properly destroy abandoned wells.
Inyo County Code Title 7, Section 7.52.090	Fees related to small water systems. Requires that every applicant for and every holder of an environmental health services permit to operate a small water system in Inyo County shall, upon application and annually, respectively, pay a fee.
Inyo County Code Title 7, Section 7.52.070	This section of the county code defines fees required of water well owners and operators in Inyo County.
Inyo County Code Title 7, Section 7.52.060	This section of the county code defines fees required of onsite waste water disposal system owners and operators in Inyo County.
State Policies and Guidance	
Integrated Energy Policy Report (Public Resources Code, Div. 15, Section 25300 et seq.)	In the 2003 Integrated Energy Policy Report (IEPR), consistent with SWRCB Policy 75-58 and the Warren-Alquist Act, the Energy Commission adopted a policy stating they would approve the use of fresh water for cooling purposes by power plants only where alternative water supply sources and alternative cooling technologies are shown to be “environmentally undesirable” or “economically unsound.”
State Water Resources Control Board Res. No. 68-16	The “Antidegradation Policy” mandates that: 1) existing high quality waters of the State are maintained until it is demonstrated that any change in quality would be consistent with maximum benefit to the people of the State, would not unreasonable affect present and anticipated beneficial uses, and would not result in waste quality less than adopted policies; and 2) requires that any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters, must meet WDRs which would result in the best practicable treatment or control of the discharge necessary to assure that: a) a pollution or nuisance would not occur and b) the highest water quality consistent with maximum benefit to the people of the state would be maintained.
State Water Resources Control Board Res. 75-58	The principal policy of the SWRCB that addresses the specific siting of energy facilities is the Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Power Plant Cooling (adopted by the Board on June 19, 1976, by Resolution 75-58). This policy states that fresh inland waters should only be used for power plant cooling if other sources or other methods of cooling would be environmentally undesirable or economically unsound.
State Water Resources Control Board Res. No. 88-63	States that all groundwater and surface water of the State is considered to be suitable for municipal or domestic water supply with the exception of those waters that meet specified conditions.
State Water Resources Control Board Res. 2005-0006	Adopts the concept of sustainability as a core value for State Water Board programs and directs its incorporation in all future policies, guidelines, and regulatory actions.

The California Safe Drinking Water and Toxic Enforcement Act	The California Health & Safety Code Section 25249.5 et seq. prohibits actions contaminating drinking water with chemicals known to cause cancer or possessing reproductive toxicity. The RWQCB administers the requirements of the act.

Water Rights

The proposed HHSEGS site overlies the Pahrump Valley groundwater basin which is located within both California and Nevada. California and Nevada have different laws governing a landowner's right to use groundwater. It is important therefore to explain the differences between the two systems and their influence on mitigation options for the proposed HHSEGS project. Below is a summary of the water rights system in each state.

California- The California Constitution requires that water be used for beneficial purposes. In non-adjudicated water basins, California law does not require groundwater users to obtain a water right. No agency has comprehensive authority to regulate groundwater statewide (Bryner and Purcell, 2003). Overlying landowners generally have the right to pump and use as much groundwater as needed as long it is put to a reasonable and beneficial use. Through court decisions and precedent, appropriation of groundwater for use outside a groundwater basin has been allowed and established in the form of an appropriative right. However, these rights are usually subordinate to the overlier's rights. In basins where a law suit is brought to adjudicate water use, the overlier's groundwater rights and appropriators are determined by the court. The court also decides 1) who the pumpers are, 2) how much water the pumpers can extract, and 3) who the watermaster would be to ensure the basin is managed in accordance with the court decree. The California portion of the Pahrump Valley basin is not adjudicated and no rights have been apportioned in accordance with a court decree.

Nevada- The Nevada Constitution requires that water be used for beneficial purposes. Underground waters belong to the public and are subject to appropriation. The Nevada Division of Water Resources has the sole authority to regulate groundwater use in the state (Bryner and Purcell, 2003). Beneficial use also extends to include the appropriative rights system of water allocation such that a user must demonstrate an actual beneficial use of water. Users cannot speculate on water rights or hold onto water rights that they do not intend to use in a timely manner. If water right holders do not use the water in a timely manner, they lose such right (Nevada State Engineer, 2012).

SETTING

Regional setting

The HHSEGS site is located in Pahrump Valley, which is located in the southern extent of the Great Basin. The Great Basin is a large topographically closed drainage basin that extends primarily throughout Nevada and western Utah (**WATER SUPPLY Figure 1**). The Great Basin is characterized by interior drainages with lakes and playas, and series of horst and graben structures (subparallel, fault-bounded ranges separated by down-dropped basins). The down dropped basins are typically filled with alluvium and playa deposits shed from the adjacent mountain ranges.

Pahrump Valley

The Pahrump Valley is a topographically closed basin that straddles the California/Nevada border (**WATER SUPPLY Figure 2**). It is approximately 30 miles wide and about 40 miles long, and is bounded on the northeast and southwest by fault block mountain ranges comprised of carbonate and clastic rocks (Spring Mountains and the Resting Spring and Nopah ranges), and a tertiary granitic pluton in the south (Kingston Range). Within these boundaries is a 650 square mile basin filled with alluvium to a depth of about 2,000 feet. The alluvium overlies Paleozoic carbonate rocks that are typically folded, faulted, and fractured.

Groundwater associated with the Pahrump Valley basin fill forms a local groundwater-flow system, whereas groundwater associated with the underlying fractured carbonate rocks is part of a larger regional groundwater system. The connection between the relatively shallow local groundwater in the valley basin fill and the deeper regional groundwater (often referred to as the "carbonate aquifer") is unclear. Groundwater in the Pahrump Valley basin fill is known as the Pahrump Valley Groundwater Basin (PVGB) (DWR 2004). The PVGB is principally recharged by precipitation falling in the Spring Mountains, and the basin supports several springs and numerous extraction wells. In the carbonate aquifer, groundwater moves to the northwest and into Ash Meadows and to the southwest through the Nopah Range. Little is known about the quantity and relative proportions of local and regional groundwater discharged by the various sinks in the valley and springs and rivers down gradient to the valley.

The Pahrump-Stewart Valley Fault Zone runs approximately parallel to the California-Nevada State Line and divides the Pahrump Valley into two groundwater sub-basins (**WATER SUPPLY Figure 2**). In the northwest, limited water levels measured in basin fill wells suggest that the fault zone does not impede groundwater flow through that portion of the valley (Comartin, 2010). In contrast, in the southwest, where the project site is located, the fault may significantly impede groundwater movement out of the valley. For example, regional groundwater-flow modeling conducted by the USGS indicated an effective hydraulic conductivity across the fault of 1.8×10^{-7} feet per day, which is several orders of magnitude smaller than the hydraulic conductivity of the adjacent alluvium (Faunt et al., 2004a). Malmburg (1967) also noted a steeper gradient along this fault zone as shown in the mapping of potentiometric contours. Given this characterization, groundwater flow across the fault and into California in the southern part of the valley could be limited by the low permeability fault zone.

The Amargosa River is a unique perennial stream that is believed to be supported by the regional groundwater flow system. It originates in the mountains of southwestern Nevada and flows south and west, terminating in the sinks and playas of Death Valley. The river is located 15 to over 20 miles southwest of the Pahrump Valley where it flows along the western flank of the Resting Spring and Nopah Mountain Ranges. Despite the large drainage area, most of the river and its tributaries are ephemeral. The perennial reaches are supported primarily by groundwater discharge from the local alluvial and deeper regional carbonate aquifers. As shown in **WATER SUPPLY Figure 2** the USGS

inferred ground-water throughflow moves northwesterly out of PVGB through the Nopah and Resting Spring Range, toward the river and mixes with ground water flowing southward from Alkali Flat. Groundwater throughflow out of the southern part of the valley toward the river is likely less significant as a result of the fault zone (Faunt et al., 2004b).

Wells and Water Levels

In the last 100 years, the PVGB has been the subject of multiple hydrogeologic reports, but none of the reports focused on the southern part of the basin where the proposed project is located. Pahrump Valley historically had abundant groundwater reserves, but pumping throughout the 1900s caused a steady rate of water table decline in the alluvial aquifer. **WATER SUPPLY Figure 3** shows the available long-term water levels records for wells located in the PVGB, which are concentrated at the northern end of the basin. The well data suggest a general decline in water levels in the northern part of the basin between 1950 and 2000 (Buqo, 2004). The observed decline in these wells of record has averaged about one foot per year. In contrast, water level data for the southern half of the basin is relatively scarce. The proposed HHSEGS site is bordered by domestic wells located primarily to the south in the community of Charleston View. Most of these wells were drilled after 1950. The available water level data from the southern half of the PVGB was used to construct a map of the potentiometric surface shown in **WATER SUPPLY Figure 4**; the explanation for this map is included as **WATER SUPPLY Figure 5**.

Basin Balance

Water budget estimates reported by Comartin (2010) indicate that the Pahrump Valley receives approximately 22,000 AFY of recharge from precipitation falling in the Spring Mountains. Groundwater outflows include evapotranspiration, southwesterly underflows into California, and groundwater pumping. Comartin (2010) estimated evapotranspiration at about 10,000 AFY, but did not provide an estimate for underflow and pumping; underflow is thought to vary primarily with the basin pumping stresses (Comartin, 2010).

Reported groundwater extractions are substantially greater than estimated safe yield for the PVGB. The Nye County Water Resources Plan states that the safe yield of the basin is between 12,000 and 19,000 AFY (Buqo, 2004). On the Nevada side of the PVGB, 69,000 AFY of groundwater extractions are permitted, but the actual reported groundwater use is substantially less than the permitted extraction rate. Reported groundwater extractions ranged from a maximum of 47,100 acre-feet (1968) to a minimum of 23,000 acre-feet (2000). These reported annual extraction rates only include the pumping covered by water rights issued by the Nevada State Engineer, and may be less than actual groundwater use because pumping by domestic wells can only be estimated. Using the Nevada State Engineer's estimate for residential water use of 0.5 AFY per residence (well), domestic water use estimated for 2011 was 5,553 AF (Nevada State Engineer, 2012).

In the California part of the basin, there are approximately 68 residents and 34 residential structures within six miles of the proposed project site. Most of these water

users are part of the Charleston View development. Staff estimated residential water use by this development at about 17 AFY.

Subsidence

During the last 100 years, the northern Pahrump Valley basin has experienced land subsidence due to water-level declines associated with excessive groundwater pumping (Buqo, 2004; Malmburg, 1986). The valley center is particularly susceptible to subsidence because of the high clay content throughout the saturated thickness of the valley-fill aquifer. Subsidence has not been monitored, but **WATER SUPPLY Figure 6** shows a map of the estimated extent of historical subsidence based on the pumping distribution, water level declines, and alluvial clay content in subsurface deposits. Most subsidence would typically occur where groundwater pumping and water-level declines were greatest.

See the **Geology and Paleontology** section of this **FSA** for an analysis and further description of threats posed by subsidence unrelated to groundwater pumping.

Springs and Groundwater-Dependent Vegetation

Certain types of plants in arid regions, such as mesquite, cottonwoods, and willow trees, often rely on groundwater for survival and occur only where the water table is shallow. These plants are called phreatophytes. Pumping groundwater in those areas can adversely impact phreatophytes by lowering water levels in the root zone. Groundwater pumping in the northern PVGB was associated with significant declines in mean annual discharge at Bennetts and Manse Springs (Belcher et al., 2004). **WATER SUPPLY Figure 7** shows the trends in spring discharge from these two springs between 1870 and 1980.

Malmburg (1967) mapped mesquite trees along multiple creek drainages 3 to 5 miles northeast, east, and southeast of the HHSEGS project, but primarily on the Nevada side of the Pahrump-Stewart Valley Fault System, as shown in **WATER SUPPLY Figure 8**. In the 1990s, the US Bureau of Land Management (BLM) conducted surveys and mapped the groundwater-dependent species in the region. **WATER SUPPLY Figure 9** shows the areas mapped by BLM (BLM, 2006).The BLM map shows more extensive vegetation occurrence than Malmburg's (1967) map, but it is not clear whether the difference stems from different mapping methods and categories or from real changes in vegetation on the landscape.This figure also shows the location of all known springs within 6 miles of the project site.

Because of their need for relatively shallow groundwater conditions, phreatophytes are also associated with areas that have seeps and springs. One of the areas mapped as having phreatophytes is located 4-miles east of the HHSEGS project site within the BLM-designated Stump Spring Area of Critical Environmental Concern (ACEC).The Stump Spring ACEC is protected for its biological and cultural resource values that include mesquite coppice dunes and mesquite washes. Declining water levels in the PVGB has therefore made protection of this area a priority (BLM, 2006). **WATER SUPPLY Figure 10** shows the proposed site relative to the mapped ACEC boundary

and a monitoring well that has been installed to measure water level changes at Stump Springs.

Faults

Numerous faults are inferred in the immediate vicinity of the proposed project site. Some faults are inferred from topographical evidence of fault scarps and others from geophysical studies. The faults bound blocks that step up east along and into the Spring Mountain Range. All of the faulting in the region is part of the regional Amargosa-Pahrump fault system, which trends northwest - southeast. **WATER SUPPLY Figure 9** shows the inferred faults in the vicinity of the project site (Workman et al., 2002). The USGS modeled the effective hydraulic conductivity across the fault at $1.8x10^{-7}$ feet per day, which is several orders of magnitude smaller than the hydraulic conductivity of the adjacent alluvium (Faunt et al., 2004). Springs appear to lie along or in close proximity to the inferred fault traces. It is common for faults to create spring conditions because they form hydraulic barriers along the displaced rocks and sediments causing groundwater to flow to the surface, or displacement exposes water bearing sediments and flow discharges at the surface. The mesquite coppice dunes and washes appear to be aligned along faults where shallow groundwater may occur.

For further discussion of the regional faul system, see the **GEOLOGY AND PALEONTOLOGY** section of this FSA.

Water Quality

The California Department of Water Resources (DWR) describes groundwater quality in the PVGB as suitable for all beneficial uses. The water quality varies in character from calcium-magnesium-bicarbonate to magnesium-calcium-bicarbonate, and the reported total dissolved solid (TDS) concentrations range from 145 to 540 mg/L (DWR, 2004).

The Nye County Water Resources Plan describes the groundwater quality in the PVGB as good. This Plan notes however that the northern part of the valley contains a very high density of septic systems and could benefit from community sewage treatment infrastructure. There are 33 land sections containing more than 100 septic systems, which increase the risk of domestic well contamination (Buqo, 2004).

There is limited data on water quality in the southern part of the basin. The Charleston View community located just south of the project site has 12 documented wells that appear to be primarily for domestic use, which suggests that groundwater is of acceptable quality for most uses. Recent water quality analyses from wells on the project site show that the groundwater quality is relatively low in Total Dissolved Solids (between 250 and 360 ppm, based on the applicant's 2011 and 2012 data) and has a bicarbonate character. There are approximately 68 residents and 34 residential structures within six miles of the proposed project in California. These residences all use septic systems for on-site wastewater disposal. Using a typical factor of about 70 gallons per day per person, for non-consumptive use and return flow through these systems, the Charleston View homes located in a 5 square mile area could be percolating up to 5 AFY of sanitary wastewater (Nishikawa, et al., 2003).

Water Use

Six water supply wells would be drilled as part of the HHSEGS project. Two wells would be required at each of the two power blocks and two more would be installed at the administration complex. Each pair of wells consists of a main well and a back-up well. Wells at the power block would supply make-up water, mirror wash water, and water for domestic uses.

Under operating conditions, each power block would require between 30 to 50 gallons per minute (gpm), and domestic water use of about 3.5 gpm (average water use of almost 45 gpm per power block). The operating plant water use would therefore average about 90 gpm, which equates to an annual average use of about 140 acre-feet per year (AFY). If the project were to operate for 30 years, it would pump a total of 4,200 Acre Feet (AF).

Construction water use could be as high as 288 AFY for almost three years. If permitted, construction would take place beginning in the second quarter of 2013 and be completed in the fourth quarter of 2015 (29 months). The total pumping for this period would be 696 AF.

Total combined pumping for construction and operation would be about 4,900 AF.

Each power block would have a 250,000 gallon raw water tank. Of that capacity, 100,000 gallons would be used in power plant operation and the other 150,000 gallons would be stored for emergency fire water.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

This section provides an evaluation of the expected direct, indirect, and cumulative impacts to groundwater resources that would be caused by project construction, operation, and maintenance. Staff's analysis of potential impacts consists of a description of the potential effect, an analysis of the relevant facts, and application of the threshold criteria for significance to the facts. If mitigation is warranted, staff provides a summary of the applicant's proposed mitigation and a discussion of the adequacy of the proposed mitigation. If necessary, staff presents additional or alternative mitigation measures and refers to specific conditions of certification related to a potential impact and the required mitigation. Mitigation is designed to reduce the effects of potential significant project impacts to a level that is less than significant.

Staff concluded that the depletion or degradation of groundwater resources, including its beneficial uses, are the most significant impacts associated with the proposed project. The thresholds of significance for these issues are discussed below.

Water Resources

Staff evaluated the potential of the project's proposed water use to cause a substantial depletion or degradation of groundwater resources for all beneficial uses. Staff considered compliance with the LORS and policies presented in **WATER SUPPLY**

Table 1 and whether there would be a significant California Environmental Quality Act (CEQA) impact. Compliance with LORS and policies includes the Energy Commission and State Water Resources Control Board policies against using freshwater for power plant cooling unless other sources or other methods of cooling would be environmentally undesirable or economically unsound. A discussion of the applicable policies is contained in the "Water Use LORS and State Policy Guidance" subsection of this FSA section.

To evaluate if significant CEQA impacts to groundwater resources would occur, the following criteria were used.

a) Would the project substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume (deplete groundwater storage)?

b) Would the project contribute to any lowering of groundwater levels and impact the production rate of pre-existing wells to a level which would not support existing or planned uses for which other permits have been granted or cause physical damage to the well?

c) Would the project contribute to any lowering of the groundwater levels and affect protected species or habitats?

d) Would the project substantially degrade groundwater quality?

Where a potentially significant impact was identified, staff or the applicant proposed mitigation to ensure the impacts would be less than significant.

DIRECT IMPACTS

This section discusses potential impacts from project groundwater pumping in the PVGB. These include whether the project would substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume (deplete groundwater storage). During the next 33 years, almost 4,900 acre-ft of groundwater would be consumed from a basin with declining water levels and reported use levels that exceed the estimated sustainable yield.

Basin Water Levels

The volume of groundwater stored in a basin varies with changes in water inflows and outflows. Groundwater storage and well water levels increase when inflow exceeds outflow. Conversely, groundwater storage and water levels decrease when inflow is less than outflow. Significant adverse impacts can occur when groundwater storage perpetually declines, which include the increase in extraction costs, costs related to well deepening or replacement, land subsidence, water quality degradation, and elimination of habitat associated with springs and shallow groundwater levels.

The PVGB has experienced significant declines in groundwater levels and spring discharge during the last 100 years. The northern half of the valley has experienced average water level declines of approximately one foot per year since the 1950s (see **WATER SUPPLY Figure 3**) (Buqo, 2004). Data going back to the 1950s is limited for

the southern half of the Valley, but staff obtained water level records for two southern basin wells reported by the United States Geological Survey that indicate a long-term decline similar to that observed in the north (the Hidden Hills irrigation well and the Orchard well).

WATER SUPPLY Figure 11 shows the water level record for the Hidden Hills irrigation well. This well experienced a significant decline in the 1980s and has not recovered. Since the 1970s the water levels have steadily declined by about 0.25 feet per year.

WATER SUPPLY Figure 12 shows the water level record for the Orchard well.The Orchard well has also experienced a steady decline in water levels since 1959. The observed long-term trend in this well is about 0.37 feet per year.

Staff obtained relatively detailed water level records from the Nye County Nuclear Waste Repository Project Office (NWRPO[1]) for several other wells located in the southern portion of the PVGB. These wells have relatively recent data records, which begin in November 2005 and end in November 2011. Staff utilized these water level records to calculate average water level changes in the southern PVGB and establish baseline conditions for the impact assessment.

Staff employed a USGS program (Helsel, 2006) to compute the Mann-Kendall test for trend and Sen's slope (Sen, 1968).The Mann-Kendall test is routinely employed in the environmental sciences to determine if the data exhibit a statistically significant trend because it is not heavily influenced by outliers or missing data. If the data does exhibit an upward or downward trend, the Sen's slope statistic determines the rate of increase or decrease represented by the data. **WATER SUPPLY Figures 11** through **16** shows the water level data and estimated trends for PVGB wells.

The statistical calculations are summarized in **WATER SUPPLY Table 2** and **WATER SUPPLY Table 3**. Results indicate that the water levels for all the wells have statistically significant downward trends at the 95-percent confidence level (significance level, $\alpha = 0.05$). Staff utilized the statistical results to consider water level trends on either side of the California-Nevada state line, which corresponds to the low permeability Pahrump-Stewart Valley Fault Zone. Staff chose the median trend to characterize the long-term water level changes in California and Nevada wells separately; the median is utilized because it is less influenced by outliers (Nevada Department of Transportation (NDOT)). **WATER SUPPLY Table 2** shows that the median water level decline calculated in the California wells is 0.23 feet per year (ft/yr); **WATER SUPPLY Table 3** shows that the median water level decline observed in the Nevada wells on the other side of the fault zone is 1.15 feet per year.

[1]http://www.nyecounty.com/LSN/index/EWDP/water_data.htm

WATER SUPPLY Table 2
Groundwater Level Trends in Southern Pahrump (CA Wells)

Well Name	Years	Number of Records	Median,ft/yr
Dry Lakebed	2005 - 2011	46	0.00
Old Orchard	2005 - 2011	44	-0.23
Quail	2005 - 2011	45	-0.31
Stateline	2005 - 2011	45	-0.24
		Arithmetic Mean	**-0.19**
		Median	**-0.23**

WATER SUPPLY Table 3
Groundwater Level Trends in Southern Pahrump (NV Wells)

Well Name	Years	Number of Records	Median,ft/yr
Beyond Sherrys	2005 - 2011	46	-1.91
NDOT	2005 - 2011	32	-7.00
Hidden Hills Irrigation	2005 - 2011	45	-0.39
Jeep Trail	2005 - 2011	44	0.60
		Arithmetic Mean	**-2.18**
		Median	**-1.15**

Overdraft can be characterized by groundwater levels that decline over a period of years and never fully recovers, even in wet years. In the PVGB, water levels have been declining both north and south of the fault zone for years. Project pumping and increased groundwater consumption would exacerbate water level declines and reductions in groundwater storage. The applicant also acknowledges that project pumping would substantially deplete groundwater supplies in the PVGB and exacerbate ongoing overdraft conditions. The applicant therefore proposes to offset the impact through acquisition and retirement of water rights in an amount equal to the proposed project pumping. Staff believes this could be appropriate mitigation if it is shown that the water rights acquired offset actual active groundwater use in the PVGB. Staff also believes it is possible there are other methods that could be implemented to offset project pumping such as developing alternative supplies, funding water conservation programs, or capturing and recharging flood flows that would otherwise drain to the playa and evaporate (See the **Soils and Surface Water** section and **SOILS-5** and **SOILS-6** for further discussion). Staff recommends adoption of Condition of Certification **WATER SUPPLY-1** which requires the project owner to develop and implement a plan prior to project construction and provide water use offset within the PVGB that is equal to project pumping, thereby ensuring no new net increase in groundwater consumption.

To ensure that the water use analyzed is consistent with that used by the proposed project, staff proposes Condition of Certification **WATER SUPPLY-2**. This condition would limit project pumping to an average of 288 acre-feet per year during the 29 months of construction and to 140 acre-feet per year for project operations.

Furthermore, this condition requires that water use is metered and reported consistent with these limitations. Staff also proposes Condition of Certification **WATER SUPPLY-3** to ensure that project wells are constructed to state standards.

Aquifer Tests

The depth and extent of water level drawdown in and around a pumping well is determined by the pumping rate, aquifer transmissivity and aquifer storativity. Well hydraulic equations used to estimate drawdown are dependent on the values of these parameters. The drawdown calculated using these equations is used by staff to evaluate the potential impact on water resources. Information on aquifer parameter values in the vicinity of the site is limited. Staff obtained two reported transmissivity estimates and one storativity estimate from a local 1966 aquifer test (HHSEGS 2011a). These values are included in **WATER SUPPLY Table 4** below.

In February 2012 the applicant conducted an aquifer test to further evaluate site aquifer water transmitting and storage properties. Staff and other interested parties reviewed and commented on the results of the test and noted several deficiencies with the methodology. There has been further disagreement between the applicant and staff regarding the characterization of the aquifer system. Specifically, there is disagreement in regard to the water sources extracted by the pumped wells, the adequacy of the water level monitoring network, and the magnitude and extent of expected pumping impacts manifested in the aquifer system. Although staff disagreed with the applicant on how the data should be used to estimate local and regional aquifer response to pumping, staff acknowledges the results provide additions to a limited dataset. The applicant also recently completed another aquifer test in October 2012 while staff was completing this analysis for the FSA. Staff completed a preliminary review of the results and found that the values were within the range of values from the February 2012 aquifer test. The applicant's transmissivity and storativity estimates from the February 2012 aquifer test are included below in **WATER SUPPLY Table 4**.

In **WATER SUPPLY Table 4**, staff also identified the minimum and maximum transmissivity and storativity estimates. The range in these values suggests there is significant variability in aquifer characteristics at and near the site. This variability translates into uncertainty in estimated impacts from the project. In order to capture the possible range in pumping impacts, staff employed the range of values to represent best- and worst-case estimates of the potential impact (minimum and maximum estimated drawdown, respectively).

WATER SUPPLY Table 4
Estimates of Aquifer Properties

Storage	Transmissivity (gpd/ft)	Source, Method
NA	4,675	AFC (Broadbent and Associates, Inc. 2003)
0.064	7,225	AFC (Geotechnical Consultants, Inc. 1966)
0.0014	1,634	Applicant, estimate from Feb 2012 pump test, MW-1, Hantush
0.0067	6,914	Applicant, estimate from Feb 2012 pump test, MW-5, Hantush
0.0028	1,175	Applicant, estimate from Feb 2012 pump test, MW-3, Hantush
0.0028	6,914	Applicant, estimate from Feb 2012 pump test, MW-2, Hantush
0.0031	660	Applicant, estimate from Feb 2012 pump test, MW-4, Hantush
0.013	**4,171**	**Average**
0.064	**7,225**	**Max**
0.0014	**660**	**Min**

Groundwater-Dependent Vegetation and Stump Springs

Staff considered whether the proposed pumping could impact groundwater dependent mesquite vegetation located about 1.5 miles from the project supply wells and at Stump Spring ACEC (**WATER SUPPLY Figure 10**). The presence of mesquite vegetation generally indicates a relatively shallow water table, and therefore may be impacted by project groundwater consumption and water level declines. In the Biological Resources section of this FSA, staff discusses the unique value of this vegetation and why it should be protected from the potential effects of project pumping.

Stump Springs is located about 4.5 miles from the project. It supports an extensive area of mesquite vegetation. Stump Springs is an intermittent spring and lacks a reliable flow record, but it was reportedly flowing in 1845 (BLM, 2006) and also by the USGS in 1919 (Grover, 1919). As discussed in the **Biological Resources** section, BLM reports that Stump Spring is currently discharging and supports three shallow, seasonal pools that range between 30 and 70 feet long, and one to two feet deep. BLM has constructed a monitoring well in the ACEC known as the Stump Springs monitoring well. The well is located about one-half mile east of the actual spring location and currently has a water level of 28 feet below ground surface (bgs).

The mechanism controlling Stump Spring discharge is not well understood. Stump Spring is located along an inferred fault structure, assumed to be part of the Pahrump-Stewart Valley Fault Zone, or Stateline Fault System (Guest et al., 2007). The opportunity may exist for confined water to rise to the surface along these fault

structures, thereby creating a spring. This faulting has also resulted in terracing along the eastern alluvial slope of Pahrump Valley, and these terraces provide the opportunity for the water table to intersect the land surface and discharge groundwater thereby creating a spring. Additionally, the 50 foot thick clay layer mapped by Grover (1919) may confine groundwater and create artesian conditions that produce spring flow, or the clay layer could impede the downward migration of any recharge and create a perched water table that also contributes to spring flow. **WATER SUPPLY Figure 17** illustrates the areal extent of the clay layer exposed in the vicinity of Stump Springs (Grover, 1919).

These local hydrogeologic conditions could influence the hydraulic connection between Stump Springs and the proposed project water supply wells, but data is lacking and the degree of connnectivity is poorly understood. As shown in **WATER SUPPLY Figure 7**, water levels around Manse and Bennetts springs have shown significant decline with historic groundwater pumping. This suggests there is a strong correlation between groundwater pumping and spring discharge at this location. Pumping conditions in the vicinity of the HHSEGS site may be different however, due to the potential presence of a fault barrier. The presence of one or more inferred faults between the project wells and Stump Springs could limit the hydraulic connection between project pumping wells and Stump Springs. BLM, other agencies, and the public have repeatedly commented throughout the project licensing review process that Stump Spring is a unique cultural and biological resource that must be protected. Staff therefore was conservative and utilized the range in aquifer parameters discussed above and assumed groundwater is hydraulically connected across the fault to consider the worst case scenario when estimating potential impacts to these sensitive biological receptors.

Drawdown Impacts to Receptors

The staff assessment employed well hydraulic equations and the principle of superposition to isolate estimated impacts due to project pumping. The principle of superposition states that linear systems can be added together to determine the conditions of the composite system (Reilly et al., 1987). The approach is particularly useful when determining pumping effects in an aquifer system with complex or unknown stresses because it isolates the pumping effect studied from other stresses to the groundwater system. In this application, the drawdown calculated by the well hydraulic equations is considered the impact due solely to the pumping well. Accordingly, this isolated drawdown distribution can be added to the existing pre-pumped water level surface to estimate the actual change in water level surface due to the new pumping.

Staff utilized the Theis equation (Theis, 1935) and the range in aquifer parameters reported in **WATER SUPPLY Table 4** to estimate a range in drawdown from pumping. The Theis equation assumes that the pumped aquifer is confined; there is no recharge; the water pumped comes from a single, infinite, and horizontal aquifer of uniform thickness; the aquifer is homogeneous and isotropic; all flow to the well is radial and horizontal; Darcy's law is valid; the pumping well and observation wells fully penetrate the aquifer; the pumping well effectively has an infinitesimal diameter; and, the well is 100 percent efficient (Fetter, 1994). The drawdown calculated with the Theis equation would be greater than observed if actual aquifer conditions are not confined, or if

recharge to the pumped aquifer occurs. Hence, the Theis equation produces conservative results when, for example, it is applied to partially or semi-confined aquifer conditions.

The following equations (Equation 1 and Equation 2) were used to apply the Theis solution and predict drawdown (s) at given distances.

$u = (r^2S)/4Tt$ (Equation 1)

$dh = (Q/4\pi T)\ W(u)$ (Equation 2)

Where,

r = radial distance from the pumping well (L)
S = aquifer storativity (dimensionless)
T = aquifer transmissivity (L^2/T)
t = time (T)
h = hydraulic head (L)
Q = pump rate (L^3/T)
W(u) = well function of u

In contrast to the approach employed by staff, the applicant's groundwater analysis considered three different equations to estimate aquifer parameters from the pumping test data and assess potential impacts from project pumping: Hantush, Hantush-Jacob, and Neuman-Witherspoon equations (CH2 2012l, CH2 2012dd). The three equations are all similar in that they represent leaky-aquifer conditions, which occur when water pumped from a well is supplied from water in storage and recharge from an adjoining aquifer and aquitard located either above or below the pumped aquifer. Many of the aquifer assumptions inherent to the Theis equation are similar to those for these leaky aquifer equations, except that the leaky aquifer equations allow for water to come from sources other than the main aquifer.

Staff agrees with the applicant that the water level response in some of the wells could possibly indicate local leaky aquifer conditions. However, the analysis of a leaky aquifer test requires drawdown data for the pumped aquifer, the adjoining aquifer that supplies the recharge (the leakage), and the leaky-bed (the aquitard) that separates the two aquifers (Kruseman et al., 1994). The well log data and water level changes monitored during the applicant's test are insufficient to identify the pumped aquifer, leaky aquifer, and intervening aquitard. For example, the monitoring wells are shallow relative to the substantially deeper depths from which the groundwater was pumped during the February 2012 aquifer test. Furthermore, the hydrogeologic information available is insufficient to confidently identify the adjoining aquifer that supplied the recharge during the test, what the water level changes were in the leaky aquifer as a result of the deeper pumping (if different from the water-bearing materials monitored by the shallower monitoring wells), the thickness and extent of the intervening aquitard, and the depth and thickness of the pumped aquifer. Staff therefore was conservative in its approach and employed the Theis equation for a confined aquifer for the impact analysis.

Stump Springs

Stump Springs is a BLM identified Area of Critical Environmental Concern (ACEC) and is surrounded by mesquite that may be dependent on groundwater for survival. The ACEC area supports a range of plant and animal species and is also a valuable cultural resource. See the **BIOLOGICAL** and **CULTURAL RESOURCES** sections of this FSA for more information about the Stump Springs area.

Staff employed the Theis equation to estimate the range of drawdown impacts. To represent the uncertainty in reported aquifer transmissivity and storativity, staff utilized the range of transmissivity and storativity values reported by the applicant in the AFC and the results of their aquifer tests (**WATER SUPPLY Table 4**). To account for uncertainty in aquifer conditions, the transmissivity and storativity values were chosen to show the range in potential drawdown impacts. This analysis assumes that the project pumps 4,900 AFY over a 33 year period consistent with the applicant's description.

WATER SUPPLY Figure 18 summarizes staff's estimate of the potential drawdown at the distance of the Stump Springs monitoring well and the latent effects on water levels after pumping ends. The range of drawdown estimated at the distance of the Stump Springs monitoring well is 0 (minimum transmissivity and maximum storativity) to 19 feet (minimum transmissivity and storativity); all other aquifer parameter combinations fall between these two limits. These results are considered maximum potential impacts because they ignore the Pahrump-Stewart Valley Fault Zone, which likely limits the hydraulic connection between project pumping and groundwater northeast of the fault zone associated with Stump Springs.

The applicant's AFC also employed the Theis equation to calculate the spatial distribution of drawdown impact from 25 years of pumping from two wells at a combined rate of 87 gpm. They utilized transmissivity values that ranged from 3,612 to 14,450 gpd/ft and a storativity value of 0.01,which are near the average values of the dataset reported in **Water Supply Table 4** (HHSG 2011a); staff's analysis employed the range of this same data set. The applicant has since changed their approach that includes the contribution of leakance and calculates a substantially smaller drawdown impact. However, there is no data regarding pumping impacts on the leaky aquifer which could be either above or below the pumping well. Consequently there is no reliable estimate of the pumping impact on the leaky aquifer.

Staff describes the maximum areal extent of the estimated pumping drawdown, ignoring the fault zone and assuming no hydraulic barrier exists between project wells and Stump Springs. In **WATER SUPPLY Figure 19**, staff shows the relatively worst-case scenario for drawdown at Stump Springs using transmissivity equal to 660 gpd/ft and storativity equal to 0.0014. **WATER SUPPLY Figure 20** shows a relatively best-case scenario for Stump Springs using transmissivity equal to 660 gpd/ft and storativity equal to 0.064. If the intervening Pahrump-Stewart Valley Fault zone acts a low permeability barrier then drawdown from project pumping would be limited on the opposite side of the fault zone where the mesquite and Stump Spring are located. The **Biological Resources** section of this **FSA** concludes that any measurable drawdown at Stump Springs or Mesquite Vegetation stands would be a significant impact. Accordingly, staff noted the wide range in estimated drawdown calculated by the variability in aquifer

parameter values. Given the significant variability and limited data available to characterize aquifer parameters, staff believes it is necessary to consider the uncertainty in aquifer conditions and evaluate the range in potential impacts that may occur at Stump Springs.

Stump Springs and the region sub-parallel to and adjacent to the Pahrump-Stewart Valley Fault Zone support approximately 1,915 acres of mesquite and associated habitat. Any incremental decline in water levels in this region could result in adverse impacts to groundwater dependent vegetation. Staff therefore proposes Condition of Certification **WATER SUPPLY-4**, which would require the applicant to monitor groundwater levels on and near the site and evaluate whether project pumping would result in measurable drawdown beneath offsite biological receptor areas. Using generally accepted methods, the monitoring data would be used to project potential drawdown beneath the biological receptor area locations. **WATER SUPPLY- 4** specifies a projected decline of 0.5 foot at the project boundary as a trigger for a potential impact. This trigger was chosen based on the close proximity of mesquite on the eastern project boundary and the ability to detect a statistically significant change in water levels that can be attributed to project pumping. Using 0.5 foot as a trigger staff anticipates this would correspond to some small decline in water level at the mesquite locations. This condition would support Condition of Certification **BIO-23** which would require the applicant to stop, modify, or reduce groundwater pumping until the applicant can show 1) the pumping can be reduced or modified to maintain groundwater levels above the 0.5 ft. drawdown threshold at the project boundary; 2) the drawdown trigger was exceeded due to factors other than the project pumping and the project did not contribute to the drawdown; or 3) through vegetation monitoring and soil coring described in this condition and predictive hydrologic trend analysis described in **WATER SUPPLY-4**, that a greater groundwater drawdown will not result in significant adverse impacts to the groundwater dependent vegetation.

Amargosa River

The Amargosa River is 185 miles long and begins in Nye County, Nevada and flows south through Tecopa, California before bending northwards and eventually terminating in Death Valley (**WATER SUPPLY Figure 1**). The Amargosa River is a federally designated Wild and Scenic river and is also designated as an Area of Critical Environmental Concern (ACEC). A portion of the river west of the site is shown on **WATER SUPPLY Figure 2.** The river is thought to get most of its water from base flow (groundwater rising to the surface) rather than from surface drainage (Stonestrom et al., 2007). Recent models of the Death Valley regional flow system suggest that the Amargosa River may receive its water from the regional groundwater (carbonate aquifer) system which spans multiple water sheds (Belcher et al., 2004). The degree of connectivity between the regional or carbonate aquifer system and intervening valley basin fill aquifers such as the PVGB is poorly understood.

The proposed project consumes groundwater and therefore reduces groundwater flow that would otherwise move down-gradient of the site. There is no available data that identifies groundwater flow paths or confirms a hydraulic connection between PVGB and the Amargosa River, so the water consumed by project pumping may or may not be a source of inflow to the Amargosa River. The inferred potentiometric surface (**WATER SUPPLY Figure 4**) indicates PVGB groundwater in the alluvial aquifer moves in a

southwesterly flow direction, but data is not sufficient to confirm that these flows discharge to the Amargosa River. It is more likely that the contributing flow, if any from this portion of the basin, occurs in the deeper regional aquifer system which is recharged up-gradient from the site. A letter submitted to the Energy Commission from the Amargosa Conservancy described a geochemical data analysis that concluded groundwater flow from the PVGB and through the Chicago Valley into the Amargosa River is limited (ARM 2011a).

Given the lack of evidence for a hydraulic connection, the relatively large intervening distance (about 20 miles), and uncertainty in potential flow barriers and permeability contrasts within the subsurface it would be speculative to conclude that project, pumping would adversely affect the Amargosa River. However, the principle of conservation of mass dictates that any groundwater consumed by the project is water that would otherwise accrue to down-gradient basins, which could possibly include discharge to the Amargosa River. Staff is not able to determine if there is a measurable change at the river because there is inadequate information available to quantify the hydraulic connection between the basin and river.

Staff understands that the BLM, as well as other agencies and interested parties considers any drawdown at the river a significant impact because of the river's Wild and Scenic designation. However, the potential for an impact relies on the river being hydraulically connected to the project pumping well and that aquifer water-transmitting and storage properties are constant and continuous down gradient of the project site. It ignores the potentially complex interaction between groundwater in the alluvium, groundwater in the deeper regional aquifer, and their combined influence on discharge to the river. Furthermore, project induced drawdown at the river is unlikely given the known heterogeneity in hydrogeologic conditions and potentially complex flow patterns between alluvial aquifers, the deeper carbonate aquifer, and the river and other discharge locations. Staff therefore concludes that a significant impact at the Amargosa River due to project pumping is unlikely. However, **WATER SUPPLY-1** which requires an offset of project water use in the PVGB would ensure there is likely no net overall change in subsurface outflow from the PVGB that might affect the Amargosa River.

Drawdown Impacts at Existing Wells (Well Interference)

All operating wells within a groundwater basin contribute to a lowering of water levels at other well locations. The overlap of drawdown among two or more wells is the "well interference," and is significant if it results in a loss of yield or exposes the well screen. The magnitude of drawdown impact is controlled by five factors: (1) the rate of pumping; (2) the duration of pumping; (3) the depth of the well screens (water-intake depth of well); (4) aquifer parameters (hydraulic conductivity and storativity, which are determined by the aquifer materials); and, (5) aquifer boundary conditions. A loss of yield is appreciable if the interference renders an existing nearby well incapable of meeting 1) maximum daily demand, 2) dry-season demand, or 3) annual demand.

Based on the estimates of the impact at Stump Springs, the neighboring well owners could experience water level declines between 1 and 50 feet after 33 years of project pumping (See **WATER SUPPLY Figure 19** and **20**).

Staff considered two additional impact scenarios that tested potential effects of the Pahrump-Stewart Valley Fault Zone acting as a barrier to groundwater flow. Because the proposed project is located near the fault zone, staff approximated its effect on drawdown beneath areas to the southwest by doubling the simulated pumping rate. This approach mimics the effect of all proposed project groundwater use extracted from approximately one-half of the aquifer located southwest of the fault. Staff considered the scenarios shown in **WATER SUPPLY Figure 19** and **WATER SUPPLY Figure 20** assuming the fault is an impermeable barrier (the maximum and minimum drawdowns, respectively). The estimated drawdown in the Charleston View Community for these conditions ranged from 77 to 13 feet, respectively.

Increased Cost of Pumping

If the total hydraulic head in neighboring domestic wells is lowered, then well yield would be reduced and an increase in pumping cost is expected. Pumping costs can be estimated with the following equation (3).

$C = 0.746Qhc / 3960e_pe_m$ (Equation 3)

Where

C = total cost per hour
Q = pump rate (gpm)
h = total head (ft)
c = cost per kWh
e_p= pump efficiency
e_m = motor efficiency

Staff estimated potential increases in pump cost incurred by an owner experiencing a 10-foot decline in water levels using a pump (e_p) and motor (e_m) efficiency of 80-percent (0.80) and a cost for energy equal to $0.16 per kWh. Using these values, pumping costs could increase by about 15 percent. Staff believes that the decrease in well yield that would result in a 15 percent increase in pumping costs is a significant impact. Staff proposes Condition of Certification **WATER SUPPLY-4** which would require the monitoring of local domestic wells to determine if project-induced water level decline is observed at the southern end of the project boundary. Staff also proposes Condition of Certification **WATER SUPPLY-5** which provides a method for calculating the reimbursement necessary to offset costs from decreased well yield. This condition utilizes an equation similar to Equation 3 above, but applied to a particular well under its own set of unique circumstances.

Physical Damage

Exposure of neighboring well screens represents the potential for physical damage to a well. A reasonable threshold of significance is if the project causes the static water level (the water level when the pump is off) at wells to fall below the top of their well screens. The shallowest well screen in the basin is not used to define the threshold because it constrains groundwater use by all other existing users. In contrast, the deepest well is also not used because many existing users can be significantly impacted before reaching the top of the deepest well screen. Additionally, in practice some wells may

have static water levels that are already below the top of the screen and a relatively small amount of additional drawdown would be of little consequence because the risk of screen collapse due to corrosion is already present. At other wells, pumping water levels (the water level when the pump is on) can be below the top of the screen. Corrosion is not usually a high risk in these situations, and a small increment of additional drawdown would presumably not substantially increase the likelihood for damage to occur. Accordingly, staff utilized the average top-of-screen depth as the threshold indicating potential physical damage to existing wells.

Staff analyzed the potential drawdown effects from project pumping on existing nearby wells. The California Department of Water Resources (DWR) maintains the record of well completion reports for the California portion of the basin only. A search of the records returned 12 wells within a 7-mile radius of the project site (**WATER SUPPLY Table 5**).

WATER SUPPLY Table 5
Wells of Record Southern Pahrump, California

Well Number	Depth to Bottom of well (ft)	Depth of Screened Interval (ft)
1	280	60-280
2	1,106	NA
3	220	160-220
4	200	160-200
5	1,351	NA
6	300	110-300
7	600	180-400, 420-600
8	310	90-110, 150-190, 230-250, 270-310
9	175	140-175
10	212	112-212
11	260	220-260
12	220	160-220

The median depth of the wells is 280 feet, and the median depth to the top of the screen is 150 feet below land surface. Current groundwater levels at the project site are about 130 feet below ground surface. Water level measurements at these wells are in close proximity to the Charleston View community. If water levels are roughly the same as at the site then predicted maximum drawdown of 50 to 77 feet could result in exposure of screens or other physical damage.

Staff proposes Condition of Certification **WATER SUPPLY-4** to monitor and mitigate potential physical damage to neighboring domestic wells beyond baseline conditions.

Subsidence

Ground subsidence can occur as a result of water level decline in aquifer systems. When the fluid pressure in an aquifer is reduced as a result of changes in the

groundwater level, a shift in the balance of support for the overlying materials causes the “skeleton” of the aquifer system to deform. Reversible deformation occurs in all aquifer systems as a result of the cyclical rise and fall of groundwater levels associated with short and longer term climatic cycles. Permanent ground subsidence can occur when pore water pressures in the aquifer fall below their lowest historical point, and the particles in the aquifer skeleton are permanently rearranged and compressed. Soils particularly susceptible to such consolidation and subsidence include compressible clays in a confined aquifer system. This type of deformation is most prevalent when confined alluvial aquifer systems are overdrafted. Subsidence due to overdraft like that occurring in the PVGB can occur and significantly impact the aquifer storage capacity. Differential settlement caused by subsidence can also change drainage patterns and cause ponding and flooding or change runoff directions. It can also damage structures and linear features such as roads and utilities.

The applicant stated in Data Response Set 1A, number 45, that subsidence is not an issue because the maximum projected drawdown at identified structures is about 9 feet. However, staff’s analysis showed that potential drawdown at local structures could be greater than 50 feet. Furthermore, dePolo et al (1999) have mapped fissures in the Pahrump Valley and concluded they are likely related to subsidence from groundwater withdrawals. Applicant aquifer test results confirm semi-confined to confined aquifer conditions and substantial thicknesses of clay beds occur beneath the site, which are both conducive to subsidence.

Given past and current groundwater pumping in the basin, subsidence could be occurring and project pumping could exacerbate subsidence rates and magnitude. It is unclear however, if subsidence is occurring on or near the site and whether any resources or structures could be affected by subsidence. Due to the uncertainty related to conditions at the project site, staff recommends that survey monuments be installed and monitoring stations established for assessment of long term changes that may occur as a result of subsidence due to groundwater pumping in the area. Staff also recommends the applicant be required to develop an action plan for mitigation of impacts based on analysis of monitoring station data. Staff recommends the project owner be required to implement **WATER SUPPLY-6** to monitor and mitigate any potential impacts associated with ground subsidence due to project groundwater pumping.

Water Quality

Water quality can be impacted by sustained pumping of the groundwater basin and migration of low quality or contaminated water towards pumping well screens. The Lahontan Regional Water Quality Control Board also protects local groundwater through the Water Quality Control Plan for the Lahontan Region, also known as the Basin Plan. The Plan establishes water quality objectives that apply to groundwater in the PVGB. Specific objectives include: coliform bacteria, chemical constituents, radioactivity, and taste and odor. Total dissolved solids concentrations (TDS) is an example of a water quality objective in the category “chemical constituent.” It is an indicator of the quality of groundwater and is a measure of acceptance for groundwater use as a drinking water source. In California, the recommended Secondary MCL or ‘Consumer Acceptance Contaminant Level’ for TDS is 500 mg/l, and upper and short term ranges can be 1,000

and 1,500 mg/l, respectively. Water with TDS concentrations greater than 3,000 mg/l is generally considered undrinkable. These water quality objectives are identified to protect the following beneficial uses identified for groundwater in the PVGB: Municipal and Domestic Supply, Agricultural Supply, and Fresh Water Replenishment. Staff reviewed available water quality data to evaluate whether the project's proposed pumping could result in water quality degradation. During the applicant's initial site investigation a water quality sample was taken from the Orchard Well which is located on the proposed site (**WATER SUPPLY Figure 4**). The constituents detected in the water sample are reported in **WATER SUPPLY Table 6** below.

WATER SUPPLY Table 6
Water Quality Constituents, Orchard Well

	Constituent	Units	Concentration
1	Alkalinity, Bicarbonate (CaCO3)	mg/L	134
2	Alkalinity, Carbonate (CaCO3)	mg/L	<20
3	Alkalinity (Total)	mg/L	134
4	Aluminum	mg/L	<0.100
5	Arsenic (Total)	ug/L	<0.030
6	Barium (Total)	ug/L	0.028
7	Beryllium	mg/L	<0.003
8	Bicarbonate	mg/L	134
9	Cadmium	mg/L	<0.003
10	Calcium	mg/L	53
11	Chloride	mg/L	7.4
12	Chromium (Total)	ug/L	<0.005
13	Conductivity	uS/cm	557
14	Copper	mg/L	<0.005
15	Flouride (Total)	mg/L	0.54
16	Hardness (CaCO3)	mg/L	246
17	Iron (Total)	ug/L	<0.10
18	Lead	mg/L	<0.015
19	Magnesium	mg/L	27
20	Manganese	mg/L	<0.005
21	Nitrate/Nitrite	mg/L	7.3
22	pH	log(L/mol)	8.0
23	Silica	mg/L	10
24	Silver	mg/L	<0.010
25	Sodium	mg/L	21
26	Sulfate	mg/L	110
27	Total Dissolved Solids (TDS)	mg/L	361
28	Total Organic Carbon (TOC)	mg/L	<1.0
29	Total Suspended Solids (TSS)	mg/L	<1.0
30	Zinc	mg/L	0.069

Staff notes that the site is partially underlain by playa deposits which can be associated with saline shallow groundwater. In some desert groundwater basins of the southwest an increase in salinity concentrations has been observed with an increase in basin fill

sediment depth. Because the proposed project could draw water from a large radial extent, and there is substantial uncertainty in the water quality distribution and drawdown effects on the quality of water produced by existing wells, staff proposes Condition of Certification **WATER SUPPLY-4** to ensure no impacts to the basin water quality objectives and existing wells. This condition requires that the project semi-annually monitor water quality in on-site extraction wells and project related monitoring wells. The monitoring results would be reported to staff and Inyo County.

Drinking Water

The proposed project would be supplied with potable water during operations from a newly constructed onsite groundwater well. Well water would need to be treated to meet the California Safe Drinking Water Act requirements, including those contained in Title 17 and Title 22 of the California Code of Regulations (CCR).

The HHSEGS is expected to employ 120 full-time employees and 50 to 60 shift workers during operations and many more during construction. Therefore the HHSEGS project would qualify as a Public Supply System by serving more than 25 people for more than 60 days. The facility would also qualify as a non-transient non-community water system, serving at least 25 persons for over 6 months per year.

Senate Bill 1307 passed in 1997 and enabled California to implement the provisions of the federal Safe Drinking Water Act. The California Department of Public Health administers the state's authority. The California Department of Public Health (CDPH) has authority to delegate regulatory authority over public water supplies serving 200 or fewer connections to a local health officer authorized by the board of supervisors. The CDPH delegated authority to the Inyo County Environmental Health Department to serve as the Local Primacy Agency (LPA), therefore the applicant would be required to meet the requirements of the Inyo County Environmental Health Department.

Staff recommends Condition of Certification **WATER SUPPLY-7**, which would require the applicant to obtain a permit to operate a non-transient, non-community water system with the Inyo County Environmental Health Department at least sixty (60) days prior to commencement of construction at the site. This condition would ensure that the applicant meets all provisions of Title 22, Section 3 to provide a suitable domestic water supply.

Staff also recommends Condition of Certification **WATER SUPPLY-3**, which would ensure that water supply wells are constructed or modified in accordance with Inyo County standards and registered with the California Department of Water Resources (DWR). The applicant would submit a well construction packet to the Inyo County Environmental Health Department for review and comment and to staff for review and approval. A Well Completion Report would also be submitted to DWR prior to approval.

Existing Wells

There are a number of wells that are currently present on the project site. These wells have been used for past activities at the site including domestic and agricultural use. Some of these wells were used for monitoring and measurement of aquifer parameters during the February and October 2012 aquifer performance tests. One of the wells

identified as the Orchard Well has an unidentified obstruction at the bottom and another known as Well No.3 currently has a submersible pump stuck at the bottom. During various site explorations other abandoned wells were also identified. The condition of some of these wells is not well known and it is unclear whether they may have been a conduit for contamination. Staff is concerned that these abandoned wells could become or are conduits for contamination of groundwater.

The California Well Standards provide minimum standards that well owners must follow to ensure protection of groundwater quality. The standards state that a well is considered “abandoned” when it has not been used for a period of one year unless the owner demonstrates his intention to use the well again for supplying water. The standards require that all "abandoned" wells and exploration or test holes be destroyed. The objective of destruction is to restore as nearly as possible those subsurface conditions which existed before the well was constructed taking into account also changes, if any, which have occurred since the time of construction. To ensure compliance with the California Well Standards staff recommends the applicant be required to comply with the California Wells Standards as specified in **WATER SUPPLY-3**. Compliance with these requirements would ensure that wells that would not be used for project purposes would be abandoned appropriately. It also provides a means for qualifying wells and maintaining them in a safe condition in the event they may be needed for future purposes. Staff acknowledges it may be beneficial to use some existing wells for monitoring purposes. In these cases the well condition would have to be evaluated and rehabilitated if necessary to ensure protection of water quality.

CUMULATIVE IMPACTS AND MITIGATION

Staff analyzed whether the project pumping along with all other reasonably foreseeable pumping in the Southern PVGB could have a significant impact. Staff found five projects that could require a substantial volume of water for annual operation. **WATER SUPPLY Figure 21** lists the reasonable foreseeable projects that may be developed in the southern PVGB.

WATER SUPPLY Figure 22 shows pumping impacts of two potentially contemporaneous groundwater users in the vicinity of the proposed HHSEGS project – the Hidden Hills Ranch and Sandy Valley projects. Staff’s cumulative analysis assumed that the HHSEGS project pumps 288 AFY for 2 years and 5 months of construction, followed by 30 years of operational pumping of 140 AFY. In addition, it assumed that the Hidden Hills Ranch pumps 211 AFY and that the Sandy Valley project pumps 170 AFY for 33 years. **WATER SUPPLY Figure 22** shows the maximum drawdown (transmissivity of 660 gpd/ft and a storativity of 0.0014) for the combined pumping from these projects.

WATER SUPPLY Figure 22 also shows that the potential cumulative water level decline at both Stump Spring and the private wells located in the Charleston View community could be greater than 60 feet. These results could be conservative with respect to the mesquite and Stump Spring. The results ignore the reportedly low permeability fault zone which could act as a partial barrier between the HHSEGS wells southwest of the fault and the Hidden Hills Ranch and Sandy Valley project wells

northeast of the fault. The fault zone would substantially limit the spread of drawdown from the Hidden Hills Ranch and Sandy Valley project wells to the area southwest of the fault which would limit the cumulative effects on the Charleston View community. Similarly, the spread of drawdown from the HHSEGS wells would be limited northeast of the fault. Staff proposes Conditions of Certification **WATER SUPPLY-4**, and **-5** to mitigate potential impacts from the HHSEGS project to neighboring wells and ensure that groundwater dependent species and habitats are adequately protected from the project's contribution to cumulative impacts.

A drawdown impact from cumulative pumping on the Amargosa River is specualtive. Staff is not able to determine if there is a measurable change at the river because there is inadequate information available to quantify the hydraulic connection between the basin and river. Given the lack of evidence for a hydraulic connection, the relatively large intervening distance (about 20 miles), uncertainty in potential flow barriers, permeability contrasts within the subsurface, and the presence of the fault zone which would isolate pumping effects from the Sandy Valley site, staff concludes that a significant cumulative impact at the Amargosa River due to project pumping is unlikely. However, **WATER SUPPLY-1** which requires an offset of project water use in the PVGB would ensure there is likely no net cumulative overall change in subsurface outflow from the PVGB that might affect the Amargosa River.

COMPLIANCE WITH LORS

The proposed HHSEGS project would comply with all LORS identified by staff if the proposed conditions of certification are implemented. Staff weighs a number of considerations while assessing how well a project's water use complies with LORS and California state policies regarding water use at industrial facilities. A summary of those considered by staff are include below.

SWRCB RESOLUTION 75-58, ENERGY COMMISSION'S 2003 INTEGRATED ENERGY POLICY REPORT, AND THE WARREN-ALQUIST ACT

The California Energy Commission, under legislative mandate specified in the *2003 Integrated Energy Policy Report (IEPR)*, would approve the use of fresh water for cooling purposes by power plants it licenses only where alternative water supply sources and alternative cooling technologies are shown to be environmentally undesirable or economically unsound. SWRCB Resolution 75-78 states that fresh inland waters should only be used for power plant cooling if other sources or other methods of cooling would be environmentally undesirable or economically unsound. . The Warren-Alquist Act promotes all feasible means of water conservation. Each of the proposed power plants include a steam turbine using an air-cooled condenser, which achieves maximum water conservation associated with cooling. Therefore, the proposed project complies with the requirements of SWRCB Resolution 75-78, the Energy Commission's 2003 Integrated Energy Policy Report (IEPR), and the Warren-Alquist Act.

PSA COMMENTS

Comment #	DATE	COMMENT TOPIC	RESPONSE
1	July 17, 2012	Inyo County	
1.4		Water Supply conditions of certification should include the same level of monitoring as outlined in the Air Quality, Biological Resources and Cultural Resources portions of the PSA.	Water supply conditions have been included that require an appropriate level of monitoring that would indicate drawdown impacts and require mitigation.
1.5		The proposed project with trigger reporting requirements mandated by SBX&-6.	Staff is aware of this reporting requirement and has written conditions that allow the county to remain in compliance.
1.67		Revise the first paragraph of WATER SUPPLY-6 to read: The project owner shall submit a Groundwater Level Monitoring, Mitigation, and Reporting Plan to the CPM and to the Inyo County Water Department review and approval.	Change accepted and incorporated in document. Specifically to the County for review and to the CPM for approval.
1.68		Revise WATER SUPPLY-6, A.1, add the following: shall identify the owner of each well, and shall include the location, depth, screened interval, pump depth, static water level, pumping water level, and capacity of each well, The plan should include, as feasible, agreements from the owner of each well approving monitoring activities.	Change accepted and incorporated in document.

1.69		1. add: and to the Inyo County Water Department 2. add: The plan shall include a model for predicting changes in the groundwater flow system resulting from the Project which has the capability to assess changes in hydraulic head, flow rate, flow direction, and water budget and shall include model runs which predict effects of the planned groundwater pumping by the Project on GDEs and predictions of the level of groundwater pumping that will cause significant impacts on such habitats and resources. The Project Owner shall also use the model to provide an evaluation of the sustainability of the water supply for the life of the project, including the cumulative sustainability when considered with other pumping occurring or projected to occur in the groundwater basin. 3. delete: This condition proposes a threshold for significant impacts to groundwater-dependent vegetation caused by water level decline due to Project groundwater pumping. This condition also proposes mitigation that would, if initiated, reduce the impact to a level that is less than significant. 4. add: The plan shall also include: i. Provisions for initiation of water level monitoring as soon as wells are available and results will be publicly available: ii. A plan for logging and aquifer testing of all new production wells; iii. A plan for verifying the predictive tools described above and for revising or recalibrating the tools as necessary. iv. A plan for revising thresholds as dictated by new data concerning system response to Project operation, v. In cooperation with U.S. BLM and if permission is granted by BLM. the applicant shall fund and construct a monitoring well approximately 0.5 mile west of the Stump Spring ACEC for inclusion in the monitoring well network. vi. An enforceable commitment based on monitoring data and significance thresholds, to implement mitigation measures as necessary.	1. add: Change accepted and incorporated in document. 2. add: Additional modeling is not necessary to make this condition enforceable. 3. delete: Staff retains this part of the condition, which is necessary to mitigate any drawdown impacts to vegetation. 4. add: i. Commission staff will make this data available to the public. ii. Staff has required well logging in accordance with DWR requirements and developed a monitoring and mitigation framework that will allow for aquifer analysis during construction and operation pumping. iii. A procedure for recalibration of the drawdown threshold is now written into this condition. iv. same as iii. v. Staff believes the monitoring well arrays proposed in WATER SUPPLY-4 will be sufficient for evaluating potential impacts in mesquite areas that are closer than Stump Spring and would therefore be an earlier indicator of a potential impact. In addition to this array staff has also proposed a new monitoring well just west of Stump Spring that can be used to evaluate whether there is a barrier such as fault which is affecting drawdown from project pumping. vi. The condition would be enforceable as it is written.

1.70		Revise WATER SUPPLY-6,C.4 and WATER SUPPLY 8,C.5, add: Groundwater elevations shall be measured throughout the life of the project at least twice per year, and reported to the CPM and to the Inyo County Water Department. The County will report these data to the California Department of Water Resources as part of the California Groundwater Elevation Monitoring Program.	Change accepted and incorporated in document.
1.71		Revise the Verification section of WATER SUPPLY-8 in each instance where a report or information is to be submitted to the CPM to read: ". to the CPM and to the Inyo County Water Department.	Change accepted and incorporated in document.
1.83		Preliminary assessment of the project indicates that the project could exacerbate overdraft conditions, contribute to water level decline for groundwater dependent vegetation, and substantially lower water levels in neighboring domestic wells. Compliance could be met based on the addition of the County's Conditions of Certification.	Comment noted. Many proposed conditions have been accepted, as indicated in the above responses.
1.84		Pump tests performed for the project were subject to irregularities in execution, and were discontinued prematurely, and the results were inconclusive. Despite these issues, preliminary assessment of the project indicates that the project could exacerbate overdraft conditions, contribute to water level decline for groundwater dependent vegetation, and substantially lower water levels in neighboring domestic wells. Compliance could be met based on the addition of the County's Conditions of Certification.	Comment noted. See responses above.

1.11		To fulfill the requirements of the legislation, DWR initiated the California Statewide Groundwater Elevation Monitoring Program (CASGEM). Participation in CASGEM by local entities is voluntary; however, if no eligible local party volunteers to become the designated monitoring entity, DWR may undertake the groundwater elevation monitoring. If DWR assumes responsibility for the groundwater monitoring, nonparticipating eligible monitoring entities may lose eligibility for water grants and loans awarded or administered by the state. Naturally, Inyo County is concerned about the potential for losing eligibility for these grant funds, and wishes to comply with the requirements of CASGEM. No funding was provided in the legislation for local entities to implement this new state prograrn.	The revised conditions would ensure that the project owner shares their groundwater elevation data with the county.
1.12		Approval of HHSEGS will invalidate any argument by Inyo County that the California portion of Pahrump Valley, California Valley, and Middle Amargosa Valley are unaffected by land use activities; therefore, the County will be required to either develop a program for reporting groundwater elevations to DWR, or be ineligible for state water grants and loans. In order to comply with CASGEM requirements, the County could use the groundwater elevation monitoring data proposed in condition of certification Water Supply - 6 and Water Supply - 8 if those data are made available to the County.	The revised conditions would ensure that the project owner shares their groundwater elevation data with the county.

Comment #	DATE	COMMENT TOPIC	RESPONSE
2	July 16, 2012	Bureau of Land Management	
2.5		The applicant has performed an on-site well pump test, which lasted 4.5 days. We fully support the PSA's pump test review (Appendix A), which questions the assumptions, procedures, and conclusions of the applicant's pump test report. We recommend that another pump test be performed, lasting at least one week. This new pump test, combined with curve fitting for determination of the rate of drawdown stabilization at the monitoring wells, would better determine whether there is a direct link between the alluvial aquifer and the underlying carbonate aquifer. This information would help estimate the degree to which pumping may affect water resources to the east and west of the project, as well as the timing of such impacts. To get the best estimation of key subsurface parameters and impacts, it would be important for at least two of the monitoring wells to penetrate the carbonate aquifer. As shown in Figure 4 of Section 4.15 in the PSA, there are locations close to the project area where the carbonate aquifer is at or near ground surface.	Figure 4 is a very small scale cross section. This figure was not intended to show the depth of the carbonate aquifer at the project site but rather a generalized characterization of the PVGB. The applicant has completed a second aquifer test (October 2012) submitted as Data Response 2A-4. None of the monitoring wells penetrated the carbonate aquifer. Staff believes the depth to the carbonate aquifer (> 1,000 feet bgs) at the site is likely much greater than the target depth for project pumping (300 to 350 bgs). It is unknown where the carbonate aquifer would be encountered in the vicinity of the site. Staff believes the monitoring network proposed in WATER SUPPLY-4 is appropriate for monitoring potential impacts given the current knowledge of the groundwater system in the PVGB.

2.6		The lack of any physical logs for any onsite or nearby wells impedes the ability to draw clear conclusions as to aquifer parameters and the impact of pumping on the aquifer. If well logs are available, the applicant should utilize them to validate its conclusions regarding the impact of pumping on groundwater. At least some of the monitoring wells should be screened in the same stratigraphic interval as the pumping well. Actual physical data from well logs rather than assumed values for aquifer parameters is critical for analyzing pump test results, and for using these results to construct a conceptual model of local and regional groundwater flow and the impacts of the HHSEGS project on this flow. If any of the above data reveal that the initial pump test conclusions were incorrect, the water supply and mitigation plans may need to be revised.	The applicant did not clearly define their conceptual model of the aquifer and did not validate their conclusions about impacts with any conceptual model of the area. Staff therefore employed a range in aquifer parameter values to consider uncertainty in projected impacts and considered these results in developing the proposed conditions of certification and appropriate mitigation.
2.7		The BLM supports implementation of condition of certification WATER SUPPLY-1, which would require the applicant to replace all extracted groundwater. This is similar to a mitigation measure being developed by California BLM in discussion with the developer of the Desert Harvest solar project in the Chuckwalla Valley, as well as future developers in that basin. Unlike the Desert Harvest mitigation, however, the PSA recommendation is to require BrightSource to simply replace the extracted water at some point during the 3D-year life of the project. At least some of this replacement should be required to occur early in the life of the project. Reinforcing this need is the existence of large ground cracks approximately 4 miles north of the HHSEGS site, which appear to be subsidence cracks caused by groundwater extraction in the area (see attached Figure 2); these features suggest that the basin is already experiencing an irreparable loss of storativity by diminishing local groundwater aquifers.	WATER SUPPLY-1 was revised to address this comment.

2.8		Specifically, the BLM suggests two additional wells directly up-gradient from Power Block 1 and two additional wells directly up-gradient from Power Block 2 to supplement CEC-identified BLM Mesquite Bosque Wells 1 and 2, respectively. These wells should be placed at regular intervals 0.5 to 1.5 miles from the project boundary. One additional well should be installed east of the Stump Springs ACEC so as to help differentiate any drawdown east of the ACEC, for example drawdown extending from the proposed BrightSource Sandy Valley SEGS project, from drawdown emanating from the HHSEGS site. If any drawdown is measured over time at the Mesquite Bosque Wells, monitoring wells placed in the configuration described above should provide adequate information to determine whether this drawdown is originating from the project site or is due to other factors identified above.	Wells in Nevada up-gradient of the site appear to have much less consistent water level trends. For this reason staff modified WATER SUPPLY-8 (now WATER SUPPLY-4) to rely solely on the onsite wells to project water level declines up-gradient to the site. This is a conservative and defensible approach to project off-site drawdown and identify if thresholds have been reached.
2.9		Condition of certification WATER-SUPPLY-8 recommends only one well to the west of the project, between 2 and 3 miles from the project boundary; this well would be on the far side of an inferred fault (Figure 13 of the PSA), which may delay drawdown at that well. The BLM recommends four additional wells; like the wells recommended above, these would be placed at regular intervals up to two miles west of the project boundary.	The Condition (now WATER SUPPLY-4) now requires one well (Offsite California Monitoring Well between 0.5 and 1.0 miles from the southwest corner of the site, located between a bearing of southwest (225°) and west (270°). An alternative location can be approved by the CPM. Staff does not believe the four additional monitoring wells proposed by BLM are necessary. The analysis provided by staff shows that potential impacts to the Amargosa River are unlikely. Additionally, WATER SUPPLY-1 would require an offset of project water use in the PVGB and ensures there is likely no net overall change in subsurface outflow that might affect down gradient discharge features. Therefore, additional monitoring wells were not considered necessary by staff.

2.10		First, we recommend that drawdown triggers also be determined for other wells closer to the project, the locations of which are discussed above. These trigger depths would be graduated based on the expected drawdown at these wells that would correlate to an 0.5-foot drawdown at the Mesquite Bosque Wells, based on results of the additional pump test and curve fitting procedure discussed above.	Staff modified the condition to address this issue.
2.11		Second, we recommend that pumping be immediately curtailed or ceased if any of these drawdown triggers are crossed, regardless of whether impacts appear in the vegetation. By the time vegetation is noticeably affected, it may be too late for pumping curtailment to save these bosques.	Staff modified the condition to address this issue, such that it dovetails with condition BIO-23 to protect vegetation.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
4	**July 21, 2012**	**The Nature Conservancy**	
4.1		The Nature Conservancy believes there is justification for considering water use by this facility as essentially permanent; as a result, we recommend analyzing the effects of project pumping over a much longer period.	The AFC states the HHSEGS project would be designed for an operating life of 33 years. In addition, staff also proposes in WATER SUPPLY -1 that the applicant be required to offset project water use for the life of project operation regardless of the 33 year impacts analysis. Staff believes this term of analysis is adequate for CEQA and the stated purpose of the project.
4.2		This analysis of longer-term impacts is critical and justified because adverse effects from groundwater withdrawal can take a very long time to propagate through to distant springs and water dependent resources, even following the cessation of pumping. By the time effects are noticed through monitoring, it is often far too late to restore the health of these resources.	The revised staff analysis considered delayed drawdown by calculating impacts almost 50 years past the planned end of the project and estimate the maximum drawdown impact.

4.3		We believe that the intended design of the network should be extended to areas or resources that may be influenced by project pumping well beyond the project period and for a minimum of 100 years, given that operations at the HHSEGS facilities are almost certain to continue well beyond the first licensing period. It is simply unrealistic to expect that renewal of the plant's operating franchise would be withdrawn three decades hence, even if severe groundwater problems were encountered.	The revised staff analysis considered delayed drawdown by calculating impacts almost 50 years past the planned end of the project and estimate the maximum drawdown impact. See answer to 4.1, above.
4.4		However, we recommend that additional wells be required, that well locations be more clearly specified in the final staff assessment, that all drilling logs and other data on well construction, testing, and performance be made public.	The eleven proposed monitoring wells would adequately characterize and protect against impacts from the project. Staff has further specified the location of the well west of the project to address this comment. Drilling logs would be available along with testing data as part of compliance submittals.
4.5		We also recommend that applicant conduct at least one additional reasonable length pump test to supplement the results of the initial truncated test, using newly drilled production and monitoring wells.	The applicant conducted another pump test. New data provided by the pump test did not change staff's characterization of impacts.
4.6		Conducting at least one well-designed aquifer performance test after installation of one or more planned production wells and several associated monitoring wells-prior to the commencement of construction and permanent installation of the rest of the wells--would provide the applicant and the CEC with valuable data about how to site other wells and whether the initial assumptions about the aquifer configuration and the absence of off-site drawdown were correct.	See answer to Question 1.69.

4.7		Further, The Nature Conservancy recommends that the CEC require a total of three offsite monitoring wells (i.e. adding 2 wells) to the southwest of the HHSEGS site to detect possible effects on the Amargosa River and its protected resources.	See answer to 2.9, above.
4.8		Additionally, because of the intense public interest in groundwater issues, WS-9 should provide that all of the monitoring wells should include continuous data logging and recording devices and that the raw data and all reports be promptly placed on a public CEC website.	Staff would review and approve a monitoring plan in accordance with WATER SUPPLY-4, which would include specifications for appropriate data logging devices in each well. Data and reports submitted in accordance with WATER SUPPLY-4 would be public information and would be made available upon request.
4.9		We recommend that WS-1 be interpreted to require actual, steady, contemporaneous reductions in PVGB pumping equivalent to the pumping by HHSEGS, we also strongly recommend replacement of groundwater use at a ratio of greater than 1:1	WATER SUPPLY-1 was revised to more explicitly require actual contemporaneous reductions in water use. Offsets pursuant to CEQA must be proportionate to the project's impact. Here, if the offset is real and verified, the offset will be proportionate to the impact.
4.10		We also encourage the CEC to provide more clarity around how the PSA compensatory mitigation obligation would work in practice. The PSA appears to allow the applicant to acquire either an annual 167 acre feet/year or a gross quantity of water rights (4,900 acre feet) with no specified time period for the acquisition.	WATER SUPPLY-1 was revised to require mitigation for the life of the project.
4.11		Moreover, the mitigation obligation is framed as "one or more activities," which would apparently not compel the applicant to actually acquire and retire active, senior water rights in the PVG Basin.	The condition requires commission staff approve a water offset plan, but the offset can be achieved by means other than retirement of water rights, such as verified execution of water conservation measures.

4.12		However, we object to the specific trigger conditions proposed in PSA's biological resources (BIO-23 and 24) and water supply (WS-8) sections as Conditions for Certification, because these Conditions will not adequately protect groundwater dependent ecological resources before they are likely to experience significant harm.	Staff revised these conditions to require the applicant to modify or stop pumping until they can prove their pumping doesn't have an adverse impact to the water-dependent vegetation starting near the state line.
4.13		We recommend that the CEC establish clearer and more effective trigger conditions. Given that we lack understanding of the local and regional hydrology and an accompanying detailed groundwater flow model that could be used to predict and avoid adverse impacts, the only reasonable alternative is to set very conservative trigger conditions. We recommend that Applicant cease groundwater pumping when specified, measurable water level declines are detected in offsite groundwater	Staff revised these conditions to require the applicant to modify or stop pumping until they can show their pumping doesn't have an adverse impact on the water-dependent vegetation adjacent to and east of the site boundary.
4.13a		We thus advocate permit conditions requiring, once offsite water levels decline or any decline in vegetation health is detected, that the applicant demonstrate that those effects are not the result of their pumping.	See answer to 4.13, above.
4.14		We recommend that at least three monitoring wells be required between the project site and the Nopah Range, adequate to determine both water levels in, and effects of pumping on, the alluvial aquifer, as well as whether the alluvial aquifer and deeper carbonate aquifer are in communication. We also recommend that CEC specify mitigation requirements, including pumping cessation or reduction in the event that specified water level declines (greater than one foot) are noted in any of the monitoring wells or other adverse effects are detected.	Staff believes the location of one well in this area is adequate for measuring baseline and background conditions for the monitoring program outlined in WATER SUPPLY-4. Mitigation would be required if water level declines are detected in monitoring wells located much closer to the project pumping wells than the proposed well between the project and Nopah Range and are therefore likely more sensitive to project groundwater use. Additionally, WATER SUPPLY-1 would require an offset of project water use in the PVGB and ensures there is likely no net overall change in subsurface outflow that might affect down gradient discharge features.

4.15		The CEC should ensure that the river, its spring tributaries, and ecological resources are adequately protected by conservative conditions on project groundwater use to avoid adverse effects before they occur. This will require a well- designed monitoring network, development and use of a predictive groundwater model, and adaptive trigger conditions.	Condition WATER SUPPLY-1 requires that 100% of project pumping is offset; therefore basin outflow would likely not change.
4.16		In general, there is a scarcity of data related to the hydrology of the southern Pahrump Valley, California Valley, Chicago Valley and the Amargosa River. Also poorly understood are the groundwater interconnections between these aforementioned areas. Data supplied by the applicant has not increased the base of knowledge.	This uncertainty is acknowledged and discussed in the FSA. Staff's analysis notes the uncertainty in the hydraulic connections and fate of subsurface outflow from the PVGB. Condition WATER SUPPLY-1 would require that 100% of project pumping be offset and therefore basin outflow would likely not change.
4.19		Assuming a travel distance of 20 miles, a hydraulic conductivity (K) value of 1 foot per day (ft/d), a porosity of 0.2 and a gradient based on the difference in groundwater elevation between the site and the river, the calculated groundwater travel time was over 3,000 years. Increasing K to 15 ft/d reduced the travel time to 214 years. These calculations do not reflect the potential for the actual groundwater flow path between the HHSEGS site and the Amargosa River (assuming it exists) to significantly reduce those travel times.	This assumed flow path and travel time relies on the river being hydraulically connected to the project pumping well, which cannot be verified. There are also potentially complex interactions between groundwater in the alluvial-aquifer from which the proposed wells would extract groundwater and the deeper regional aquifer. These hydraulic interactions can result in complex flow patterns between aquifers, the river and other discharge locations. Furthermore, the intervening distance between pumping wells and river is substantial (about 20 miles), and there is uncertainty regarding potential subsurface flow barriers and permeability contrasts that would significantly limit hydraulic communication with the river. We therefore removed the travel time analysis.
4.20		More critically, the travel time for a particle of water to reach the Amargosa River from Pahrump Valley has little relationship to hydraulic effects, which can be transmitted nearly instantaneously over long distances within a confined aquifer. The result is that an estimate of travel time from Pahrump Valley is not a conservative assessment of potential effects to the Amargosa River.	See answer to 4.19 above.

Comment #	DATE	COMMENT TOPIC	RESPONSE
2	July 16, 2012	Bureau of Land Management	
5.1		Although the PSA water supply analysis acknowledges that HHSEGS pumping might affect the Amargosa, it discounts that effect based on calculations of the length of time that the pumping effects might take to affect the river— using the same inadequate body of data discussed above. The attached analysis commissioned by the Nature Conservancy by Johnson Wright, Inc., hydrogeological consultants, posits other likely routes by which the HHSEGS pumping might well affect the river much more quickly and directly than the PSA analysis estimates. We believe that it is incumbent on the Applicant and the CEC to rule out these effects and to require mitigation (e.g., pumping cessation) if effects are predicted by water level declines in appropriately sited monitoring wells.	This assumed flow path and travel time relies on the river being hydraulically connected to the project pumping well, which cannot be verified. There are also potentially complex interactions between groundwater in the alluvial-aquifer from which the proposed wells would extract groundwater and the deeper regional aquifer. These hydraulic interactions can result in complex flow patterns between aquifers, the river and other discharge locations. Furthermore, the intervening distance between pumping wells and river is substantial (about 20 miles), and there is uncertainty regarding potential subsurface flow barriers and permeability contrasts that would significantly limit hydraulic communication with the river. We therefore removed the travel time analysis. WATER SUPPLY-1 requires an offset of project water use in the PVGB and ensures there is likely no net overall change in subsurface outflow from the PVGB that might affect down gradient discharge features.

5.2		The PSA proposes that Applicant install a single monitoring well between the project and California Valley, but would propose no mitigation conditions in the event that water level declines are detected. This is clearly inadequate. We suggest that at least three monitoring wells be located west of the project site, completed in the alluvial aquifer in the producing horizon from which the project will be pumping water. Moreover, to establish whether the HHSEGS pumping will affect the carbonate aquifer, at least one well should have a dual completion in the alluvial and carbonate aquifers. (We note that the BLM's recent comments on the PSA support installing monitoring wells penetrating the carbonate aquifer.) If future water level declines in these wells predict effects on the Wild and Scenic Amargosa River, pumping should cease or be curtailed; however, the Applicant should first be given a reasonable opportunity to demonstrate that the water level changes are not due to its operations.	Staff believes the location of one well in this area would be adequate for measuring baseline and background conditions for the monitoring program outlined in WATER SUPPLY-4. Mitigation would be required if water level declines are detected in monitoring wells located much closer to the project pumping wells than the proposed well between the project and California Valley and are therefore likely more sensitive to project groundwater use. Additionally, WATER SUPPLY-1 requires an offset of project water use in the PVGB and ensures there is likely no net overall change in subsurface outflow that might affect down gradient discharge features.

5.2a		With regard to the groundwater dependent resources, in an attempt to protect groundwater dependent resources, the PSA water supply and biological resources conditions would require mitigation in the form of a temporary pumping cessation; however, before groundwater pumping is modified or discontinued over the long-term, the PSA requires the CEC to meet the burden of satisfying three difficult conditions: a water level decline of .5 foot, that the health of water dependent vegetation had declined by 20%, and that these effects were not due to actions or conditions beyond the control of the Applicant. This is nearly an impossible burden, and enforcement would be extraordinarily expensive, difficult, and protracted even in the face of clear adverse changes. Moreover, by first requiring a demonstrable decline in the health of vegetation, remediation would very likely be too late to avert permanent harm to the target resources. The Conservancy believes that declines in the water level in off-site monitoring wells sited to detect impending effects on key resources alone is a sufficient trigger for mitigation requirements, both for the groundwater dependent resources and the Amargosa River. In addition, vegetation effects should be included as a triggering condition as an independent basis for pumping reduction.	Staff significantly revised the water level monitoring approach and use of the trigger in WATER SUPPLY-4, which would require the applicant to modify or stop pumping until they can show their pumping doesn't have an adverse impact to the water-dependent vegetation east of the project boundary. See also the Biological Resources section and BIO-23 and -24 for further discussion of impact monitoring and mitigation.
5.3		In our view if a clear and easily enforceable groundwater level trigger is reached, the Applicant should have the burden of proof to establish that their operations are not the cause of the decline and, if the Applicant cannot meet this burden within a reasonable period time, groundwater pumping should cease.	Staff significantly revised the water level monitoring approach and use of the trigger in WATER SUPPLY-4, which would require the applicant to modify or stop pumping until they can show their pumping doesn't have an adverse impact to the water-dependent vegetation east of the project boundary. See also the Biological Resources section and BIO-23 and -24 for further discussion of impact monitoring and mitigation.

5.4		Both the PSA and the Applicant propose compensatory mitigation for groundwater pumping by employing some (largely undefined) method to offset project water use on a 1:1 ratio. The Amargosa Conservancy supports such compensatory mitigation, but believes that the nature of the obligation as proposed in the PSA and by the Applicant poses significant issues and requires clarification and improvement. The offset obligation, if framed to require reduction of Pahrump Valley basin water use, should be limited to permanent retirement of active senior water rights with a long and documented history of steady use, located closest to the project site, approved by Nye County and the Nevada State Engineer—and in multiples of the proposed project use. Multiple retirements are necessary for compensation because of the fact that the Pahrump basin is grossly over allocated, so retirement of even senior active rights may well have no positive effect on reducing basin water use, even in the short run. Also, because offsetting rights may likely be available only in the distant northern section of the Pahrump Basin in Nevada, effective mitigation for impacts of project water use on nearby resources also justifies a higher ratio. Accordingly, we suggest at least a 4:1 permanent retirement ratio.	WATER SUPPLY-1 was revised to more explicitly require actual contemporaneous reductions in water use. The goal of the offset requirement is that Pahrump Valley underflow discharge remain the same. CEQA provides for mitigation that is proportionate to the impact of a project. Thus, this project cannot be used to mitigate overdraft conditions caused by other users.
5.7		We believe that the CEC is required to take a much more serious look at the potential, long term effects of all of the existing and allocated water rights in the Pahrump Valley basin and of the potential cumulative impacts of groundwater pumping by the project in combination with groundwater pumping by other reasonably foreseeable projects on the Amargosa River and on other groundwater dependent resources. While the PSA has included a short list of current and future projects, the list is not complete, and does not include other forms of water pumping and use (e.g., agricultural pumping).	Staff has considered the over allocation of water rights in Nevada and understands that if all existing rights were utilized there would likely be significantly greater overdraft impacts in the PVGB than currently exist. Staff or the State of California do not control the administration of water rights in Nevada or project development that may occur in Nevada. Under CEQA, it is not reasonable to require an offset greater than 1:1 where true water use can be replaced and full mitigation is achieved for the proposed project. Staff has updated the list of reasonably foreseeable projects that could pump a significant volume of groundwater and considered this in the analysis.

Comment #	DATE	COMMENT TOPIC	RESPONSE
6	July 23, 2012	**Basin and Range Watch**	
6.38		The Energy Commission hydrologist said the applicant needed to reach out much farther in their analysis, and we agree. A gradient in a confined system is not a source of recharge. CEC wanted the applicant to have 3 monitoring wells outside the project in a line with the proposed project wells, all at 1,000 feet deep, and we recommend this as well. Two upstream from the project and one downstream. Triggers should be required as new mitigation, such as sending out biologists to monitor how the deep-rooted mesquite at Stump Springs react, and if they appear to be adversely affected. CEC said if they see a half foot drop in water at the project boundary, then the assumption could be made that pumping might be affecting Stump Springs.	Staff agrees with much of this comment, including triggers based on water drawdown and vegetation monitoring. In WATER SUPPLY-4 staff has revised the required depths for monitoring wells to be equivalent to the depths of production wells.
6.39		We agree with the CEC that groundwater pumping by the project would need mitigation. Mitigation Measures Water Supply 1, 6, 7, and 8 to offset impacts to overdraft in the basin and potential impacts to local well owners and nearby springs are needed.	Comment noted. The FSA addresses these issues.
6.40		We also recommend, in contrast with CEC, that there might be potential impacts to the Amargosa River drainage from unstudied connections with the Pahrump Valley aquifer; mitigation measures should be enacted.	See answer to 5.2 above.
6.41		A Water Supply Plan showing how the applicant will replace 163 AFY per year as a condition of certification in Water Supply-1 should be completed before approval and certification of the project so that the public can review this important plan. How do we know there are even enough private wells and water rights to purchase and retire?	A water rights purchase is one way to mitigate the proposed water use in the PVGB, but there are likely other approaches as well. The details of the offset plan would be provided after certification but prior to construction. Construction would not proceed until a viable offset plan is approved.

6.42		Similarly, a Groundwater Level Monitoring, Mitigation, and Reporting Plan (Water Supply-6) should be prepared now, before certification, so that the public -- and especially local residents -- can review the plan. There is a lot of deferred mitigation in this review. If project pumping lowers residents' well levels by 1.5 feet then the applicant should reimburse the well owners. We believe ten feet lowering is too much and damage may already be done to resident's ability to have a reliable water supply.	Staff has identified an adequate number of wells, locations, and depths to implement the monitoring and mitigation required in WATER SUPPLY-4 and -5. Staff requires complete details of the monitoring plan prior to project construction. In the FSA staff used 10 feet of drawdown and estimated there could be a 15 percent increase in pumping costs, which would be significant.
6.43		They want more monitoring wells farther out, towards California where unknown and potential connections with Amargosa Valley could be present. We support this recommendation, as more needs to be studied about the complex hydrology of the region before more drawdown is allowed. A regional groundwater map should be made, and more well testing should be undertaken before approval of this project.	See answer to 5.2, above.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
7	**July 23, 2012**	**Pahrump Paiute Tribe**	
7.8		Another effect to development is water usage, as illustrated by the lack of springs that once existed in the Pahrump Valley.	Spring flow in the valley seemed to decrease with increased development in Pahrump throughout the 1900s. This is discussed in both the PSA and FSA.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
8	**July 23, 2012**	**Richard Arnold, Pahrump Paiute Tribe**	
8.6		Any impacts to the hydrology and other important resources associated with the HHSEGS will elevate the risks of us maintaining cultural and ecological balance within and adjacent to the proposed Project Area and most importantly, to our cultural landscape.	The proposed mitigation in both the Water Supply and Soil and Surface Water sections would reduce the impacts to local hydrology to a level that is less than significant.

Comment #	DATE	COMMENT TOPIC	RESPONSE
9	**July 21, 2012**	**Big Pine Tribe of Owens Valley**	
9.2		The project will use approximately 140 acre feet of water a year. The Pahrump Valley groundwater basin has been in a state of overdraft for decades. The additional amount of water depletion for this project could have severe impacts on fragile desert vegetation such as the nearby mesquite bosques and other sensitive plant associations. Some last surviving cottonwoods and willows at Stump Springs not mentioned in the report may also be severely threatened with even minimal impacts to groundwater depletion.	The proposed mitigation measures in both the Water Supply and Biological Resources sections would be protective of the local groundwater-dependent vegetation and the local water supply. Proposed conditions would require the applicant to cease or reduce project pumping until they could prove that their pumping is not having an adverse impact. WATER SUPPLY-1 would require that the applicant offset all of their groundwater pumping within the Pahrump Valley.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
10	**July 21, 2012**	**Intervenor Cindy MacDonald -- Water Supply, pg. 19-1**	
AIR RESOURCES 10.61		If the applicant uses water trucks to control fugitive and windblown dust over the life of the project, what are the additional water annual water requirements and can they be met with the currently proposed water limitations?	The applicant has taken this water usage into account, staff agrees with their water use for mirror washing. Staff estimates 27 acre feet per year per power block for mirror washing. The total expected use of 140 AFY would leave 26 AFY for drinking (< 5 AFY) and dust suppression. So about 20 AFY left for dust suppression.
10.1		Given the critical nature of water resource availability in the Pahrump Valley Ground Basin, why does the CEC Staff believe it is appropriate to develop plans to resolve these issues outside the CEQA equivalency process and public review?	The Energy Commission is not exempt from CEQA. The amount of mitigation is already described. The details of how the applicant will meet the performance standard set in the conditions can be determined post licensing, so long as the basic requirement is satisfied.
10.2		Under what authority is the CEC Staff exempt from reasonably developing the Water Use Off Set Plan mitigation measure during this CEQA equivalency process, which should include analyzing levels of significance, compliance with LORS and effectiveness of mitigation measures to reduce impacts?	See answer to 10.1, above.

10.3		What is the projected zone of impact this Water Use Off Set Plan will be developed for?	The offset would have to occur in the Pahrump Valley groundwater basin. Therefore, the mitigation would address the impact within the Pahrump Valley groundwater basin.
10.4		What are some reasonably available measures or activities the applicant might employ in this Water Use Off Set Plan that would “replace” 4,900 acre-feet or 163 AFY over the life of the project?	The applicant could for instance buy out an existing agricultural operation in Pahrump with a historic record of pumping.
10.5		Does the 4,900 acre-feet or 163 AFY apply per year of operation or will it just be required as a one-time replacement value sometime during the 30-year life of the project?	See answer to 4.10, above.
10.6		Does the 4,900 acre-feet or 163 AFY only apply to the operational portion of the proposed project or does it apply to the construction portion of the project as well?	See answer to 4.10, above..
10.7		Why did Staff stipulate “replacing water” versus “retiring water” rights and what is the difference?	Staff did not use one phase over the other for any particular reason.
10.8		If the applicant is required to increase their right to an additional 4,900 acre-feet or 163 AFY of water without retiring it, would this mean the applicant will be authorized to use approximately 303 AFY if the proposed project is approved?	WATER SUPPLY-1 sets the construction limit to 288 acre-feet per year and operation pumping to 140 acre-feet per year for the life of the project.
10.8.1		What jurisdiction, if any, does the CEC have over both the entire 10,000 acres the applicant will be leasing and its associated water rights?	Staff is not aware of any CEC jurisdiction over the applicant's water rights. The CEC has authority over the project “site” and “related facilities”.
10.9		What is the current approximate water value and/or rights in terms of acre-feet-per-year that is associated with the 6,800 additional acres that is part of the applicant’s lease agreement?	In most areas of California, overlying land owners may extract percolating groundwater and put it to beneficial use without approval from the State Board or a court. California does not have a permit process for regulation of groundwater use. In several basins, however, groundwater use is subject to regulation in accordance with court decrees adjudicating the groundwater rights within the basins.

10.10		Can the CEC assume jurisdiction over this additional acreage and its associated water resources as a Condition of the Permit, even if the proposed project is not directly active on this portion of the site?	No.
10.11		While the CEC may be able to impose direct limits on water use for the proposed project itself, can the CEC also impose limits on water use regarding the other 6,800 acres that will not be directly a part of the HHSEGS construction and operations?	No.
10.12		If the CEC has no jurisdiction over the other 6,800 acres, will the applicant and/or landowner be capable of developing this acreage and its associated water rights in any manner they see fit without restrictions or limitations if the proposed project is approved?	The applicant would be required to comply with the requirements of the permitting agency responsible for whatever land use is approved at the site. This would require CEQA analysis, including satisfaction of provisions in CEQA requiring assessment of a reliable water source. Inyo County would normally be the permitting agency.
10.13		What are the reasonably foreseeable impacts of the applicant's control of this additional acreage if no restrictions or limitations are incorporated as a Condition of the Permit? Topics may include additional development adjacent to the project site such as temporary worker housing, permanent residential housing, commercial development and/or industrial development, growth-inducing impacts, increased water demand, etc.	The CEC process is a review of the Hidden Hills project only. However, any development on the "site" or of a "related facility" would require an amendment from the CEC.
10.14		Should the current landowner, which is merely leasing the project site to the applicant, choose to induce growth and capitalize on the proposed project's approval on the additional lands he owns surrounding the proposed project site, what control, if any, does the CEC have with respect to limiting or restricting that landowners development of the area and the associated water requirements necessary for that growth?	See answers to 10.8.1 and 10.13, above.

10.15		What impacts will this additional project have on water withdrawal in the project vicinity?	Any additional development that results in significant additional pumping in the vicinity could contribute to water level lowering.
10.16		While the AFC files, subsequent related documents and the Preliminary Staff Assessment occasionally reference Nevada LORS that may be applicable to the proposed project (such as traffic, hazardous materials, waste management, etc.) why has no discussion included Nevada LORS and jurisdictional analysis of the Pahrump Valley Groundwater Basin as well?	The FSA addresses LORS applicable to the project, including California laws and regulations. The impacts to Nevada are addressed in the staff analysis, but a specific analysis of compliance with Nevada laws is not required because the project is in California.
10.17		If the CEC Staff were to incorporate applicable Nevada LORS related to the authorization of water allocations from the Pahrump Valley Groundwater Basin, would the proposed project still be compliant with LORS?	See answer to 10.16, above.
10.18		What dialogue, if any, has the CEC or Inyo County engaged in with the Nevada State Engineer regarding coordinating the shared water resources of the Pahrump Valley Groundwater Basin, which has historically and predominately been used for the public interest of the people of Nevada?	Energy Commission staff has contacted the Nevada State Engineer's office to learn more about their permitting process and understand how it affects project analysis. Staff has also spent significant time researching the water right's and permit process, history, and status of water rights on the Nevada State Engineer's website.
10.19		Is it the applicant's or CEC's intention to circumvent impacts to Nevada or Nevada Water Right Laws in order serve California's interest at the expense of the people of Nevada?	No, the intent is that all impacts to the water basin would be mitigated for, whether the impact is in California or Nevada.
10.20		Why does the CEC Staff believe that subjecting local well owner to significant burdens results in reducing the proposed projects impacts to "less than significant"?	The purpose of the mitigation requirements is that the applicant must pay for impacts to local wells. Well owners do not have to participate in the program. Those that do not participate however cannot be reimbursed.

10.21		If a local well owner does not agree to or comply with the Conditions of Certification, are the projects impacts still reduced to “less than significant”?	Yes. Participation in the program that tracks impacts to local well owners is voluntary and requires well owner approval. Owners that do not participate cannot be compensated.
10.22		If the proposed mitigation measures are based predominately on a 10 ft. drawdown trigger level but the CPM can eliminate the monitoring program, how will the terms and agreements designed to protect the local well owners from project impacts be honored or upheld?	The word "eliminated" was removed from condition WATER SUPPLY-6 in response to this comment.
10.23		If the applicant has sole control over the monitoring network, which will be used as the singular source of data to determine trends, impacts and degrees of significance, what happens in the event that local well owners dispute what the applicant is reporting or how the CEC chooses to interpret those reports?	Local well owners are free to discuss the alleged impacts with CEC staff and be involved in the review of data. Staff does not intend to work around the local well owners.
10.24		In the event a local well owners water supply and/or well is impacted but the CEC/applicant disputes that impact, there are only two reasonably foreseeable options the well owner will have to remedy the impacts; a) they can spend their time and money legally challenging the CEC/applicant’s data and decisions, b) they can spend their time and money fixing the problems so as to regain their water supply. How is either of these options not considered a significant burden on local well owners?	CEC staff is willing to relieve local well owners of this burden. However, much like the environmental review process for the staff analysis, local well owners are free to discuss the alleged impacts with CEC staff and be involved in the review of data. Staff does not intend to work around the local well owners.
10.25		Given the fact that there is currently no development or any other projects capable of producing significant impacts such as the proposed project can, why would Staff stipulate a two-prong requirement for mitigation that includes “water level changes are different from background trends” AND “are caused by project pumping”?	There are currently pumpers in this portion of the PVGB. Staff estimates 17 AFY is currently being used and water levels in this portion of the PVGB are already in decline. The current decline is used to estimate the background trend and is different than the decline and trend that may be caused by the project pumping. Staff is requiring that the applicant mitigate only for impacts resulting from their pumping.

10.26		What is the definition of “significantly affected by Project pumping”? Who makes this determination, the applicant, the CEC or the well owner?	Staff. In absence of specific public guidance to help shape the significance threshold, staff might choose a common significance threshold such as 10% increase in cost.
10.27		Who determines the “impact of drawdown” induced solely by the proposed project?	CEC staff will make that determination.
10.28		Who will be monitoring “any other source” that occurs in the proposed projects vicinity in order to determine proportional impacts and mitigation measures?	It is in the applicant’s interest to discover and report other new pumpers in the area if it looks like they could significantly contribute to drawdown.
10.29		Does the CEC have the authority to require “any other source” of development that may occur over the life of the project to subject themselves to the same terms and conditions the applicant and local stakeholders must agree to so that those sources may be included in the proportional equation of mitigation?	No.
10.30		In the event the CEC eliminates the monitoring program over the life of the proposed project, what methodology, data collection, proof, etc., will local well owners be required to produce that will satisfy the CEC and/or applicant’s requirements for determining merits of impacts?	The CEC will not eliminate the monitoring program. The word "eliminated" was removed from condition WATER SUPPLY-6 in response to this comment. The CEC may always be contacted to help resolve impacts resulting from project operation through the complaint process.
10.31		In the event the CEC eliminates the monitoring program over the life of the proposed project, what methodology, data collection, proof, etc., will local well owners be required to produce that will satisfy the CEC and/or applicant’s requirements for determining merits of impacts induced solely by the proposed project?	See answer to 10.30, above.

10.32		Outside the CEC, which agency in the State of California has the jurisdiction and responsibility to protect the public interest of local well owners and community stakeholders in the project vicinity should those well owners not agree to the terms and conditions set forth by the CEC to accommodate the proposed project?	Staff is not aware of any other state agencies with such authority. In general, groundwater use by overlying landowners is not regulated in California, and pumpers routinely impact one another by lowering each other's water levels by some amount. If chronic water-level declines (overdraft) become unbearable, the principal legal/regulatory remedy is to initiate a court-administered adjudication of groundwater rights. Any basin user can initiate the process, but the process is typically long and expensive.
10.33		In the event the CEC eliminates the monitoring program over the life of the proposed project and a dispute arises regarding the terms, agreements, conditions, stipulations, contract, data, methodology, etc., where will local well owners go to file their grievances and/or receive compensation?	See answer to 10.30, above.
10.34		Why does the local vegetation get an lifetime monitoring mandate but monitoring data and programs that supposedly help local well owners can be revised and/or eliminated after only five years?	See answer to 10.30, above.

Comment #	DATE	COMMENT TOPIC	RESPONSE
11	July 23, 2012	**Intervenor Center for Biological Diversity**	
11.40		The PSA indicates that up to 140 AFY of water will be used yearly on the HHSEGS site during normal operations (PSA at 4.15-2), although construction water use could be as high as 288 AFY for up to three years (PSA at 4.15-8). Although no water will leave the site, additional information on the effects of groundwater pumping on nearby seeps and springs in the adjacent mountains is lacking. In fact the seven-day ground water pump test that the CEC required was never completed. We have repeatedly requested that the seven-day ground water pump test be completed and once again ask the CEC to enforce their own requirement. No data is presented that addresses the hydrological connection between these essential wildlife sustaining locations, the Amargosa drainage and the proposed project impacts.	Neither staff nor the CEC required any pump test as a follow up to the first test. The conditions proposed to protect the springs are conservative. They would require that the project cease pumping when drawdown of 0.5 is projected at the site boundary. There is insufficient information to conclude or quantify a hydrologic connection between project wells and the Amargosa River. Condition WATER SUPPLY-1 requires that at least 100% of project pumping be offset and therefore PVGB outflow would likely not change. Please see staff's analysis of potential Amargosa River impacts in this FSA.
11.4		Additionally, because of the substantial evaporation rate at the project site, please provide data on how much pumped ground water will actually be returned to the groundwater basin.	The current assumption is that none of the water pumped by the proposed HHSEGS project would return to the aquifer.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
13	July 23, 2012	**Applicant, BrightSource Energy, Inc. -- Water Supply, pg. 293**	
13.14		The applicant will retire water rights. The applicant will protect local groundwater users from impacts.	Conditions in the FSA provide a back-up plan in case water rights with a sufficient pump record cannot be retired. The back-up plan allows for the retirement of inactive rights in conjunction with additional monitoring wells west of the project with drawdown triggers.

13.15		1. Staff needs to acknowledge the benefit of the applicant's proposal to retire water. 2. California water law is ambiguous. 3. The alternatives analysis should be constructed differently. 4. The PSA is focused on Nevada. 5. Staff's analysis is too simple. 6. A 0.5-foot decline in water levels is indistinguishable from background decline.	1. In this Final Staff Analysis staff has acknowledged the applicants proposal to offset project water use through retirement of water rights. One outcome of the offset is to also ensure Pahrump Valley underflow discharge remains the same. 2. Comment noted. 3. Comment sent to ENERGY COMMISSION Alternatives staff. 4. Water Supply impacts resulting from the project are evaluated. 5. Staff's analysis is sufficient given available quantitative information on the PVGB and surrounding areas and considers uncertainty in hydrologic conditions. 6. The approach is based on statistically significant trends in historical water levels in PVGB wells.
13.16		Please use our PowerPoint presentation in your analysis.	PowerPoint presentation was considered.
13.17		Please use our PowerPoint presentation in your analysis.	PowerPoint presentation was considered.
13.18		Page 4.15 1, Summary of Conclusion, 3rd paragraph, Item 1: The basin is not in overdraft but is over permitted per the Nevada State Water Engineer. The Nevada State Water Engineer has no authority over water rights in California.	Water levels within the proposed project vicinity show a statistically significant decline indicating groundwater discharge is greater than recharge and the basin is in a state of overdraft. The declines are observed in both Nevada and California portions of the basin.
13.19		Page 4.15 1, Summary of Conclusions, 3rd paragraph, Item 2: We believe the following conclusion is not supported by the data for reasons explained in General Comment 2 above: “If not mitigated, the proposed project pumping could contribute to a water level decline in areas that support groundwater dependent vegetation, including the Stump Springs Area of Critical Environmental Concern.”	Comment noted.

13.20		Page 4.15 1, Summary of Conclusions, 3rd paragraph, Item 3: We believe the following conclusion is not supported by the data for reasons explained in General Comment 2 above: “If not mitigated, the proposed project could substantially lower the water level in neighboring domestic wells.”	Comment noted.
13.21		Page 4.15 1, Introduction, 1st paragraph, 1st sentence: Please change “Bright Source Energy” to “the Applicant.”	Brightsource Energy is the owner of the project and it should be noted here. The wording was modified to reflect this concern.
13.22		Page 4.15 2, Introduction, 1st full paragraph, last sentence: Please change “HHSG 2011a” to “HHSEGS 2011a.”	Done.
13.23		Page 4.15 5, heading: Please change “Hydrogeologic Setting” to “Hydrogeologic Setting."	Done.
13.24		Page 4.15 8, 1st paragraph (partial paragraph), 3rd sentence in paragraph: Please reword the sentence as follows: “Recent water quality analyses from wells on the project site show the groundwater is relatively low in Total Dissolved Solids (between 250 and 361 ppm, based on 2011 and 2012 data) and has a bicarbonate character.”	Done.
13.25		Page 4.15 9, Method for Determining Significance, Water Resources, b: Please see comment under Alternatives. The significant impact should be measured against what the current beneficial use impact or potential impacts are. Need to consider what the current entitled draw from the project site would be if full development of residential lots were to occur.	The baseline is current conditions.
13.26		Page 4.15 9, Method for Determining Significance, Water Resources, c: Please define the term “affected” when stating that species or habitats would be affected. This criterion is better suited for the biological resources section.	"Affected" refers to impacts due to lowered water levels.

13.27		Page 4.15 9, Method for Determining Significance, Water Resources, c: The PSA should identify with specificity the legal authorities for these purported significance criteria. Citations to those legal authorities should be included in the FSA.	Comment noted.
13.28		Page 4.15 10, 3rd full paragraph: Please reword the sentence as follows: The long term declining trend estimated by these data is comparable to that estimated for the rest of this portion of the basin and is about 0.37 foot per year, or 4.44 inches per year.	Comment noted. Change not necessary. Terms in feet are most useful for the subject analysis.
13.29		Page 4.15 10, 3rd paragraph: Please provide WATER SUPPLY Figure 15 at a scale similar to that of the other figures. The scaling on this figure makes the slope on the Orchard Well figure look steeper than some of the other figures.	Done.
13.30		Page 4.15 10, 7th full paragraph, 1st sentence: The years 2005 through 2011 represent the period of heaviest drought in the area so are not representative of a trend. In addition, they only cover a span of 6 years, which is not sufficient data to make a determination of trends.	There are 32 to 46 records. Though it is a relatively short record, it is the most complete record within the project vicinity. This record shows a statistically significant trend over the period of record.
13.31		Page 4.15 10, 7th full paragraph, 3rd sentence: The magnitudes of water level changes indicated by Sen's Test for slope indicate that the median water level change in the wells reviewed was about (-)0.273 feet per year (ft/yr), or approximately 3.28 inches per year.	Done (units of in/yr not reported).
13.32		Page 4.15 11, 2nd paragraph, 7th sentence: The PSA states: "The northern portion of the PVGB has an extensive record of pumping that shows an approximate loss in water levels of one foot per year."	Yes. The average change in water levels over the period of record shows a decline in the water table equal to about one foot per year.

13.33		Page 4.15 11, 2nd paragraph, last three sentences: We suggest that the division between the subbasins is at the faults to the east of the site, placing only the Dry Lake Bed Well, Old Orchard Well, and Quail Well in the southern subbasin. This results in an arithmetic mean of (-) 0.18, significantly lower than the mean for all eight wells (-)1.185. This suggests that the boundary of the subbasin is more properly drawn along the faults.	Staff would also include the Stateline well, which would make the arithmetic mean trend about (-)0.23 ft/yr.
13.34		The CEC estimate of storativity is too low. If staff used a value of 0.1 instead of 0.005, the applicant's proposed use of 140 ac-ft/year looks smaller.	Employing a greater storativity value would simulate a greater loss in storage and a lower magnitude of water level decline. However, the use of a higher value for storativity is not supported by the data.
13.35		If CEC used a higher value for storativity, the water level decline induced by the project would be less.	See answer to 13.34, above.
13.36		It is possible the basin has been in overdraft for thousands of years as is evident from the dry lake bed. Thus, this trend will continue with or without development of the plant.	Protecting water supplies is therefore critical.
13.37		Page 4.15 12. 2nd full paragraph: Mitigation requirements (WATER SUPPLY 1) should provide credit for the reduction in water use from allowed current residential use and for the provision of storm water recharge via implementation of best management practices (BMPs).	Existing conditions involve little residential pumping, and the residential build out the comment refers to is at best speculative. Recharge from storm water retention is unlikely given the high clay content in the shallow subsurface. Recharge in the desert rarely occurs at the valley floor because evaporation and evapotranspiration rates are too high and percolation rates are too low. Furthermore the proposed site condition described in the AFC would create a general increase in site runoff due to compaction and reworking of the surface.
13.38		Page 4.15 12, 2nd full paragraph: The PSA states: “This condition requires the project owner to provide a water use offset within the PVGB that is equal to project pumping.” Is this defined as a ratio of 1:1 and any overdraft permitted rights? Meaning active or non active?	The water use mitigation must represent active water rights with a recent pumping history.

13.38		Page 4.15 13, Increased Cost of Pumping, Equation 2: The actual equation for the Cooper Jacob modified non equilibrium method is s=2.30Q/(4piT)log(2.25Tt/r2S). A more robust form of this equation is the Theis equation s=114.6QW(u)/T and u=1.87r2S/Tt with Q in gpm, T in gpd per foot, r in feet and t in days.	All drawdowns calculated for the FSA used the Theis solution rather than its approximate form.
13.40		Page 4.15 13, Increased Cost of Pumping, Equation 2 Assumptions: These are simplifying assumptions used to make the analytical solutions solvable. They are not meant as an expression of real aquifer conditions. They are limitations of the method that clarify how the solution will vary from real world conditions.	Comment noted.
13.41		Page 4.15 15, Thresholds to Determine Significant Impact, 1st sentence: These calculations are based on assumed theoretical aquifer conditions that we believe do not reflect site conditions. Our modeling indicates that drawdown will not propagate to the domestic wells based on the regional gradient.	Simulated drawdown is the impact.
13.42		Page 4.15 15, Thresholds to Determine Significant Impact, 2nd sentence: Please reword this sentence as follows: One threshold therefore could be limiting drawdown to 10 feet below existing conditions or mitigating adverse effects of drawdown greater than 10 feet below existing conditions.	Done.
13.43		Page 4.15 15, Aquifer Parameters, 2nd paragraph, 1st sentence: Curve matching is a long established industry standard. It is the basis for aquifer analysis dating back over 70 years and is not considered subjective. Please revise the PSA to reflect this fact.	The word 'subjective' was removed.
13.44		Staff and applicant show different curve matches for pump test results.	The FSA considers both of the applicant's aquifer test analyses.

13.45		Page 4.15 16, 2nd full paragraph, 1st sentence: The PSA states: "Using staff's estimates of transmissivity and Equation 3 above it is possible water level declines in neighboring wells could be on the order of 10 15 feet after 30 years of project pumping." Is the 10 to 15 inclusive of background declines currently predicted in the PSA by Staff's estimates?	The 10 to 15 feet is the isolated drawdown due solely to the pumping.
13.46		Page 4.15 16, 2nd full paragraph: Actual drawdown for those assumptions is 7.84 feet after 30 years pumping at 101 gpm. This ignores recharge and regional flow. Actual drawdown will be less.	7.84 feet is the simulated drawdown due to the pumping, which by definition is the impact.
13.47		Page 4.15 16, last paragraph, 2nd sentence: The PSA is requiring Applicant to take responsibility for increased pumping costs and maintenance that may be experienced by residents of Charleston View. How is the effect of over pumping from neighbors' wells or from other projects within the basin to be accounted for? The HHSEGS will bear the burden of others' pumping under this scenario. In addition, the condition of certification may incentivize neighboring owners to over pump their wells, by eliminating financial deterrents, thereby hastening overdraft conditions.	The groundwater monitoring plan shall monitor select private wells and proposed project supply and monitoring wells. Data collection shall document background- and pre-construction conditions and trends. The plan would be designed to monitor project related trends that can be quantitatively compared against background and pre-construction conditions.
13.48		Page 4.15 16, last paragraph, 3rd sentence: Conditions of Certification WATER SUPPLY 6 and WATER SUPPLY 7 require monitoring and mitigation of potential impacts to neighboring domestic wells. This should only pertain to impacts above the baseline.	Agreed, language added.
13.49		Page 4.15 17, Groundwater Dependent Vegetation and Stump Springs, 1st paragraph, last sentence: What is the basis for BLM's claim that Stump Springs still produces water at the site intermittently?	Sentence deleted. Staff has provided updated information in the FSA.

13.50		Page 4.15 17, 4th paragraph, 2nd sentence: Both of these assumptions are exceedingly conservative and essentially incorrect. Based upon our aquifer analysis and that of others in the basin, the aquifer is unconfined or leaky artesian; and, the clear existence of a regional groundwater gradient as indicated in Figure 5 of the PSA is a priori indication of the existence of recharge.	The reported water level response in some of the wells could possibly indicate local leaky aquifer conditions. However, the available hydrogeologic information is insufficient to confidently identify the adjoining aquifer that supplied the recharge, the water level changes in the leaky aquifer as a result of the deeper pumping (if different from the water-bearing materials monitored by the shallower monitoring wells), the thickness and extent of the intervening aquitard, and the depth and thickness of the pumped aquifer. Staff therefore was conservative in its approach and employed the Theis equation for a confined aquifer. The groundwater gradient is not relevant to the impact, which is the isolated drawdown due to the pumping.
13.51		Page, 4.15 17, 5th paragraph, 1st sentence: These calculations are based on assumed theoretical aquifer conditions that we believe do not reflect site conditions. Our modeling indicates that drawdown will not propagate to Stump Springs based on the regional gradient and leakance without regard to the likely presence of a permeability barrier in the aquifer created by one or more faults.	Staff was conservative in its approach and employed the Theis equation for a confined aquifer. The groundwater gradient is not relevant to the impact, which is the isolated drawdown due to the pumping. In the FSA, staff included an analysis that assumes the fault zone is an impermeable barrier in its evaluation of potential impacts on water levels west of the fault. Water levels measured under the monitoring program during project operation will confirm whether the fault prevents drawdown from reaching Stump Springs and other habitat areas on the east side of the fault.
13.52		Page 4.15 18, 1st paragraph after Table 5, 2nd sentence: This analysis would only be valid for a fully confined aquifer of infinite extent with no gradient. In reality the site wells are approximately 250 feet lower than Stump Springs and the aquifer is likely bounded by faults that will impede the propagation of drawdown to the springs.	The absence of a hydraulic connection between the site and Stump Springs has yet to be demonstrated. The FSA considers potential impacts with and without an impermeable fault barrier.

13.53		Page 4.15 18, 1st paragraph after Table 5, 3rd sentence: The PSA states that the approach was supported by the Applicant in the AFC. However, such support was given by Applicant prior to performance of the Aquifer Pump Test. Since that time, the belief that in the possibility that the aquifer is confined is no longer held by the Applicant.	Comment noted.
13.54		Page 4.15 18, 1st paragraph after Table 5, 5th sentence: To correctly apply superposition, one must consider the actual flow field and the change in flow that occurs in response to pumping. The cone of depression, superimposed on the sloping potentiometric surface, changes the shape of the surface and causes some of the regional groundwater flux to be diverted to the pumping well. As the cone grows deeper and wider, more water is diverted to the well. At some point, enough water is diverted to the well to replace the water being pumped and the cone of depression no longer expands and a new stable potentiometric surface is established. This does not occur in a theoretical infinite aquifer with no gradient, and such aquifers do not exist. Our modeling shows the cone of depression will stabilize shortly after pumping begins, even with the assumption of no leakance, after which time water levels will no longer decline. This is entirely consistent with the results of the pumping test on site and consistent with normal aquifer responses.	The impact is defined as the volume of water removed (consumed) from the over drafted groundwater basin, and the drawdown of groundwater level due solely to the pumping well. The water consumed is equal to the water extracted. The drawdown attributed solely to the pumping well is isolated at finite locations in the aquifer using superposition. This approach is conservative, as in other aspects of Staff's analysis, to assure the maximum potential impact is considered.
13.55		Page 4.15 18, 1st paragraph after Table 5, 6th sentence: This model was designed to predict worst case conditions before any site data was available. Although the model was intended to incorporate the regional gradient the Winflow modeling package does not factor the gradient into its drawdown calculations. While Winflow does allow a gradient to be specified, it does not include the gradient in the solution but only applies it after the fact to draw the contour lines.	Winflow can be employed to calculate the isolated drawdown due solely to the pumping well, which is defined as the impact.

13.56		Page 4.15 19, 1st paragraph, 2nd sentence: Please provide support for the statement that “any” decline in water levels could result in adverse impacts to groundwater dependent vegetation and define “adverse impacts.”	Please refer to the BIOLOGICAL RESOURCES FSA section for discussion of groundwater impacts to vegetation.
13.57		Page 4.15 20, 1st paragraph (partial), last two sentences: This calculation refers to groundwater flow velocity, which is essentially how long would it take for a drop of water to move to the river. This is different than the propagation of drawdown, which is based on confined storage and transmissivity of the aquifer.	Analysis was removed.
13.58		Page 4.15 20, 2nd paragraph, 3rd sentence: The monitoring program described in WATER SUPPLY 8 will measure water level declines from any source, not just the project. Multiple factors could contribute to the decline.	The groundwater monitoring plan shall monitor and document background- and pre-construction conditions and trends. Using the methods specified in WATER SUPPLY-4 monitoring of project related trends can then be quantitatively compared against background and pre-construction conditions caused by multiple factors.
13.59		Page 4.15 22, Drinking Water, 2nd paragraph, 1st sentence: The HHSEGS is expected to employ **120** full time employees and 50 to 60 shift workers during operations and many more during construction.	Correction made.

13.60		Staff recommends Condition of Certification WATER SUPPLY 10, if groundwater will be used for potable purposes, which that would require the applicant to submit information to the Inyo County Environmental Health Department at least sixty (60) days prior to commencement of construction at the site, that would typically accompany an application obtain for obtain a permit to operate a non transient, non community water system with the Inyo County Environmental Health Department at least sixty (60) days prior to commencement of construction at the site. if groundwater will be used for potable purposes. This condition would ensure that the applicant meets all provisions of Title 22, Section 3 to provide a suitable domestic water supply.	Compliance is required in accordance with state and federal law.
13.61		Page 4.15 23, 1st full paragraph: Please reword this paragraph as follows: Staff also recommends Condition of Certification WATER SUPPLY 3, which would ensure that the domestic wells are constructed or modified in accordance with County standards and registered with the State of California through DWR. The applicant shall submit a well construction packet to the Inyo County Environmental Health Department for review and comment and to the CPM for review and approval. Aa Well Completion Report shall also be submitted to DWR prior to approval.	Change made as requested.
13.62		Page 4.15 23, Cumulative Impacts and Mitigation, 2nd paragraph: These calculations are based on assumed theoretical aquifer conditions that we believe do not reflect site conditions. Aquifer properties have not been determined at the Sandy Valley site.	Due to uncertainty in aquifer conditions staff employed a conservative approach and utilized a range in reported aquifer conditions.
13.63		Page 4.15 24, Basin Balance, 1st paragraph, 1st sentence: The loss in storage attributable to the project would be equal to the pumping at the site, a maximum of 140 AFY, immediately after construction and would decrease to zero once the cone of depression stabilized.	Existing groundwater consumption exceeds recharge; hence the basin is in over draft. Any new consumption therefore increases the depletion of groundwater storage in the basin. Neither staff nor the applicant has identified a source of water that would increase recharge to the basin in response to project pumping.

13.64		Page 4.15 24, Basin Balance, 1st paragraph, 2nd sentence: The loss in storage attributable to the projects would be no greater than the sum of pumping at the sites, a maximum of 317 AFY, immediately after construction if they all started pumping on the same day, and would decrease to zero once the cones of depression stabilized.	Staff removed this section of the analysis.
13.65		Page 4.15 24, Basin Balance, 3rd paragraph, last sentence: Please reword the sentence as follows: Their combined use of up to **317** AFY would represent about **3%** of the basin's safe yield.	Staff removed this section of the analysis.
13.66		Page 4.15 25, State Water Resources Control Board Resolutions, 1st paragraph: This 1975 Resolution is just that, a resolution. Its legal weight is questionable. It also focuses on new appropriations of surface water. It is inapplicable here on the facts.	Staff removed this.
13.67		Page 4.15 26, Order from the Genesis Solar Project Committee, 1st paragraph: This Genesis reference is NOT a decision of the Commission. It was an interim order of the Committee. It is NOT reflected in the Final Decision. This is not precedent because it is not a decision of the Commission. It is also directly contradicts California Water Law, the constitutional sections cited previously, about making reasonable and beneficial use of water. The California Constitution does not require "worst, feasible available water that applicant could use for particular purposes on a project."	Staff removed this.
13.68		Page 4.15 31, Conclusions, Conclusion 2: We believe this conclusion is based on an inaccurate understanding of the pumping impacts. See previous comments.	This Conclusion was revised.
13.69		Page 4.15 31, Conclusions, Conclusion 3: We believe this conclusion is based on an inaccurate understanding of the pumping impacts. See previous comments.	This Conclusion was revised.
13.70		Page 4.15 51, Appendix A	Staff removed this section of the analysis.

13.71		Page 4.15 52, Appendix A	Staff removed this section of the analysis.
13.72		Page 4.15 52, Appendix A	Staff removed this section of the analysis.
13.73		Page 4.15 52, Appendix A	Staff removed this section of the analysis.
13.74		Page 4.15 53, Appendix A	Staff removed this section of the analysis.
13.75		Page 4.15 53, Appendix A	Staff removed this section of the analysis.
13.76		Comments on WATER SUPPLY condition 1	Staff accepted some of the proposed edits.
13.77		Comments on WATER SUPPLY condition 2	Staff would not accept a rolling average for water use. As written the condition is more enforceable.
13.78		Comments on WATER SUPPLY condition 2: Page 4.15 34, WATER SUPPLY 2, Verification, 2nd paragraph "Water usage" is not defined. Does filling onsite storage tanks count as daily water usage? Or only water taken out of the water system count as "usage"? Please define this term.	Water usage is considered removal from the ground.
13.79		Comments on WATER SUPPLY condition 3	Staff cannot comment on the County's internal approval procedure.
13.80		Comments on WATER SUPPLY condition 4	Some edits accepted.
13.81		Comments on WATER SUPPLY condition 5: Page 4.15 36, WATER SUPPLY 5: this condition should be deleted. WC 4999 et al. apply to groundwater extraction in Los Angeles, Riverside, San Bernardino, and Ventura counties only. It does not apply to Inyo County.	Condition was removed.
13.82		Comments on WATER SUPPLY condition 6	Some edits accepted. Staff also accepts the use of the USGS method for tracking water levels. Staff does not agree that a bulk of the condition should move to the Verification section of the condition.

13.83		Comments on WATER SUPPLY condition 7	Staff does not agree that a bulk of the condition should move to the Verification section of the condition.
13.84		Comments on WATER SUPPLY condition 8	Monitoring must begin prior to construction to establish background and baseline conditions. All monitoring wells must also be installed to the same depth as the pumping wells.
13.85		Comments on WATER SUPPLY condition 9: Page 4.15 47. WATER SUPPLY 9. The Applicant's data, as described in these PSA Comments and in its filings in this proceeding, demonstrates that the project will have no significant adverse effects on water supplies. If anything, the Applicant's water usage will be less than the 170 residential units contemplated in the No Project Alternative. Accordingly, given (a) the project's lack of water supply related impacts and (b) the lack of any water discharges associated with project operations, there will be no significant effects on water quality. The Applicant's proposed conditions Water Supply 6 and Water Supply 8 constitute a rigorous monitoring program that will demonstrate the lack of significant impacts in either water supply or water quality. Because no significant impacts on water quality have been identified, the FSA should not seek to impose mitigation. Water Supply 9 should be deleted.	Staff does not plan to remove WATER SUPPLY-9 (now incorporated in WATER SUPPLY-4). The immediate vicinity has a history of nitrate contamination which degraded local drinking water supplies. The project should be required to monitor and report on water quality conditions throughout the life of the project.
13.86		Comments on WATER SUPPLY condition 10	It is staff's understanding that this requirement stems from the federal Safe Drinking Water Act and that the county must be responsible for approving it. The Energy Commission does not have in-lieu permitting authority.

ADDITIONAL RESPONSES TO AGENCY AND PUBLIC COMMENTS

Agency comments received during the Preliminary Staff Assessment process are included below in an abbreviated format. Please visit the commission website to review complete comment letters at http://www.energy.ca.gov/sitingcases/hiddenhills/documents/index.html.

Letter from Amargosa Conservancy, December 28, 2011 (TN-63256)

Comment: *"…we believe that pumping, over time, may adversely affect sensitive water-dependent ecological resources in the lower Amargosa, including several listed and special status species."*

Response: Staff believes that it is speculative that pumping from this project would result in a measureable impact to water-dependent ecological resources in the lower Amargosa River. However, staff is requiring that the applicant offset project pumping with mitigation equal to the project's consumption of groundwater to address PVGB overdraft impacts. Assuming that the Amargosa River eventually receives water that was once beneath the Pahrump Valley, this mitigation would address out-of-basin concerns.

Comment: *"Also, we note that the applicant has stated that its property lease does not end at 30 years, but has claimed the lease terms as "proprietary" and business confidential, and has thus refused to release its conditions. Under that circumstance, the Energy Commission must assume (in accordance with the common business understanding that an enormous investment in infrastructure will likely result in permanent generation facilities on this site) that groundwater pumping will continue, indefinitely."*

Response: Staff agrees that there is the possibility that such an enormous investment could result in groundwater pumping beyond the life of the project. Staff is suggesting that the applicant offset water rights for the entire life of the project. Staff is requiring mitigation that constitutes a true offset for project pumping.

Comment: *"As an initial observation, the groundwater modeling presented by the Applicant in AFC Appendix 5.150 is unacceptably simplistic."*

Response: Staff disagrees with the phrasing "unacceptably simplistic." Staff instead believes that since the Calvada Springs area is poorly defined, the use of superposition may be most appropriate. As discussed in this analysis, the principle of superposition is employed to isolate the direct influence of pumping regardless of water table conditions and other groundwater sources and sinks. This may be the best way to demonstrate the impact of this project's pumping on sensitive receptors.

Comment: *"It is critically important to note that the USGS Death Valley Regional Flow System regional groundwater model (the only accepted regional representation of groundwater flows--although coarse-scaled) posits that groundwater flows from*

Pahrump Valley into the Amargosa River. The Applicant has not used that model in its analyses on project impacts."

Response: Regardless of whether or not the applicant has considered this possible flow condition in their analysis, staff has considered this potential hydraulic connection. Staff concluded the USGS model is not an appropriate tool to analyze this project. Given the scale of the model and the limited data available in the project area that can be used for model calibration, predicted changes would not be more reliable than other methods and thus have little added value for impact analysis.

Comment: *"Although the new geochemical work (anticipated to be released in early 2012) suggests that flow from Pahrump Valley into Chicago Valley and thence into the Amargosa could be less important in comparison to the overall flow system in the Amargosa Basin, those results should be properly placed in a wider context and confirmed by sampling from new wells that need to be drilled in the area between the project site and the Amargosa River."*

Response: Staff agrees that the chemistry of the water that would be pumped by the project should be analyzed to help understand the source and fate of water in the region. Staff is recommending a groundwater monitoring and reporting condition that addresses this concern. Staff has recommended the adoption of Condition of Certification **WATER SUPPLY-4**, which would require the applicant to do groundwater quality sampling and analyses as part of the project's monitoring program.

Comment: *"…the Energy Commission must assume a strong influence of groundwater flow within the basin fill aquifer and the lower carbonate aquifer on springs in the Shoshone -Tecopa area, and that projected drawdown caused by HHSEGS pumping will propagate into and adversely affect the Amargosa Wild and Scenic River."*

Response: The mitigation suggested by staff to offset project pumping maintains the basin water budget and therefore also out-of-basin flow to the river, if any, that exists.

Letter from Inyo County Water Department, January 18, 2012 (TN-63478)

Comment: *"Retirement of water rights is ineffective as mitigation if the retirement does not result in an actual reduction in pumping."*

Response: Staff concurs and has written Condition of Certification **WATER SUPPLY-1** such that it would require the applicant to address this in the proposed mitigation.

Comment: *"…and generally conclude that the principal source of recharge to the basin is from the Spring Mountains to the northeast, groundwater flows to the southwest, and some groundwater exits the basin to the southwest. Faults run parallel to the state line, and may partially buffer the Project site from effects of pumping in the Pahrump area and recharge from the Spring Mountains. These faults are areas of natural groundwater discharge."*

Response: Staff agrees that connectedness between the northern and southern PVGB is unclear. Staff also agrees that faults running parallel to the state line may buffer the proposed site from the effect of pumping in northern PVGB. This concept also agrees with staff's analysis which shows a lower average water level decline in southern PVGB (0.25 foot per year) compared to the average decline observed in northern PVGB (one foot per year).

Comment: *"Prior reports suggest that groundwater from the Pahrump Valley basin flows through the Nopah Range and discharges in the Tecopa/Shoshone/Amargosa River area, but the flow-paths, rates of flow, and sources of water for regional discharge zones are not well known."*

Response: Staff notes that the flow-paths and regional discharge zones for the PVGB is not well understood. This comment is similar to one shared by the Amargosa Conservancy (TN-63256).

Comment: "*The circumstances discussed above suggest a number potential adverse effects from the Project:*

1. Pumping for the Project may adversely affect well owners near the Project. Active wells have been identified south of the Project site."

Response: Staff agrees and is suggesting mitigation measures for local wells in Condition of Certification **WATER SUPPLY-4** and**-5**.

Comment: *"2. Pumping for the Project may adversely affect phreatophytic vegetation northeast of Project. Zones of phreatophytic vegetation have been mapped northeast of the site."*

Response: Staff agrees that pumping may adversely affect phreatophytic vegetation to the northeast of the project and has recommended Condition of Certification **WATER SUPPLY-4** to mitigate for this effect.

Comment: *"3. Pumping for the Project may affect groundwater users down-gradient from Pahrump Valley, in the Tecopa/China Ranch/Amargosa River area. These potentially affected users may not have all been identified, but include China Ranch and Tecopa."*

Response: This comment has been addressed in responses regarding impacts to the Amargosa River above.

Comment: *"4. Pumping for the Project may adversely affect groundwater-dependent and groundwater influenced habitat down-gradient of the Project. Of particular concern are the Amargosa River and China Ranch."*

Response: Same response as that above.

Comment: *"5. Pumping for the Project may contribute to overdraft of the Pahrump Valley groundwater basin."*

Response: Addressed in previous responses. Staff concurs and has recommended mitigation for potential impacts.

Comment: *"In view of the foregoing, the County of Inyo has proposed the following to Hidden Hills Solar:*

A. Prior to the commencement of construction, Hidden Hills Solar shall cooperate with the County to complete and provide to the CEC and other interested agencies an inventory of private wells potentially affected by the Project that identifies the owner of each well and includes the location, depth, screened interval, pump depth, static water level, pumping water level, and capacity of each well. For each such well, Hidden Hills Solar shall assess any projected impact of the Project on the well and shall develop and submit a plan for monitoring and mitigating any adverse effects on the well, including thresholds where mitigation activities would be undertaken. The plan should include, as feasible, agreements from the owner of each well approving monitoring activities. Monitoring should include both groundwater elevation and water quality. Mitigations should include deepening or replacing wells that become inoperable due to Project pumping, monetary compensation for additional pump lift incurred by Project pumping, and mitigation for impacts to water quality."

Response: Staff agrees and has recommended Condition of Certification **WATER SUPPLY-4 and -5** to mitigate these potential impacts.

Comment: *"C". Prior to the commencement of construction, Hidden Hills Solar shall develop and provide to the County and the CEC and other interested agencies a model for predicting changes in the groundwater flow system resulting from the Project which has the capability to assess changes in hydraulic head, flow rate, flow direction, and water budget. Hidden Hills Solar shall also provide to the County, the CEC and other interested agencies model runs which predict effects of the planned groundwater pumping by the Project on the habitats and resources described above and predictions of the level of groundwater pumping that will cause significant impacts on such habitats and resources. Hidden Hills Solar shall also use the model to provide an evaluation of the sustainability of the water supply for the life of the project, including the cumulative sustainability when considered with other pumping occurring or projected to occur in the groundwater basin (including the California and Nevada portions of the basin)."*

Response: Response to the appropriateness of an extensive groundwater model is discussed in responses to the Amargosa Conservancy above. There is currently very limited data available for the southern portion of the PVGB. The ability to develop a calibrated model that could be used for analysis of well interference, cumulative overdraft, groundwater dependent vegetation, and regional impacts could be difficult and time consuming. Much more research into groundwater basin conditions and long term monitoring data would be needed. Staff believes the monitoring program proposed in Condition of Certification **WATER SUPPLY-4** would adequately measure potential project impacts which could then be mitigated in accordance with **WATER SUPPLY-1** and **-5**, and **Bio-23**.

Letter from Nye County Water District, January 31, 2012 (TN 63651)

Comment: *"Some areas within the Pahrump Basin have experienced drops in water level and the basin has been designated by the Nevada State Engineer as a basin in need of administration (Designated Basin). As a designated basin there are no additional appropriations of water rights and any use would require purchase of existing water rights. Water Districts are accorded special status to assist and advise the State Engineer in the administration of designated basins."*

Response: Staff acknowledges that PVGB has experienced significant water level declines. The information provided about water rights availability was very helpful for developing a satisfactory mitigation measure to offset the project's water uses. In this analysis staff recommends the purchase of an existing water right(s) to offset the proposed use. Furthermore, staff has expressed the need for any purchased water right to constitute an exercised right, or one that has contributed to the current state of declining water levels in the basin.

PROPOSED FINDINGS OF FACT

Based on the evidence, staff proposes the following findings:

1. The proposed HHSEGS site would pump groundwater from the PVGB.

2. Domestic well owners are located adjacent to or within 3 miles of the project site.

3. The proposed project is bordered by sensitive groundwater-dependent vegetation, which is habitat for endemic species.

4. The proposed project is located within five miles of the Stump Spring Area of Critical Environmental Concern (ACEC).

5. The Stump Spring ACEC is designated for protection by the United States Bureau of Land Management (BLM) because of its cultural and biological resources.

6. There is limited data available for site specific analysis of potential effects due to project use of groundwater from the PVGB.

7. Monitoring project groundwater pumping would provide data that could be used to evaluate effects on the existing groundwater users and groundwater dependent vegetation.

8. The PVGB is a basin that has for many years been in “overdraft”, such that recharge of the basin has been exceeded, and continues to be exceeded, by groundwater pumping.

9. The historic overdraft of the PVGB continues today, and Nevada has made it a “designated” basin to control groundwater pumping on the Nevada sideof the border by requiring permits for non-domestic groundwater pumping.

10. Without mitigation, the impact of the project would be cumulatively significant.

11. There is a high level of uncertainty regarding potential impacts from project groundwater pumping, particularly with regard to the potential impact on local springs and wells.

12. The Stump Spring ACEC, with temporal springs and vegetation, may be dependent on local groundwater levels, and could be significantly affected by project groundwater pumping.

13. Local domestic wells, particularly those most proximate to the project site, could be significantly affected by project groundwater pumping.

14. Although it is possible that project groundwater pumping could eventually have a deleterious effect on the Amargosa River, no existing information or model can establish or describe such effect or its extent.

15. Impacts to the PVGB can be mitigated to a level that is less than significant by restricting groundwater use in the Nevada part of the basin by some commensurate level.

16. Restricting groundwater use in the PVGB should reduce impacts, if any, to the Amargosa River.

17. Local well monitoring with defined thresholds and compensation can mitigate impacts to local wells to a level that is less than significant

18. Monitoring wells, coupled with thresholds that require changing water supply sources or reduced pumping, can mitigate impacts to Stump Spring ACEC to a level that is less than significant.

CONCLUSIONS

Based on the assessment of the proposed Hidden Hills Solar Electric Generating System (HHSEGS), California Energy Commission (Energy Commission) staff concludes that:

1. If not mitigated, the proposed project would exacerbate overdraft conditions in the Pahrump Valley groundwater basin. **WATER SUPPLY-1** would require the proposed project to mitigate for its groundwater use by offsetting it through a measure that would constitute a real water savings for the basin. To be effective, such offset must be associated with a documented pumping and water use history, and could not be replaced by alternative water rights.

2. Staff recommends condition of certification **WATER SUPPLY-2** which expressly limits the applicant's water use. Staff also proposes **WATER SUPPLY-3,** which requires the applicant to construct and report well-related information in accordance with appropriate LORS and install metering devices to ensure accurate reporting of water use.

3. If not mitigated, the proposed project pumping could exacerbate water level declines. Accordingly, staff proposes a monitoring plan in the conditions of certification. **WATER SUPPLY-4** monitors groundwater conditions for potential impacts on existing neighboring wells, groundwater dependent vegetation, the Stump Spring Area of Critical Environmental Concern (ACEC), and groundwater quality. The monitoring is designed to prevent potential impacts to groundwater dependent vegetation, among the other noted concerns, and therefore also compliments conditions recommended in the Biological Resources section. Staff proposes a monitoring program in condition of certification **WATER SUPPLY-5** to mitigate potential drawdown impacts in existing wells. **WATER SUPPLY-6** recommends a plan to monitor land subsidence as a result of declining water levels and aquifer dewatering that potentially may occur as a result of pumping.
4. Given the lack of evidence for a hydraulic connection, the relatively large intervening distance (about 20 miles), and uncertainty in potential flow barriers and permeability contrasts within the subsurface it would be speculative to conclude that project, pumping would adversely affect the Amargosa River. There is no available data that identifies groundwater flow paths or confirms a hydraulic connection between PVGB and the Amargosa River, so the water consumed by project pumping may or may not be a source of inflow to the Amargosa River. Although staff concludes that a significant impact due to project pumping is unlikely, **WATER SUPPLY-1** which requires an offset of project water use in the PVGB would ensure there is likely no net overall change in subsurface outflow from the PVGB that might affect the Amargosa River.

5. Staff recommends condition of certification **WATER SUPPLY-7**, which would require the applicant to obtain a permit to operate a non-transient, non-community water system with the Inyo County Environmental Health Department at least sixty (60) days prior to commencement of construction at the site. This condition would ensure

that the applicant meets all provisions of Title 22, Section 3 to provide a suitable domestic water supply.

With implementation of the conditions of certification listed below, the proposed HHSEGS project would comply with all applicable LORS, and would not result in any unmitigated significant impacts related to **WATER SUPPLY** resources.

PROPOSED CONDITIONS OF CERTIFICATION

WATER USE OFFSET PLAN

WATER SUPPLY-1 The Project owner shall submit a Water Supply Plan that will identify how the project would mitigate project overdraft impacts to Pahrump Valley Groundwater Basin (PVGB). These activities shall result in replacement of 288 acre feet per year for construction and 140 acre-feet per year for groundwater pumped from the PVGB during project operation. Replacement shall occur or be in implementation; by the time the project begins to pump groundwater for construction. The activities proposed for mitigation may include, but are not limited to, retirement of active and senior water rights, forbearance of water use, and water conservation. The proposed method would be outlined in the Water Supply Plan to be submitted to the CPM for review and approval.

The Water Supply Plan shall include the following at a minimum:

1. Identification of the activity and water source that would replace 288 acre feet per year for construction and 140 acre-feet per year for groundwater pumped from the PVGB during project operation;
2. Demonstration of the project owner's legal entitlement to the water or ability to conduct the activity;
3. Assessment of whether any artificial recharge of groundwater can be achieved while using storm water controls in accordance with **SOILS-5** and **SOILS-6** or other methods..If recharge can be achieved then the volume recharged can be used to offset project water use in accordance with this condition.
4. Include a discussion of any needed governmental approval of the identified activities, including a discussion of the discussion of the conditions of approval;
5. Discuss whether any governmental approval of the identified activities would be needed, and, if so, whether that approval would require compliance with CEQA or NEPA;
6. Demonstration of how water pumped from the PVGB would be replaced for each of the activities;
7. An estimated schedule for completion of the activities;
8. Performance measures that would be used to evaluate the amount of water replaced by the activities;
9. Monitoring and Reporting Plan outlining the steps necessary and proposed frequency of reporting to show the activities are achieving the intended benefits and replacing PVGB extractions.

The project owner shall implement the activities reviewed and approved in the Water Supply Plan in accordance with the agreed upon schedule in the Water Supply Plan. If agreement on identification or implementation of mitigation

activities cannot be achieved the project owner shall not begin construction or operation until assurance that the agreed upon activities can be identified and implemented.

Verification: The project owner shall submit a Water Supply Plan to the CPM for review 120 days prior to start of construction. Construction or operation pumping will not begin until the Water Supply Plan has been approved by the CPM and implemented by the project owner.

CONSTRUCTION AND OPERATIONS WATER USE

WATER SUPPLY-2 The proposed project's use of groundwater for all construction activities shall not exceed an average rate of 288 acre-feet per year of construction. The proposed project's use of groundwater for all operations and domestic use activities shall not exceed 140 acre-feet per year.

Prior to the use of groundwater for construction, the project owner shall install and maintain metering devices as part of the water supply and distribution system to document project water use and to monitor and record in gallons per month the total volume(s) of water supplied to the project from this water source. The metering devices shall be of an adequate design for the intended use and shall be operational for the life of the project. Metering devices shall be calibrated and maintained in accordance with the manufacturers recommended procedures and schedule.

Verification: Beginning six (6) months after the start of construction, the project owner shall prepare a semi-annual summary report of the amount of water used for construction purposes. The summary shall include the monthly water usage in gallons. The report shall also include photographs and documentation showing the type of meter and installed condition.

The project owner shall prepare an annual summary report, which will include daily usage, monthly range and monthly average of daily water usage in gallons per day, and total water used on a monthly and annual basis in acre-feet by source. For years subsequent to the initial year of operation, the annual summary report will also include the yearly range and yearly average water use by source. For calculating the total water use, the term "year" will correspond to the date established for the annual compliance report submittal. The report shall also include reports on meter calibration and maintenance, and document it is in working order.

PROJECT GROUNDWATER WELLS

WATER SUPPLY-3 PRE-WELL INSTALLATION The project owner proposes to construct and operate six groundwater production wells onsite that will produce water from the Pahrump Valley basin. The project owner shall ensure that each well is completed in accordance with all applicable state and local water well construction permits and requirements, including Inyo County code Chapter 14.28 Water Wells. Prior to initiation of well construction activities, the project owner shall submit for review and comment a well construction packet to the Inyo County Environmental Services and fees

normally required for county well permits, with copies to the CPM. The Project shall not construct a well or extract and use groundwater without CPM approval to construct and operate the well.

POST-WELL INSTALLATION. The project owner shall provide documentation to the county with copies to the CPM that the well has been properly completed. In accordance with California's Water Code section 13754, the driller of the well shall submit to the DWR a Well Completion Report for each well installed. The project owner shall ensure the Well Completion reports are submitted. The project owner shall ensure compliance with all county water well standards and requirements for the life of the wells and shall provide the CPM with two (2) copies each of all monitoring or other reports required for compliance with the Inyo County Environmental Health Services water well standards and operation requirements, as well as any changes made to the operation of the well.

DESTRUCTION OF WELLS. On property controlled by the project owner the project owner shall protect groundwater resources by abandoning all groundwater wells that will not be used for project purposes. These groundwater wells shall be abandoned in accordance with all applicable state and local water well abandonment requirements, including the California Department of Water Resources Bulletins 74-81 & 74-90. Prior to the start of well construction activities, the project owner shall submit for review and comment a well abandonment packet to Inyo County, in accordance with the Inyo County Code Title 14, Chapter 14.28, containing the documentation, plans, and fees normally required for the county's well abandonment permit, with copies to the CPM for review and approval.

Verification: The project owner shall do all of the following:

1. No later than sixty (60) days prior to the construction of the onsite groundwater production wells, the project owner shall submit to the CPM a copy of the water well construction packet submitted to the Inyo County Environmental Health Services for review and comment.

2. No later than thirty (30) days prior to the construction of the onsite groundwater production wells, the project owner shall submit a copy of written concurrence received from the Inyo County Environmental Health Department that the proposed well construction activities comply with all county well requirements and meet the requirements established by the county's water well permit program for review and comment

3. No later than sixty (60) days after installation of each well at the project site, the project owner shall ensure that the well driller submits a Well Completion Report to the DWR with a copy provided to the CPM. The project owner shall submit to the CPM, together with the Well Completion Report, a copy of well drilling logs, water quality analyses, and any inspection reports.

4. During well construction and for the operational life of the well, the project owner shall submit two (2) copies each to the CPM of any proposed well construction or operation permit changes and shall submit copies within ten (10) days of submittal to or receipt from the Inyo County Environmental Health Services for review and comment and to the CPM for review and approval.

5. No later than fifteen (15) days after completion of the onsite groundwater production wells, the project owner shall submit documentation to the CPM, and the Lahontan RWQCB that well drilling activities were conducted in compliance with Title 23, California Code of Regulations, Chapter 15, Discharges of Hazardous Wastes to Land, (23 CCR, sections 2510 et seq.) requirements and that any onsite drilling sumps used for project drilling activities were removed in compliance with 23 CCR section 2511(c).

6. No later than 180 days after the start of project construction the project owner shall provide a plan showing the results of a site survey to identify abandoned wells and a schedule for completion of abandonment of wells for CPM review and approval. Abandonment shall be conducted in accordance with the approved plan.

GROUNDWATER MONITORING AND REPORTING FOR IMPACTS AND MITIGATION FOR GROUNDWATER-DEPENDENT VEGETATION, NEIGHBORING WELLS, AND WATER QUALITY

WATER SUPPLY–4 The project owner shall submit a Groundwater Monitoring, Mitigation, and Reporting Plan (GMMRP) to the Inyo County Water Department for review and to the CPM for review and approval in advance of construction activities and prior to the operation of onsite groundwater supply wells. The plan shall monitor select private wells and proposed project supply and monitoring wells. It shall explain the timing and methodology for monitoring site and off-site groundwater levels and quality. The monitoring period shall include pre-construction, construction, and project operation. The report shall document background conditions and pre-construction conditions and trends and plans to monitor project related trends that can be quantitatively compared against background and pre-construction conditions near project pumping wells and near potentially impacted resources (groundwater dependent ecosystems and domestic wells).

The GMMRP shall include a scaled map showing the site and vicinity, existing well locations, and proposed monitoring well locations (both existing wells and new monitoring wells proposed for construction). The map shall also include relevant natural and man-made features (existing and proposed as part of this project).

The monitoring network is intended to protect groundwater dependent vegetation, other groundwater users and groundwater quality that may be within the influence of project pumping during the project life. The projected area of groundwater drawdown shall be refined on an annual basis during project construction and every year during project operations using the data acquired in fulfillment of this condition. The GMMRP also shall provide: (1)

available well construction information and borehole lithology for each existing well proposed for use as a monitoring well; (2) description of proposed design, drilling and installation methods for new monitoring and water supply wells; and, (3) schedule for completion of the work for all existing wells included in the monitoring network. The GMMRP shall include a well survey that documents the drilling methods employed to construct existing wells, the individual well construction as-builds, borehole lithology recorded from the drill cuttings, well development, geophysical survey, and well survey results—to the extent the information is available—and describe how the well is designed to provide groundwater level and quality samples that would be appropriate for measurement of water levels and quality. The well survey shall measure the location and elevation of the top of the well casing and reference point for all water level measurements, and shall include the coordinate system and datum for the survey measurements for all existing and proposed wells.

A. Prior to Project Construction

1. A well reconnaissance shall be conducted to investigate and document the condition of existing water supply wells located within 3 miles of the project site boundary, provided that access is granted by the well owners. The reconnaissance shall include sending notices by registered mail to all property owners within a 3 mile radius of the project area, shall identify the owner of each well, and shall include the location, depth, screened interval, pump depth, static water level, pumping water level, and capacity of each well, to the extent such information is reasonably available or can be measured. The plan should include agreements from the owner of each well that approves participation in the monitoring activities.

2. The project owners shall install up to 11 monitoring wells, subject to the ability to gain access and the right to use certain off-site well locations. All newly constructed monitoring wells shall be constructed consistent with appropriate Federal, State and Inyo County specifications.

3. The monitoring plan and network of monitoring wells shall make use of existing and new monitoring wells installed by the project owner. All monitoring wells shall be installed to a depth that matches the depth of the project pumping wells. The monitoring network shall include the following wells at a minimum:

    - Three wells (Power Block 1 Onsite Monitoring Wells) directly up-gradient (gradient hereafter refers to groundwater potentiometric surface identified in **Water Supply Figure 4**) from the Power Block 1 production well, in a linear array, within the property boundary. Wells shall be installed within one-half mile of the Power Block 1 production well at different distances from the production wells.

- One well (Power Block 1 Offsite Monitoring Well) directly up-gradient from the Power Block 1 production well, between 1.0 and 1.5 miles from the project property boundary at the western edge of the mesquite bosque on BLM land (herein known as the BLM Mesquite Bosque Well 1) .
- Three wells (Power Block 2 Onsite Monitoring Wells) directly up-gradient from Power Block 2, in a linear array, within the property boundary. Wells shall be installed within one-half mile of the Power Block 1 production well at different distances from the production wells.
- One well (Power Block 2 Offsite Monitoring Well) directly up-gradient from Power Block 2, between 1.0 and 1.5 miles from the project property boundary (BLM Mesquite Bosque Well 2).
- One well (Southern Monitoring Well) at the southern end of the site within the project boundaries.
- One well (Northern Monitoring Well) at the northern end of the site within the project boundaries.
- One well (Offsite California Monitoring Well between 0.5 and 1.0 miles from the southwest corner of the site, located between a bearing of southwest (225°) and west (270°). An alternative location can be approved by the CPM.

4. As authorized access allows, measure groundwater levels in the off-site background wells and on-site pumping and monitoring wells to provide preconstruction groundwater level trends. Construct water level maps of the PVGB for the area within 3 miles of the site boundary using the preconstruction groundwater data. Update trend plots and statistical analyses as data becomes available. The CPM may also modify the frequency of measurement required in Section B. and C., below, depending on the trends demonstrated by the monitoring results.

5. Commence water quality monitoring to establish pre-construction groundwater quality conditions in the monitored wells.

6. Prior to use of any groundwater for construction, all baseline groundwater level and quality monitoring data shall be reported to the CPM. The report shall include the following:

   a) An assessment of pre-project groundwater levels and a summary of available weather information (monthly average temperature and rainfall records from the nearest weather station).

   b) An assessment of pre-project groundwater quality with groundwater samples analyzed for TDS, chloride, nitrates, major cations and anions, coliform bacteria, radioactivity, taste and odor, oxygen-18 and deuterium isotopes. The report to the CPM shall assess the

utility of these constituents for future monitoring. Any recommendations to add or remove constituents shall be supported with the data and other relevant factual evidence. The CPM shall finalize the required list of constituents to be analyzed based on these recommendations and review of two years of monitoring results. The CPM may also modify the frequency of sampling required in Section B. and C., below depending on the trends demonstrated by the monitoring results.

c) The data shall be tabulated, summarized, and submitted to the CPM. The data summary shall include the range (minimum and maximum values), average, and median for each constituent analyzed. If a sufficient number of data points are available, the data shall also be analyzed using the Mann-Kendall test for trend at 90 percent confidence to assess whether pre-project water quality trends, if any, are statistically significant.

B. During Construction:

1. Continuously collect water levels (every hour at minimum) using a pressure transducer from wells within the monitoring network and report water levels on a monthly basis throughout the construction period and at the end of the construction period. If non-vented pressure transducers are being utilized for water levels, a separate pressure transducer shall be used to collect data at the same frequency collected from well pressure transducers. Perform statistical trend analysis on the water level data. Assess apparent trend and delineate project-induced drawdown using the distance-drawdown method and the method described in USGS Scientific Investigations Report 2006-5024, or by using an alternative trend analysis approved by the CPM. Measured water levels shall be analyzed using the USGS trend analysis methods to remove extraneous factors such as local decline, pumping from other locations, and barometric effects. Statistically significant pre-construction and background trends, if any, shall be removed from the observed water levels trends. The remaining drawdown will be presumed to represent the project-related-drawdown, and the project-related-drawdown will be plotted on a distance-drawdown semi-log plot. Statistical analysis and projected drawdown estimates shall be calculated at intervals frequent enough to detect a decline in water levels that will extend to the project boundary and determine if and when the trigger specified in D.1 may be reached.

2. During project construction, the project owner shall monthly monitor the quality of groundwater and changes in groundwater quality in the monitoring network and submit data semiannually to the CPM. The summary report shall document water quality monitoring methods, the water quality data, water quality plots, and a comparison between pre-

and post-construction water quality trends as itemized below. The report shall also include a summary of actual water use conditions.

a) Groundwater samples from all wells in the monitoring well network shall be analyzed and reported semiannually for the constituent list approved by the CPM as part of A.6.b.

b) The compliance data shall be analyzed for both trends and for contrast with the pre-project data. For analysis purposes, pre-project water quality shall be defined by samples collected prior to project construction as specified above, and compliance data shall be defined by samples collected after the construction start date.

i. Trends shall be analyzed using the Mann-Kendall test for trend at the 90 percent confidence. Trends in the compliance data shall be compared and contrasted to pre-project trends, if any.

ii. The difference between pre-project and compliance mean or median concentrations shall be compared using an Analysis of Variance (ANOVA) or other appropriate statistical method approved by the RWQCB for evaluation of water quality impacts. A parametric ANOVA (for example, an F-test) can be conducted on the two data sets if the residuals between observed and expected values are normally distributed and have equal variance, or the data can be transformed to an approximately normal distribution. If the data cannot be represented by a normal distribution, then a nonparametric ANOVA shall be conducted (for example, the Kruskal-Wallis test). If a statistically significant difference is identified at 90 percent confidence between the two data sets, the monitoring data are inconsistent with random differences between the pre-project and baseline data indicating a significant water quality impact from project pumping may be occurring.

iii. Contour maps of cumulative change in water level since the start of the project shall be prepared.

C. During Operation:

1. Continuously collect water levels (every hour at minimum) using a pressure transducer from wells within the monitoring network and report water levels on a monthly basis for the first year of operation and quarterly thereafter. If non-vented pressure transducers are being utilized for water levels, a separate pressure transducer shall be used to collect data at the same frequency collected from well pressure transducers. Operational parameters (i.e., pumping rate and time of pumping) of the water supply wells shall be monitored and reported. Additionally, quarterly groundwater use in the southern PVGB shall be estimated based on available land and water use information.

2. On an annual basis, perform statistical trend analysis of water level data and compare to predicted water level declines due to project pumping. Assess apparent trend and delineate project-induced drawdown using the distance-drawdown method and the method described in USGS Scientific Investigations Report 2006-5024, or by using an alternative trend analysis approved by the CPM. Observed changes in water level in the monitoring wells shall be analyzed using the USGS trend analysis methods to remove extraneous factors such as local decline, pumping from other locations, and barometric effects. Statistically significant pre-construction and background trends, if any, shall be removed from the observed water levels trends. The remaining drawdown will be presumed to represent the project-related-drawdown, and the project-related-drawdown, which shall be plotted on a distance-drawdown semi-log plot.

3. During the first year of project operation, the project owner shall monthly monitor the quality of groundwater and changes in groundwater quality in the monitoring network and submit data semiannually to the CPM. After the first year of project operation, the project owner shall quarterly monitor the quality of groundwater and changes in groundwater quality in the monitoring network and submit data semiannually to the CPM. The summary report shall document water quality monitoring methods, the water quality data, water quality plots, and a comparison between pre- and post-construction water quality trends as itemized below. The report shall also include a summary of actual water use conditions.

   a) Groundwater samples from all wells in the monitoring well network shall be analyzed and reported semiannually for the constituent list approved by the CPM as part of A.6.b.

   b) The compliance data shall be analyzed for both trends and for contrast with the pre-project data. For analysis purposes, pre-project water quality shall be defined by samples collected prior to project construction as specified above, and compliance data shall be defined by samples collected after the construction start date.

      i. Trends shall be analyzed using the Mann-Kendall test for trend at the 90 percent confidence. Trends in the compliance data shall be compared and contrasted to pre-project trends, if any.

      ii. The difference between pre-project and compliance mean or median concentrations shall be compared using an Analysis of Variance (ANOVA) or other appropriate statistical method approved by the RWQCB for evaluation of water quality impacts. A parametric ANOVA (for example, an F-test) can be conducted on the two data sets if the residuals between observed and expected values are normally distributed and

have equal variance, or the data can be transformed to an approximately normal distribution. If the data cannot be represented by a normal distribution, then a nonparametric ANOVA shall be conducted (for example, the Kruskal-Wallis test). If a statistically significant difference is identified at 90 percent confidence between the two data sets, the monitoring data are inconsistent with random differences between the pre-project and baseline data indicating a significant water quality impact from project pumping may be occurring.

iii. Contour maps of cumulative change in water level since the start of the project shall be prepared.

D. Mitigation During Construction and Operation

1. If water levels in either of the Power Block 1 or Power Block 2 Onsite Monitoring Wells identify a projected 0.5 foot or greater water level decline at the property boundary due to project pumping during construction or operation, the project owner shall comply with BIO-23 and reduce, modify, or stop project pumping until the project owner can show:

   - the pumping can be reduced or modified to maintain groundwater levels above the 0.5 ft. drawdown threshold at the project boundary; or

   - the drawdown trigger was exceeded due to factors other than the project pumping and the project did not contribute to the drawdown; or

   - through vegetation monitoring and soil coring described in **BIO-23** and predictive water level trend analysis in C.2. of this condition, that a greater groundwater drawdown will not result in significant adverse impacts to the groundwater dependent vegetation.

2. If the CPM concludes water levels in neighboring wells have been lowered beyond pre-project water levels, then the project owner shall provide mitigation to the impacted well owner(s). Mitigation shall be provided to the impacted well owners that experience 10 feet or more of project-related drawdown (under static, non-pumping conditions). The type and extent of mitigation shall be determined by the amount of water level decline induced by the project, the type of impact, and site specific well construction and water use characteristics. If an impact is determined to be caused by drawdown from more than one source, the level of mitigation provided shall be proportional to the amount of drawdown induced by the project relative to other sources. In order to be eligible, a well owner must provide access to the project owner to document well location and construction, including pump intake depth,

and that the well was constructed and usable before project pumping was initiated. The mitigation of impacts shall be determined as follows:

a) If project pumping has lowered water levels by 10 feet or more and increased pumping lifts, increased energy costs shall be calculated. Payment or reimbursement for the increased costs shall be provided at the option of the affected well owner on an annual or one-time lump sum basis. In the absence of specific electrical use data supplied by the well owner, the project owner shall use **WATER SUPPLY-5** to calculate increased energy costs.

b) If groundwater monitoring data indicate project pumping has lowered water levels below the top of the well screen or slots (if known), and the well yield is shown to have decreased and is no longer capable of meeting 110-percent of the well owner's maximum daily demand, dry-season demand, or annual demand – assuming the pre-project well yield documented by the initial well reconnaissance met or exceeded these yield levels – compensation shall be provided for the diagnosis and maintenance to treat and remove encrustation from the well screen or slots. Reimbursement shall be provided at an amount equal to the customary local cost of performing the necessary diagnosis and maintenance for well screen encrustation. Should the well yield reductions be recurring, the project owner shall provide payment or reimbursement for periodic maintenance throughout the life of the project. If with treatment the well yield is incapable of meeting 110-percent of the well owner's maximum daily demand, dry season demand, or annual demand the well owner should be compensated by reimbursement or well replacement.

c) If project pumping has lowered water levels to significantly impact well yield so that it can no longer meet its intended purpose, causes the well to go dry, or cause casing collapse, payment or reimbursement of an amount equal to the cost of deepening or replacing the well shall be provided to accommodate these effects. Payment or reimbursement shall be at an amount equal to the customary local cost of deepening the existing well or constructing a new well of comparable design and yield (only deeper). The demand for water, which determines the required well yield, shall be determined on a per well basis using well owner interviews and field verification of property conditions and water requirements compiled as part of the pre-project well reconnaissance. Well yield shall be considered significantly impacted if it is incapable of meeting 110-percent of the well owner's maximum daily demand, dry-season demand, or annual demand – assuming the pre-project well yield documented by the initial well reconnaissance met or exceeded these yield levels.

d) The project owner shall notify any private well owners of the impacted wells within one month of the CPM approval of the compensation analysis for increased energy costs.

e) Pump lowering – In the event that groundwater is lowered as a result of project pumping to an extent where pumps are exposed but well screens remain submerged the pumps shall be lowered to maintain production in the well. The project owner shall reimburse the impacted well owner for the costs associated with lowering pumps.

f) Deepening of wells – If the groundwater is lowered enough as a result of project pumping that well screens and/or pump intakes are exposed, and pump lowering is not an option, such affected wells shall be deepened or new wells constructed. The project owner shall reimburse the impacted well owner for all costs associated with deepening existing wells or constructing new wells shall be borne by the project owner.

3. If the Project's pumping is proven to not be contributing to the water level decline in mesquite habitat projected at the site boundary, the trigger for action can be revised in increments of 0.5 foot. In this case, D.1. would be revised to 1.0 foot, 1.5 feet, etc. The revision of the trigger set in D.1. is dependent on the project owner's demonstration that project pumping is not responsible for the decline in the vigor of mesquite habitat adjacent to the property and around the Stump Spring ACEC. This revision to the condition also requires CPM approval.

4. Groundwater quality data shall be used to ensure the project owner complies with the requirements of WATER SUPPLY-7. If the water quality data show that project pumping is causing a decline in water quality that could lead to exceedance of the allowable Water Quality Objectives for beneficial uses of the PVGB the project owner shall prepare an engineering report consistent with the RWQCB requirements for protection of beneficial uses (See also SOILS-9, Septic System). It is the Commission's intent that these requirements be enforceable by both the Commission and the Lahontan RWQCB. Accordingly, the Commission and the RWQCB shall confer with each other and coordinate, as needed, in enforcement of the requirements for any measures that may be required to protect beneficial uses.

5. If mitigation includes monetary compensation, the project owner shall provide documentation to the CPM that compensation payments have been made by March 31 of each year of project operation or, if lump-sum payments are made, payment is made by March 31 following the first year of operation only. Within 30 days after compensation is paid, the project owner shall submit to the CPM a compliance report describing compensation for increased energy costs necessary to comply with the provisions of this condition.

6. During the life of the project, the project owner shall provide to the CPM all monitoring reports, complaints, studies and other relevant data within 10 days of being received by the project owner.

Verification The project owner shall do all of the following:

1. At least six weeks prior to the start of construction activities, a Groundwater Monitoring, Mitigation, and Reporting Plan (GMMRP) shall be submitted to Inyo County Water Department, the Bureau of Land Management Nevada and California state leads for Soil, Water, Air and Riparian Programs, and the BLM Southern Nevada District and Barstow District Hydrologist and Botanist for review and comment and the CPM for review and approval.

2. At least 30 days prior to operation of the site groundwater supply wells for construction, the project owner shall submit to the CPM a comprehensive report presenting all the baseline groundwater level and quality data required by section A of **WATER SUPPLY-4** above. The report shall include the following:

   a. An assessment of pre-project groundwater quality with groundwater samples analyzed for TDS, chloride, nitrates, major cations and anions, and oxygen-18 and deuterium isotopes. These analyses, and particularly the stable isotope data, can be useful for identifying partially evaporated water sources and assessing their contributions to the quality of water produced by wells.

   b. The data shall be tabulated, summarized, and submitted to the CPM. The data summary shall include the estimated range (minimum and maximum values), average, and median for each constituent analyzed.

3. During project construction, the project owner shall submit to the CPM reports presenting all the data and information required in item B above. The reports shall be provided 30 days following the end of the monitoring period. The project owner shall also submit to the CPM all calculations and assumptions made in development of the report data and interpretations.

4. No later than March 31 of each year of construction or 60 days prior to project operation, the project owner shall provide to the CPM for review and approval, documentation showing that any mitigation to private well owners during project construction was satisfied, based on the requirements of the property owner as determined by the CPM.

5. During project operation, the project owner shall submit to the CPM, applicable monthly, quarterly, semiannual, and annual reports presenting all the data and information required in section C above. Reports shall be submitted to the CPM 30 days following the end of the monitoring period. The fourth quarter report shall serve as the annual report and shall be provided on January 31 in the following year. The project owner shall submit to the CPM all calculations and assumptions made in development of report data and interpretations, calculations, and assumptions used in development of any reports.

After the first five year operational and monitoring period, the project owner shall submit a five year monitoring report to the CPM that includes all monitoring data collected and a summary of the findings. The CPM shall determine if the water level measurements and sampling frequencies should be revised.

GROUNDWATER PUMPING COST CALCULATION

WATER SUPPLY-5 Where it is determined that the project owner shall reimburse a private well owner for increased energy costs identified as a result of analysis performed in Condition of Certification **WATER SUPPLY-4,** the project owner shall calculate the compensation owed to any owner of an impacted well as described below.

Increased cost for energy =	change in lift/total system head x total energy consumption x costs/unit of energy

Where:

change in lift (ft) =	calculated change in water level in the well resulting from project
total system head (ft) =	elevation head + discharge pressure head
elevation head (ft) =	difference in elevation between wellhead discharge pressure gauge and water level in well during pumping.
discharge pressure head (ft) =	pressure at wellhead discharge gauge (psi) X 2.31

The project owner shall submit to the CPM for review and approval the documentation showing which well owners must be compensated for increased energy costs and that the proposed amount is sufficient compensation to comply with the provisions of this condition.

A. Any reimbursements (either lump sum or annual) to impacted well owners shall be only to those well owners whose wells were in service within six months of the Commission decision and within a 5-mile radius of the project site.

B. The project owner shall notify all owners of the impacted wells within one month of the CPM approval of the compensation analysis for increase energy costs.

C. Compensation shall be provided on either a one-time lump-sum basis, or on an annual basis, as described below.

Annual Compensation: Compensation provided on an annual basis shall be calculated prospectively for each year by estimating energy costs that will be incurred to provide the additional lift required as a result of the project. With the permission of the impacted well owner, the project owner shall provide

energy meters for each well or well field affected by the project. The impacted well owner to receive compensation must provide documentation of energy consumption in the form of meter readings or other verification of fuel consumption. For each year after the first year of operation, the project owner shall include an adjustment for any deviations between projected and actual energy costs for the previous calendar year.

One-Time Lump-Sum Compensation: Compensation provided on a one-time lump-sum basis shall be based on a well-interference analysis, assuming the maximum project-pumping rate of 163 acre-feet per year. Compensation associated with increased pumping lift for the life of the project shall be estimated as a lump sum payment as follows:

A. The current cost of energy to the affected party considering time of use or tiers of energy cost applicable to the party's billing of electricity from the utility providing electric service, or a reasonable equivalent if the party independently generates their electricity;

B. An annual inflation factor for energy cost of 3 percent; and

C. A net present value determination assuming a term of 30 years and a discount rate of 9 percent;

Verification: The project owner shall do all of the following:

1. No later than 30 days after CPM approval of the well drawdown analysis, the project owner shall submit to the CPM for review and approval all documentation and calculations describing necessary compensation for energy costs associated with additional lift requirements.

2. The project owner shall submit to the CPM all calculations, along with any letters signed by the well owners indicating agreement with the calculations, and the name and phone numbers of those well owners that do not agree with the calculations. Compensation payments shall be made by March 31 of each year of project operation or, if lump-sum payment is selected, payment shall be made by March 31 of the first year of operation only. Within 30 days after compensation is paid, the project owner shall submit to the CPM a compliance report describing compensation for increased energy costs necessary to comply with the provisions of this condition.

GROUND SUBSIDENCE MONITORING AND ACTION PLAN

WATER SUPPLY–6 One monument monitoring station per production well or a minimum of three stations shall be constructed to measure potential inelastic subsidence that may alter surface characteristics of the PVGB and affect structures near the proposed production wells. The project owner shall:

A. Prepare and submit a Subsidence Monitoring Plan (SMP), including all calculations and assumptions. The plan shall include the following elements:

1. Construction diagrams of the proposed monument monitoring stations including size and description, planned depth, measuring points, and protection measures;

2. Map depicting locations (minimum of three) of the planned monument monitoring stations;

3. Monitoring program that includes monitoring frequency, thresholds of significance, reporting format.

B. Prepare annual reports commencing three (3) months following commencement of groundwater production during construction and operations.

1. The reports shall include presentation and interpretation of the data collected including comparison to the thresholds developed in Item C.

C. Prepare a Mitigation Action Plan that details the following:

1. Thresholds of significance for implementation of proposed action plan based on monitoring station data;

a. Subsidence shall not be allowed to damage existing structures either on or off the site or alter the appearance or use of the structure;

b. Any subsidence that may occur shall not be allowed to alter natural drainage patterns or permit the formation of playas or lakes;

c. If any subsidence violates (a) or (b) the project owner shall investigate the need to immediately modify or cease pumping for project operations until the cause is interpreted and subsidence caused by project pumping abates and the structures and/or drainage patterns are stabilized and corrected.

2. The project owner shall prepare an Action Plan that details proposed actions by the applicant in the event thresholds are achieved during the monitoring program

The project owner shall submit the Ground Subsidence Monitoring and Action Plan that is prepared by an Engineering Geologist registered in the State of California thirty (30) days prior to the start of extraction of groundwater for construction or operation.

Verification: The project owner shall do all of the following:

1. At least thirty (30) days prior to project construction, the project owner shall submit to the CPM, a comprehensive report presenting all the data and information required in item A above.

2. During project construction and operations, the project owner shall submit to the CPM quarterly reports presenting all the data and information required in item B above.

3. The project owner shall submit to the CPM all calculations and assumptions made in development of the report data and interpretations.

4. After the first five (5) years of the monitoring period, the project owner shall submit a 5-year monitoring report to the CPM that submits all monitoring data collected and provides a summary of the findings. The CPM shall determine if the Ground Subsidence Monitoring and Action Plan frequencies should be revised..

NON-TRANSIENT, NON-COMMUNITY WATER SYSTEM

WATER SUPPLY-7 The project is subject to the requirements of California Code of Regulations, Title 22, Article 3, Sections 64400.80 through 64445 (22 CCR § 64400.80 – 64445) for a non-transient, non-community water system (serving 25 people or more for more than six months). The project owner shall submit water system plans to Inyo County Environmental Health Services for review and approval. In addition, the system will require periodic monitoring consistent with **WATER SUPPLY-4**, for various bacteriological, inorganic and organic constituents.

Verification: The project owner shall obtain a permit to operate a non-transient, non-community water system with the Inyo County Environmental Health Services at least sixty (60) days prior to commencement of construction at the site. In addition, the project owner shall submit to the CPM a monitoring and reporting plan for production wells operated as part of the domestic water supply system prior to plant operations. The plan shall include reporting requirements including monthly, quarterly, and annual submissions.

The project owner shall designate a California Certified Water Treatment Plant Operator as well as the technical, managerial, and financial requirements as prescribed by State law. The project owner shall supply the CPM updates on an annual basis regarding monitoring requirements, any submittals to the Inyo County Environmental Health Services, and proof of annual renewal of the operating permit.

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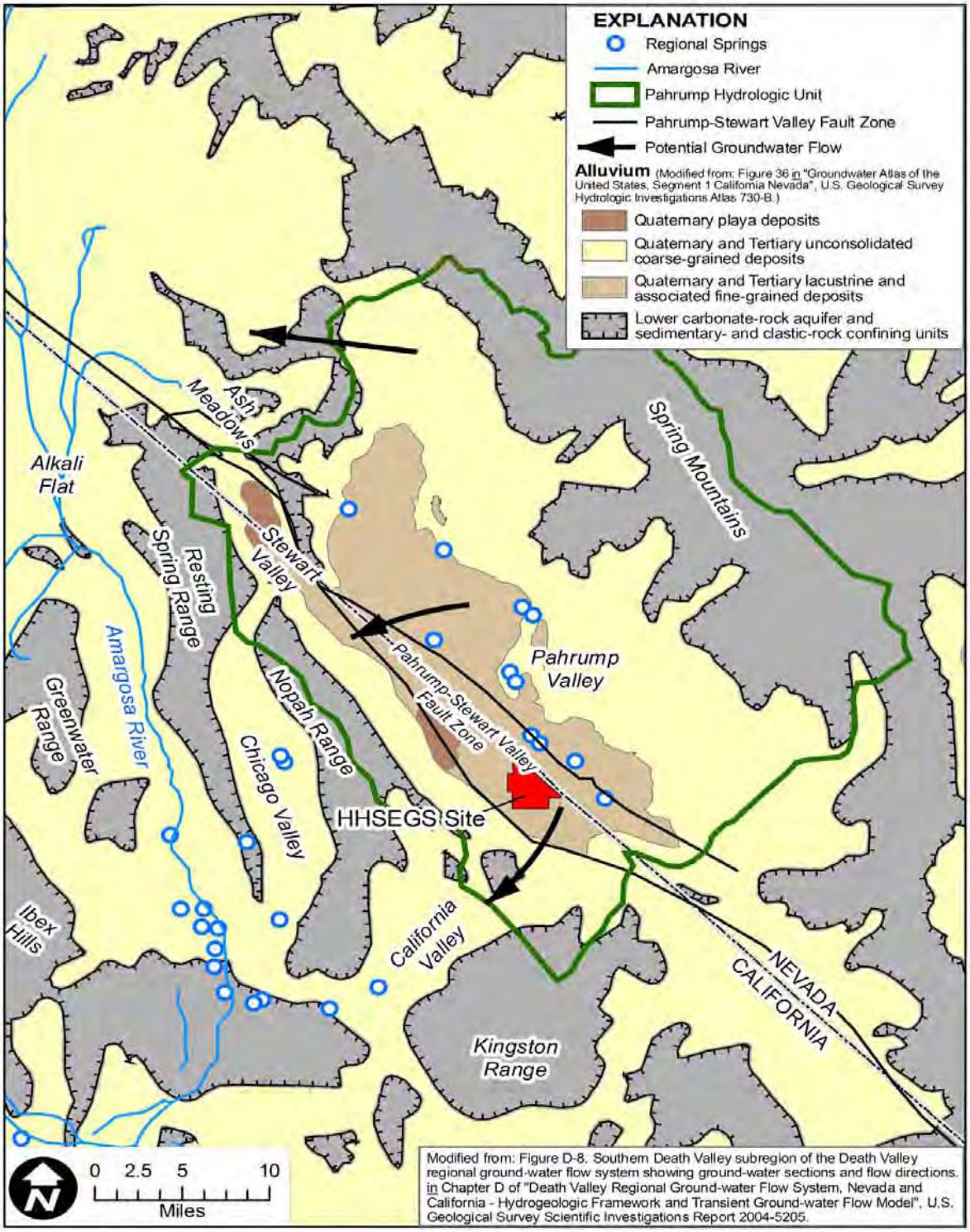
WATER SUPPLY - FIGURE 1
Hidden Hills Solar Electric Generating System (HHSEGS)

The Great Basin is a large-scale, topographically closed surface water basin. The area is also aligned with the Basin and Range geologic province, which is characterized by extension, and an alternating mountain/valley-fill landscape.

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE:USGS, 2011

WATER SUPPLY - FIGURE 2
Hidden Hills Solar Electric Generating System (HHSEGS)

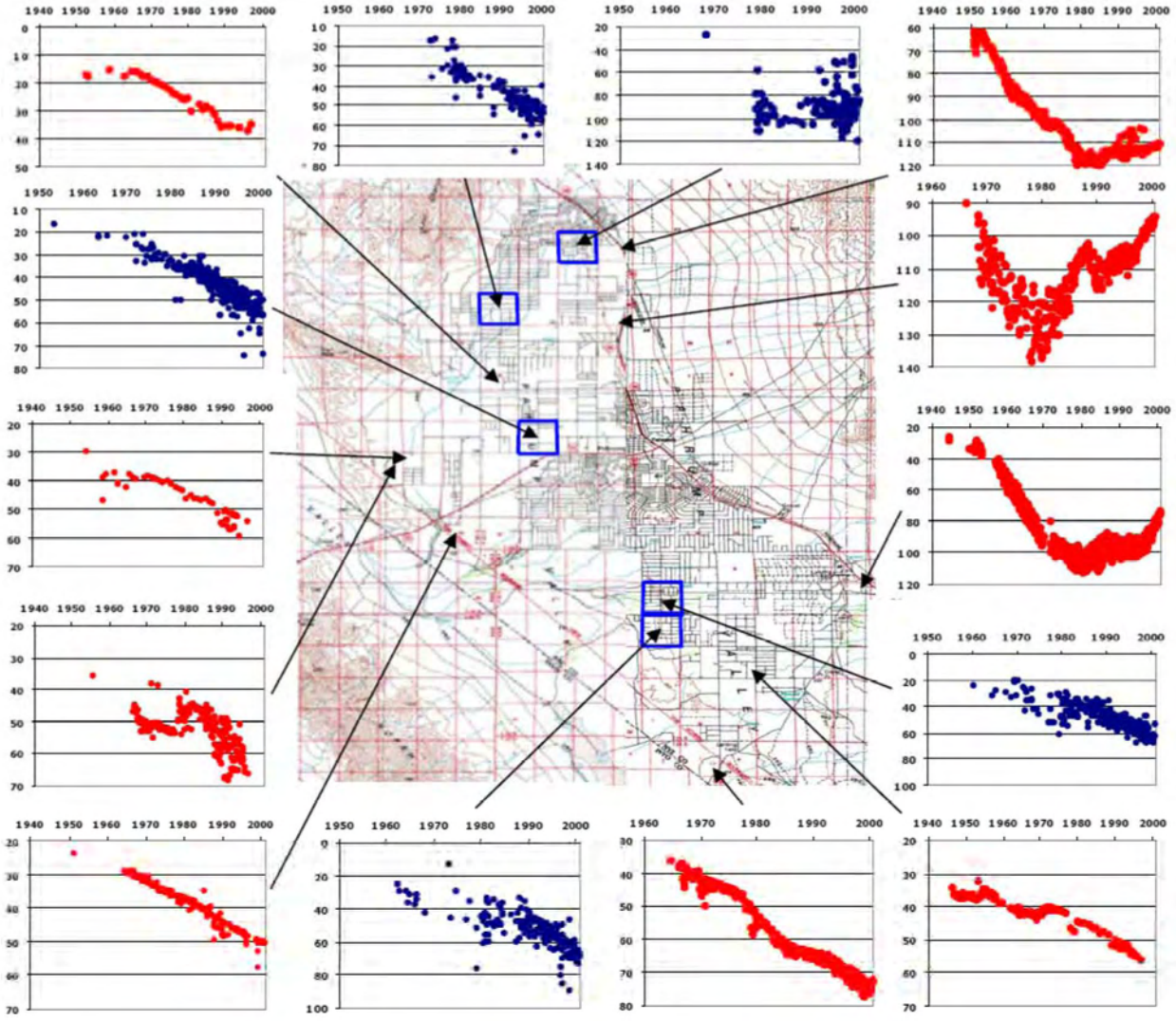
The Pahrump Valley and vicinity.



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE:Faunt[B] et al., 2004

WATER SUPPLY - FIGURE 3
Hidden Hills Solar Electric Generating System (HHSEGS)

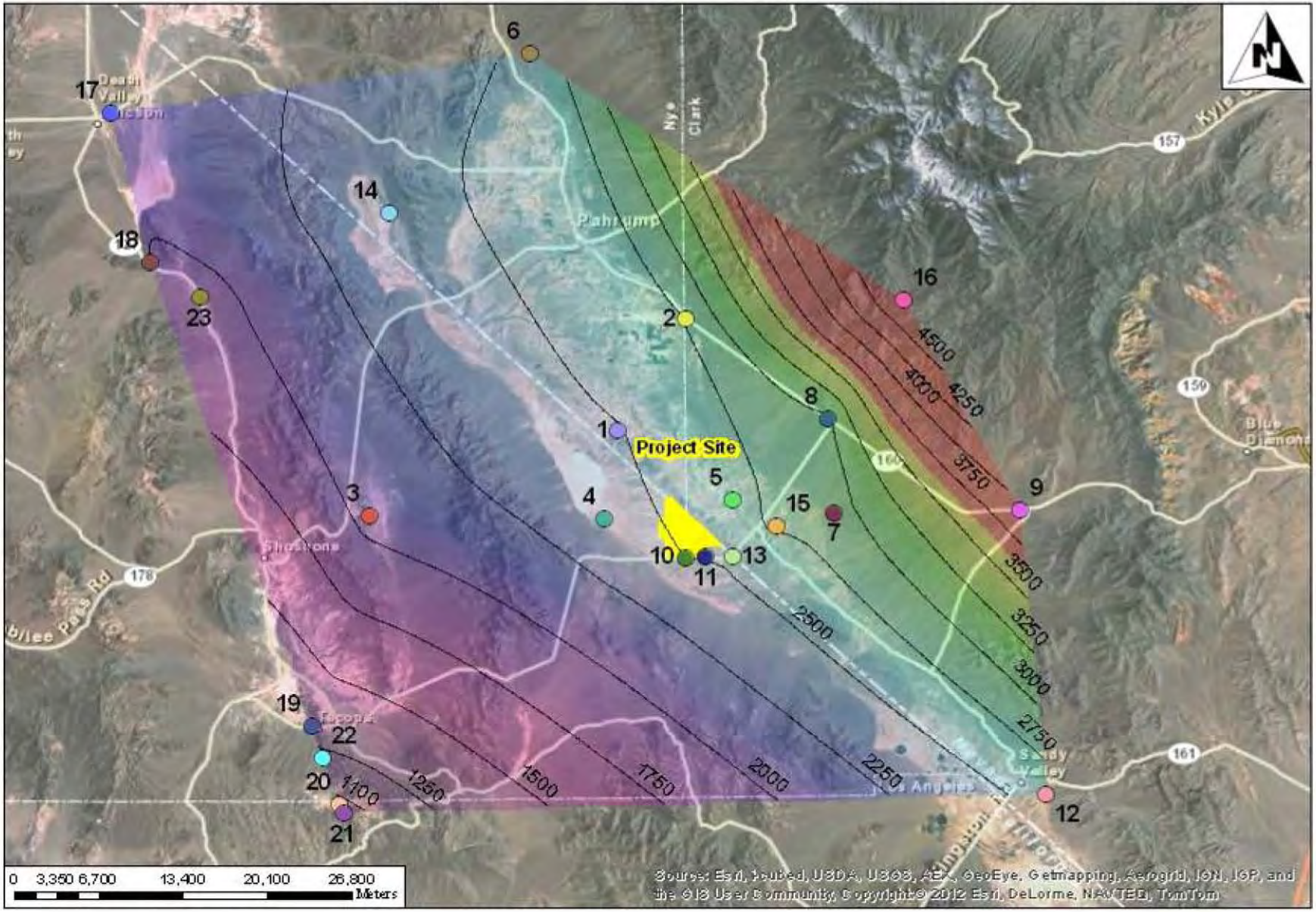
Water levels in northern Pahrump Valley between 1940 and 2000. Vertical axes represent feet below land surface.



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: Buqo, 2004

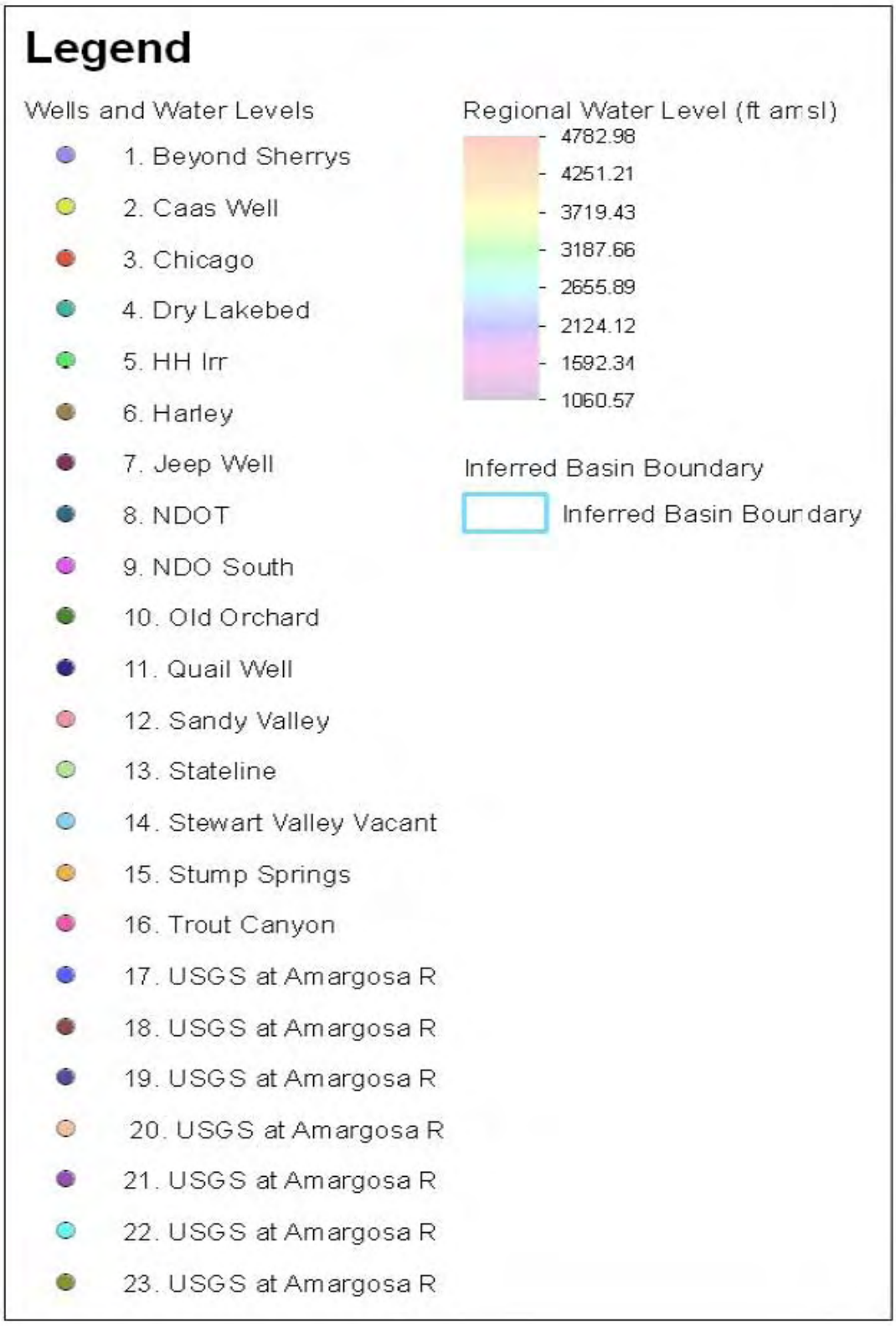
WATER SUPPLY - FIGURE 4

Hidden Hills Solar Electric Generating System (HHSEGS) - Inferred potentiometric surface for Pahrump Valley, based on 2011 water level data, extrapolated a little north, to the Amargosa River in the west, and Sandy Valley to the south (see **WATER SUPPLY: Figure 5** for Legend).



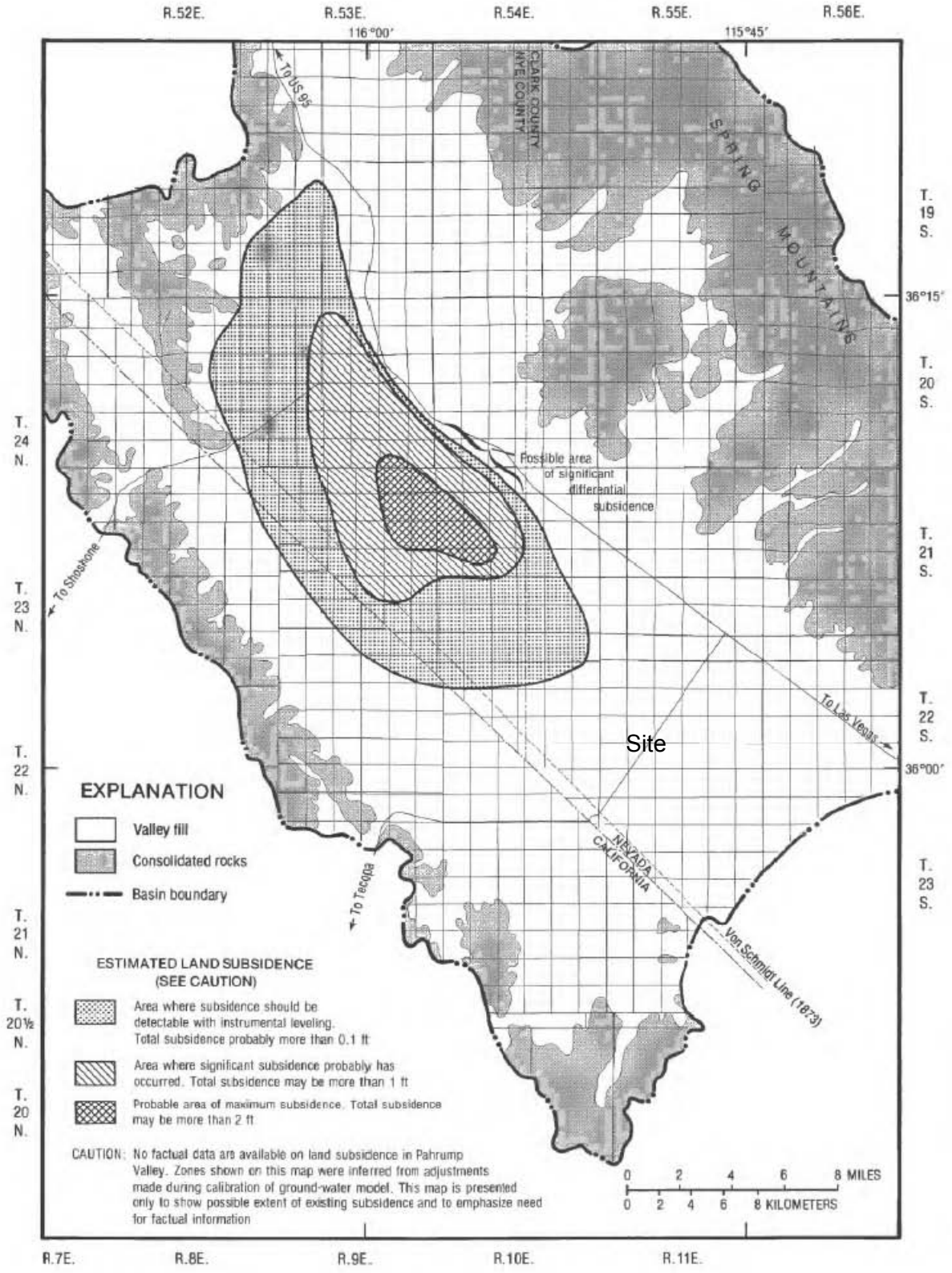
WATER SUPPLY - FIGURE 5

Hidden Hills Solar Electric Generating System (HHSEGS)– Legend for **WATER SUPPLY: Figure 4**.



WATER SUPPLY - FIGURE 6

Hidden Hills Solar Electric Generating System (HHSEGS) – Estimated land subsidence in Pahrump Valley.

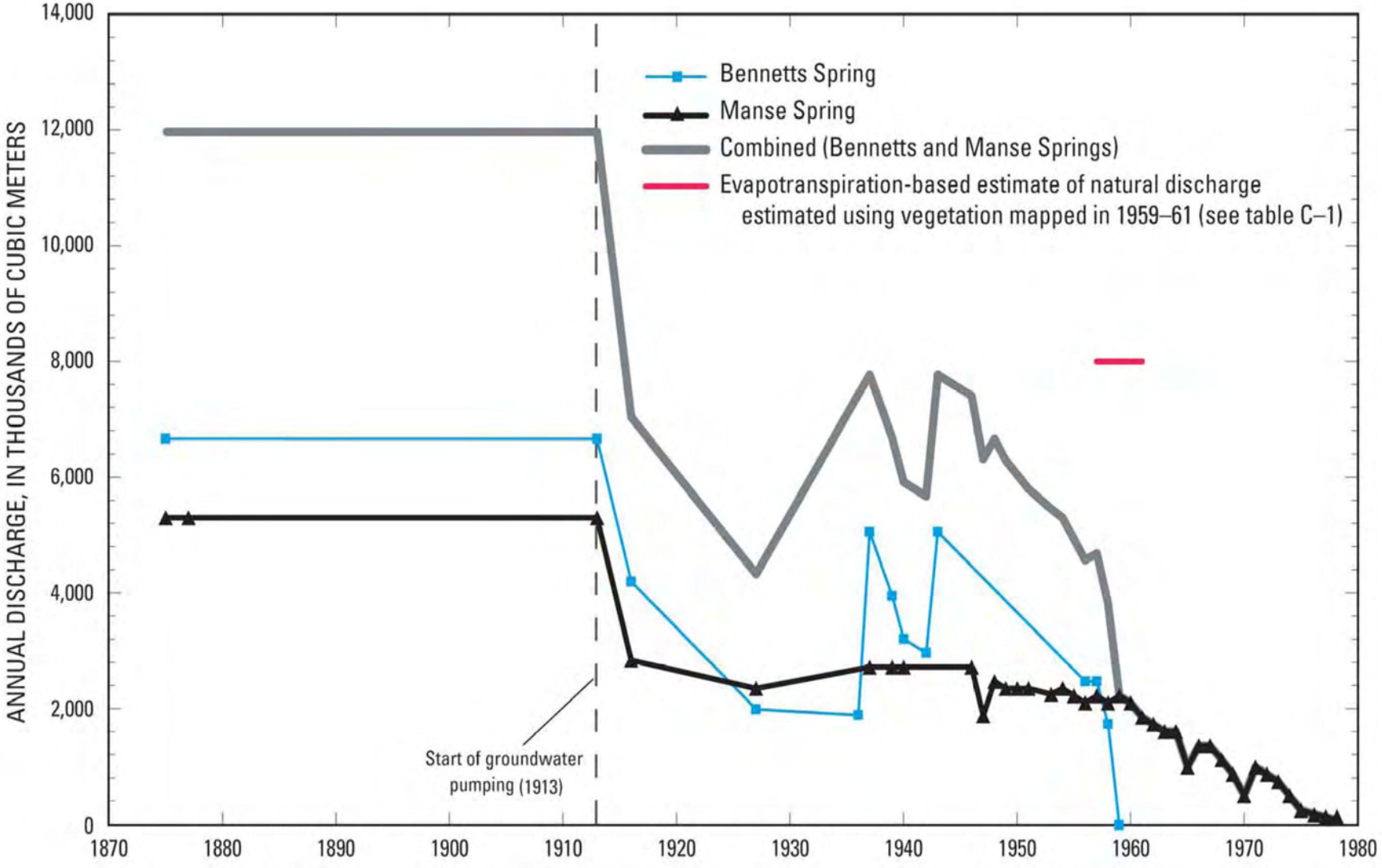


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE:Harrill, 1986

WATER SUPPLY - FIGURE 7

Hidden Hills Solar Electric Generating System (HHSEGS) - Annual discharge estimates for Bennetts and Manse Spring, for years 1870 through 1980.



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Belcher et al., 2004

WATER SUPPLY - FIGURE 8

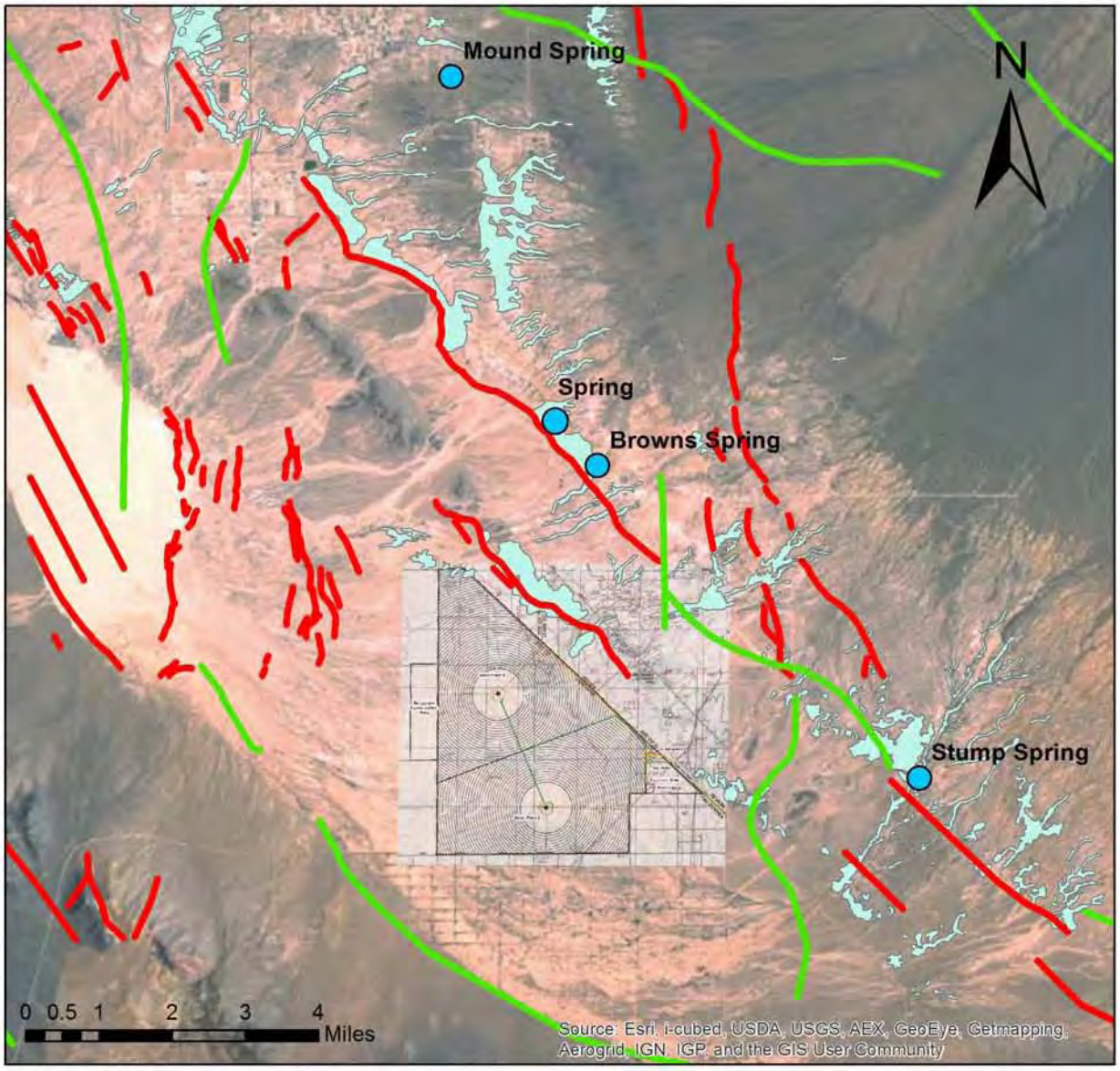
Hidden Hills Solar Electric Generating System (HHSEGS) – Mesquite stands in the vicinity of the project (Malmburg, 1967).

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Malmburg, 1967

WATER SUPPLY - FIGURE 9

Hidden Hills Solar Electric Generating System (HHSEGS) – Mesquite-acacia habit mapped by BLM staff in the 1990s.

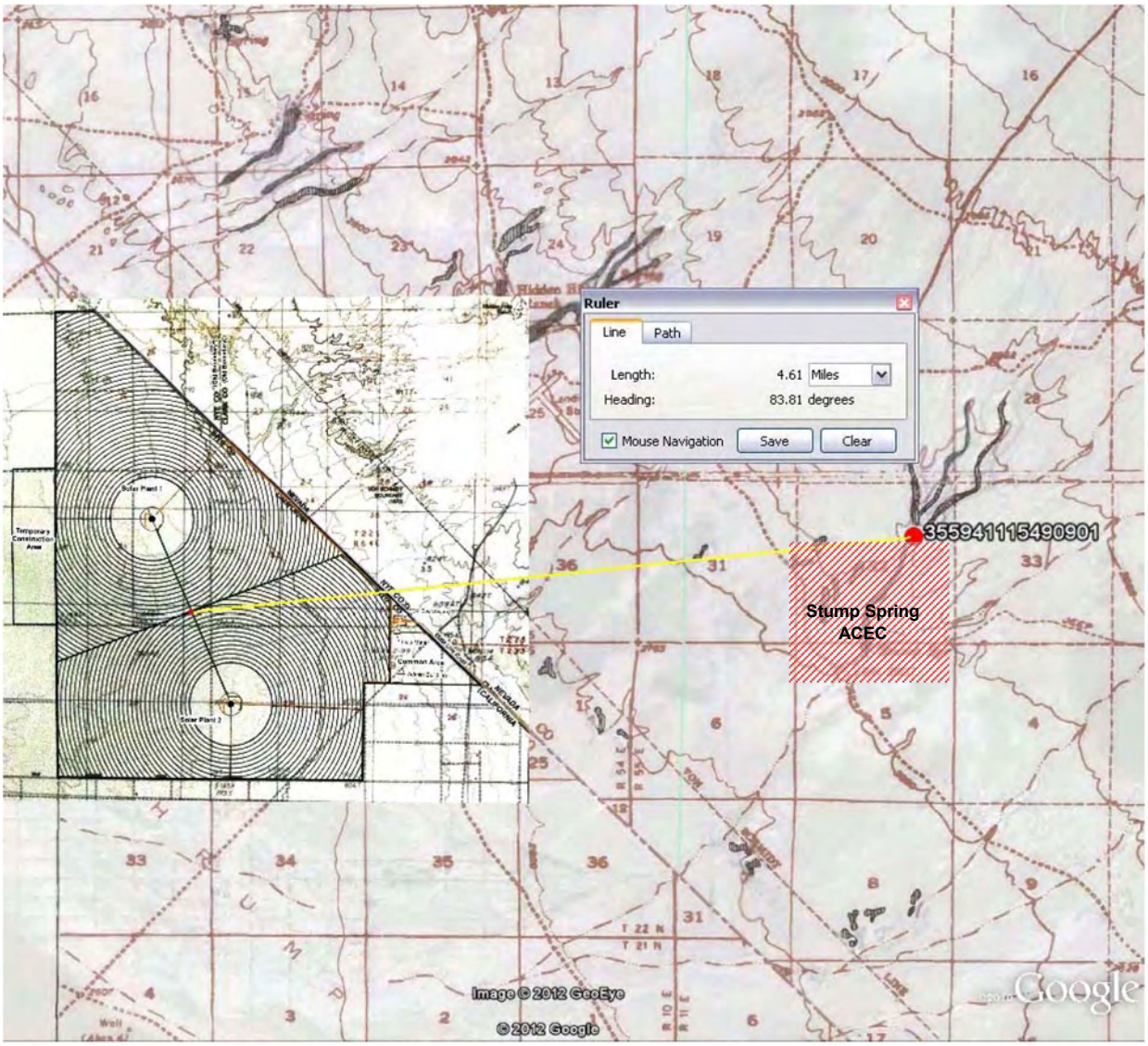


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: BLM, Workman et al., 2002.

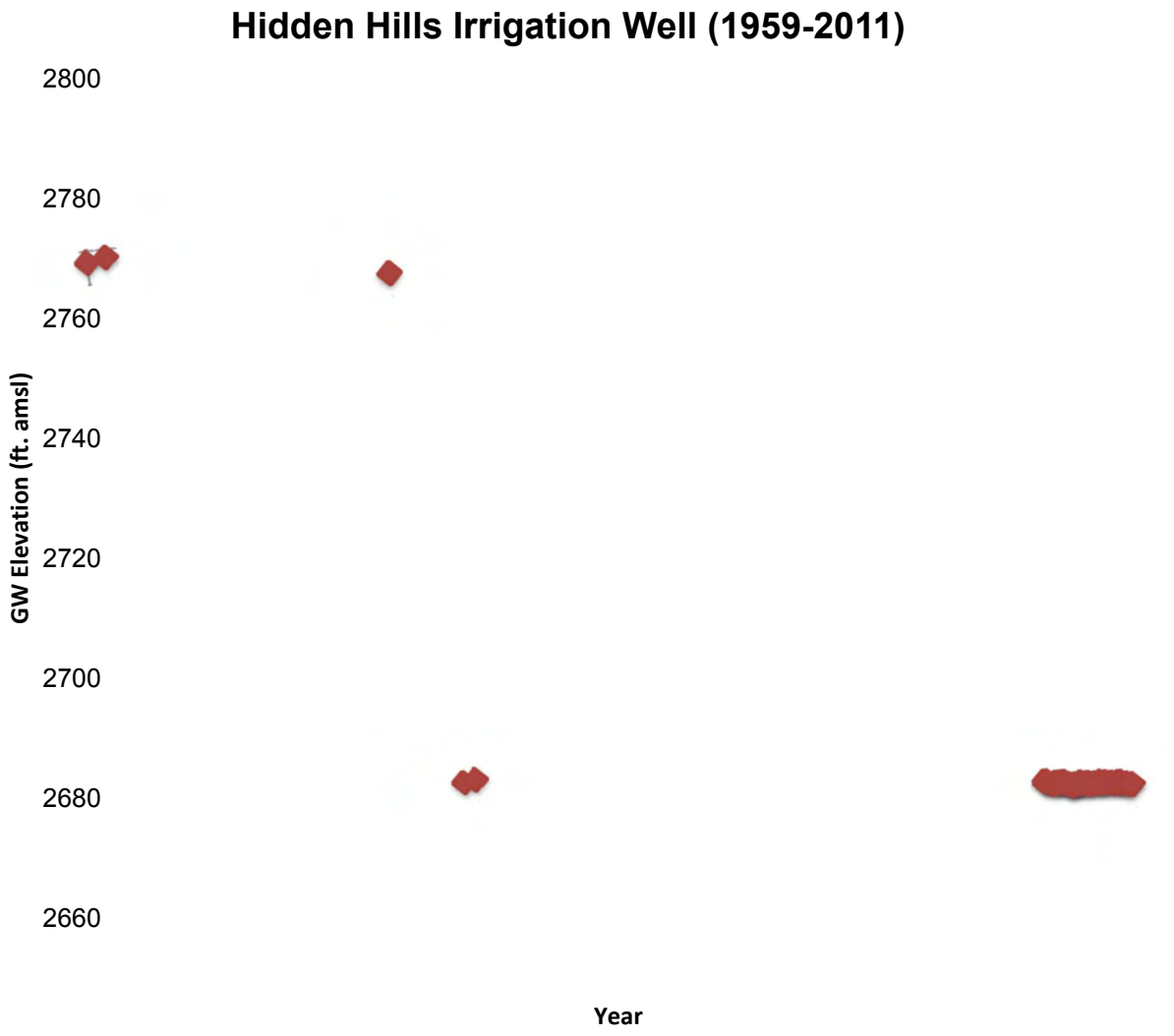
WATER SUPPLY - FIGURE 10
Hidden Hills Solar Electric Generating System (HHSEGS)

The Stump Springs Area of Critical Environmental Concern is about 4 miles from the center of the project. The Stump Springs monitoring well is about 4.6 miles from the center of the project.



WATER SUPPLY - FIGURE 11
Hidden Hills Solar Electric Generating System (HHSEGS)

Water levels at the Hidden Hills Irrigation well between 1959 and 2011. The blue line represents the Sen's slope estimator. The slope of trendlineindicates that the decline in the well is equal to 0.25 feet per year.

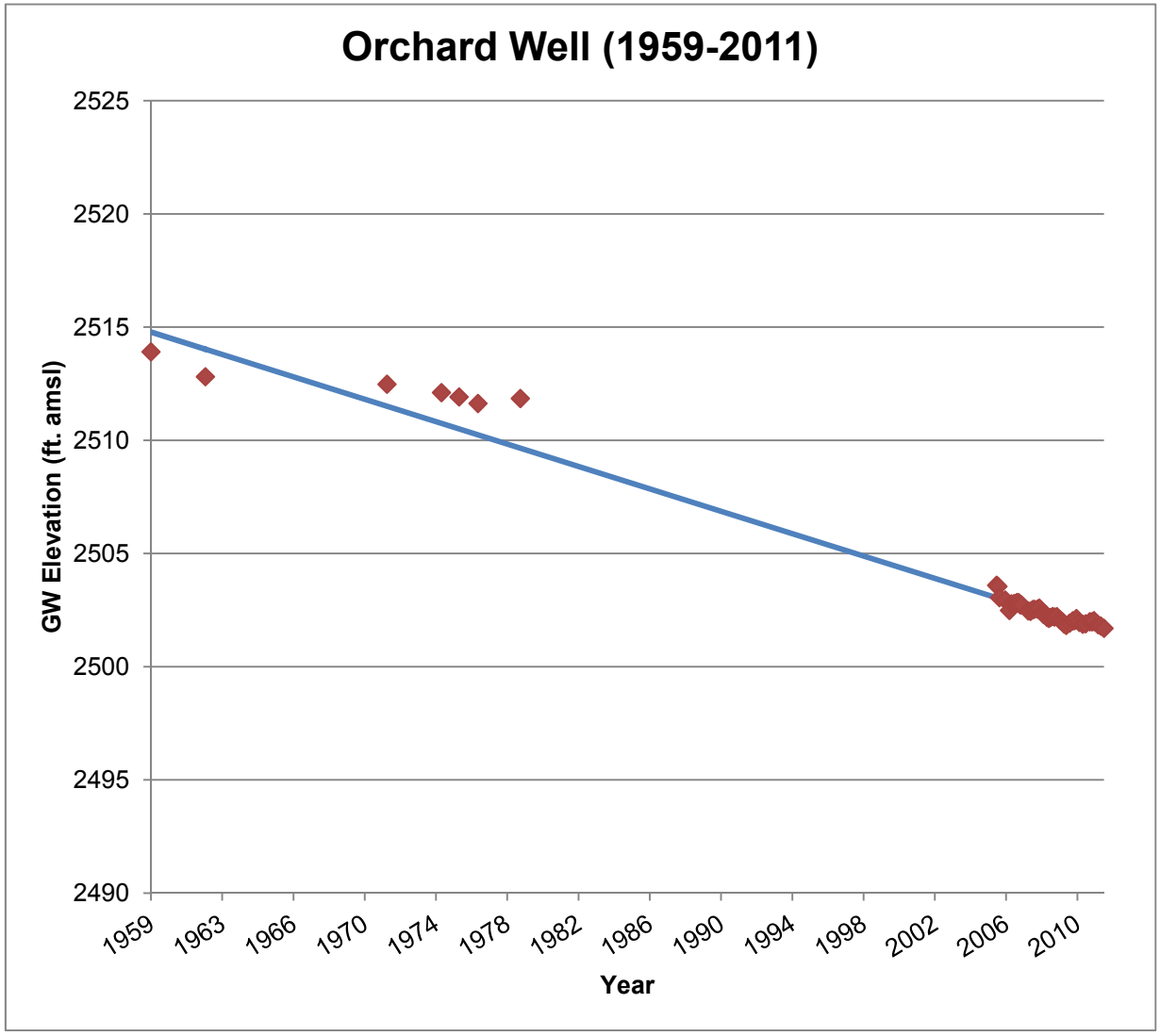


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE:USGS, 2011

WATER SUPPLY - FIGURE 12

Hidden Hills Solar Electric Generating System (HHSEGS)

Water levels at the Old Orchard well between 1959 and 2011. The blue line represents the Sen's slope estimator. The slope of trendline indicates that the decline in the well is equal to 0.37 feet per year (4.44 inches per year).



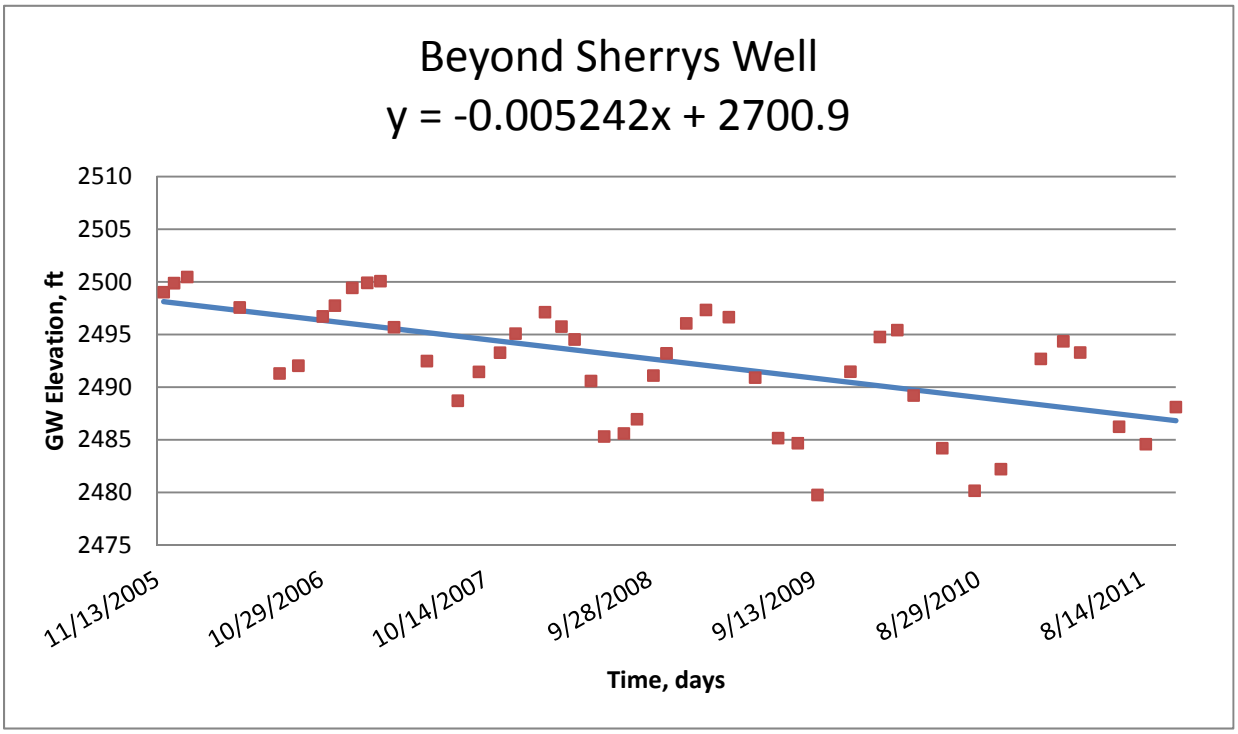
CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

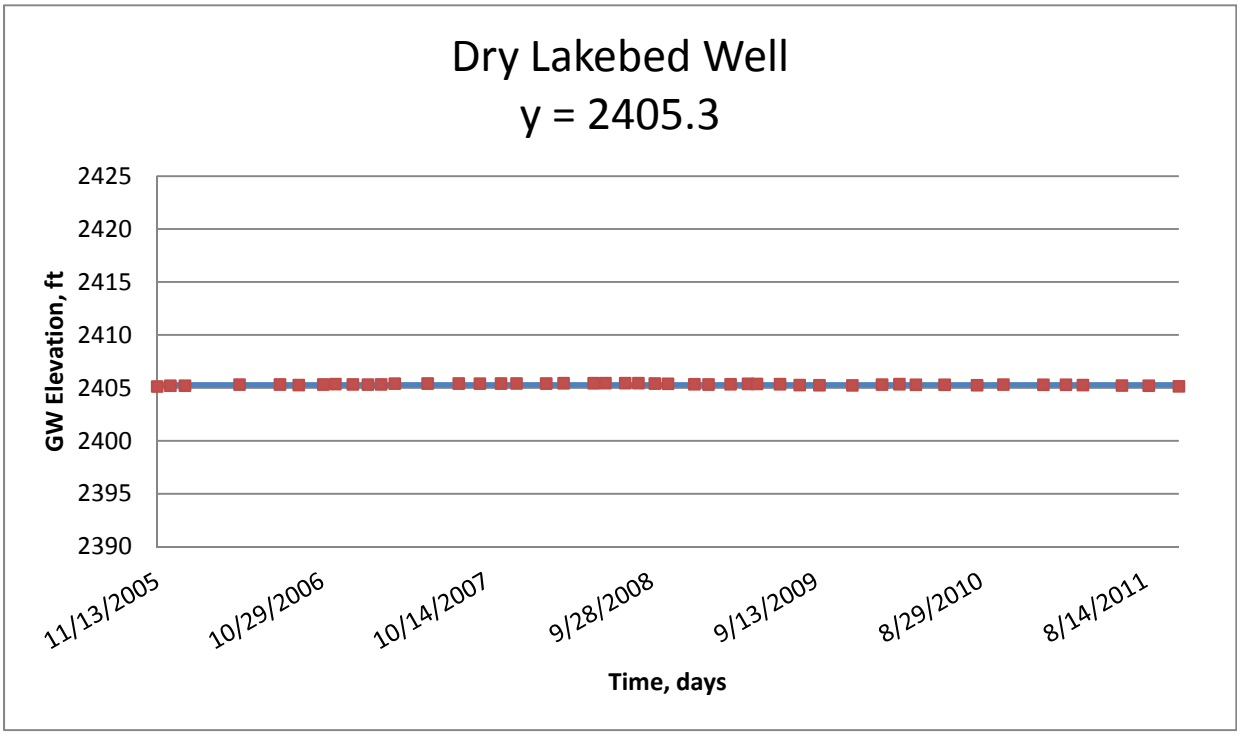
SOURCE: USGS, 2012

WATER SUPPLY - FIGURE 13

Hidden Hills Solar Electric Generating System (HHSEGS)

Water level trends in feet per day, between November 2005 and November 2011, for the Beyond Sherrys (-1.91 ft/yr) and Dry Lakebed (0.00 ft/yr) wells.



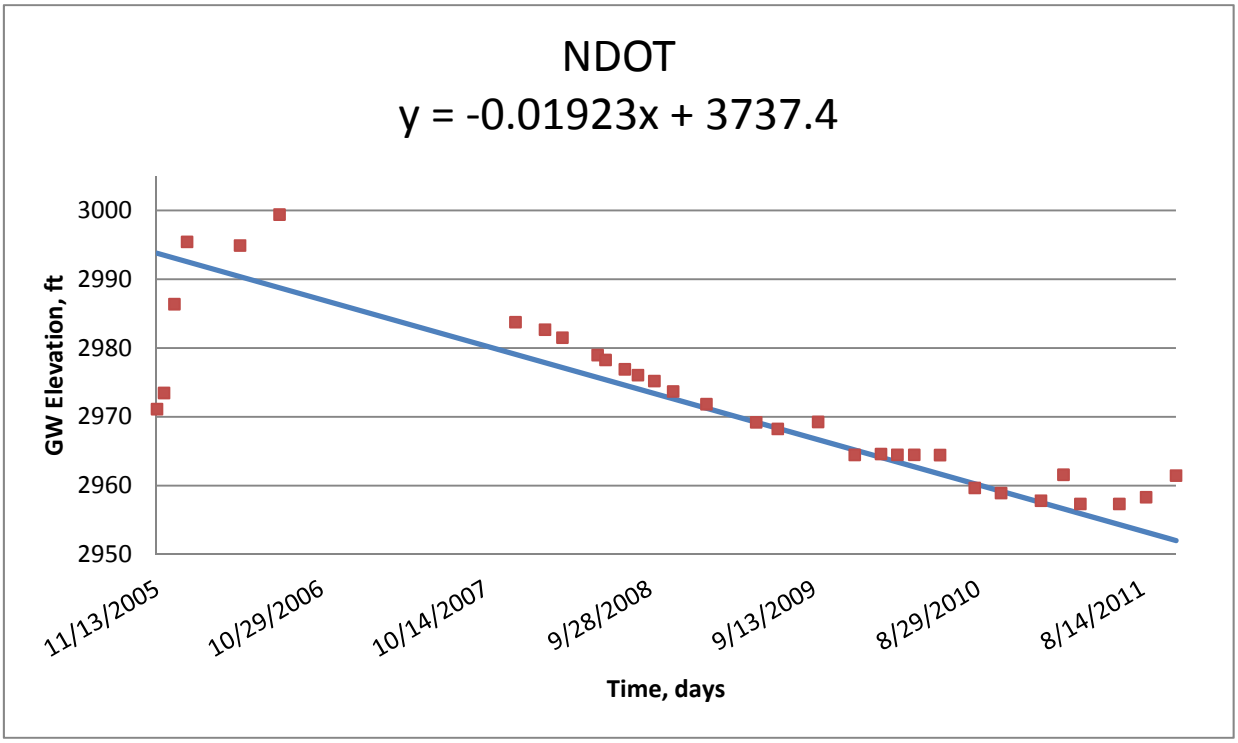


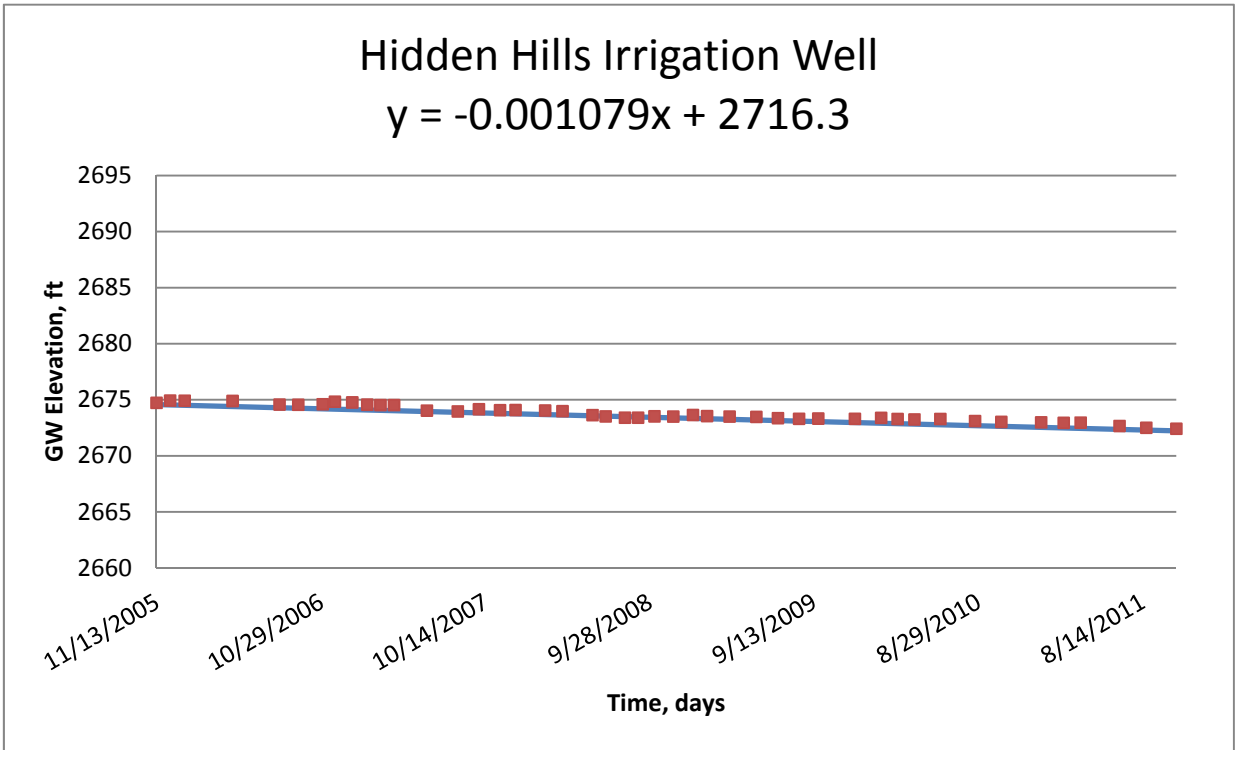
CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: NWRPO

WATER SUPPLY - FIGURE 14
Hidden Hills Solar Electric Generating System (HHSEGS)

Water level trends in feet per day, between November 2005 and November 2011, for the NDOT (-7.00 ft/yr) and Hidden Hills (-0.39 ft/yr) irrigation wells.

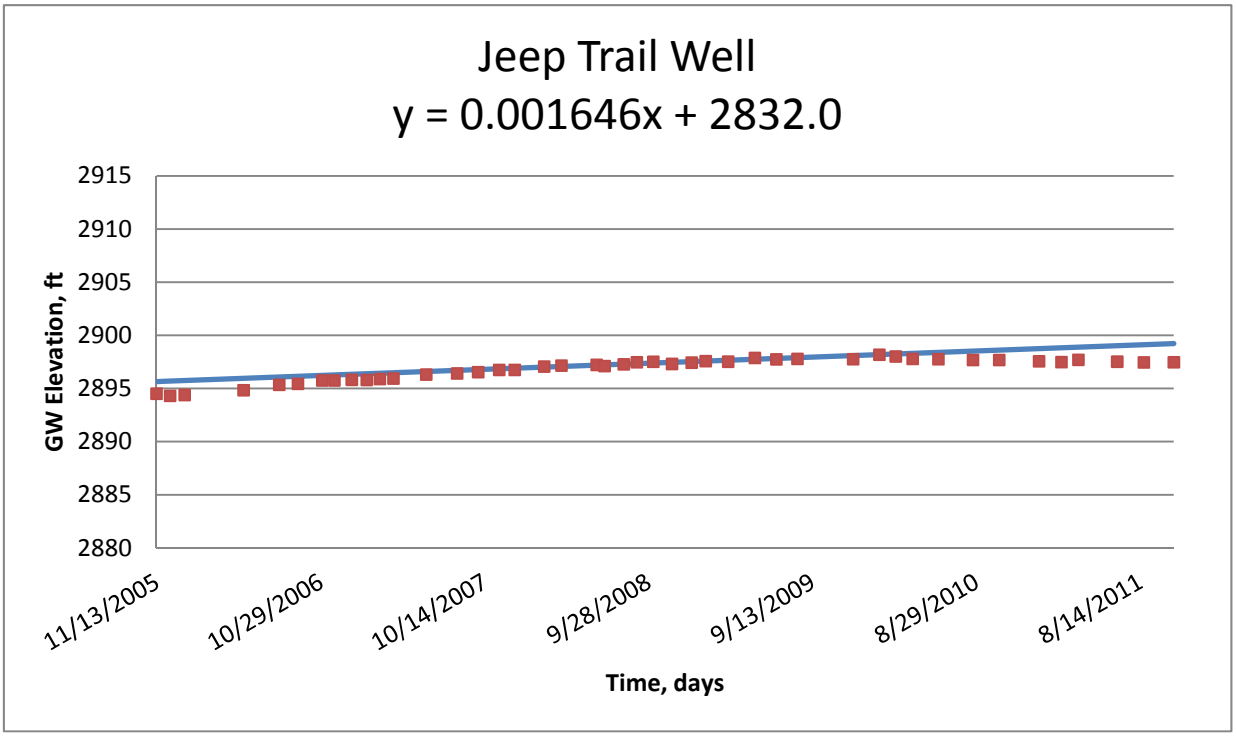


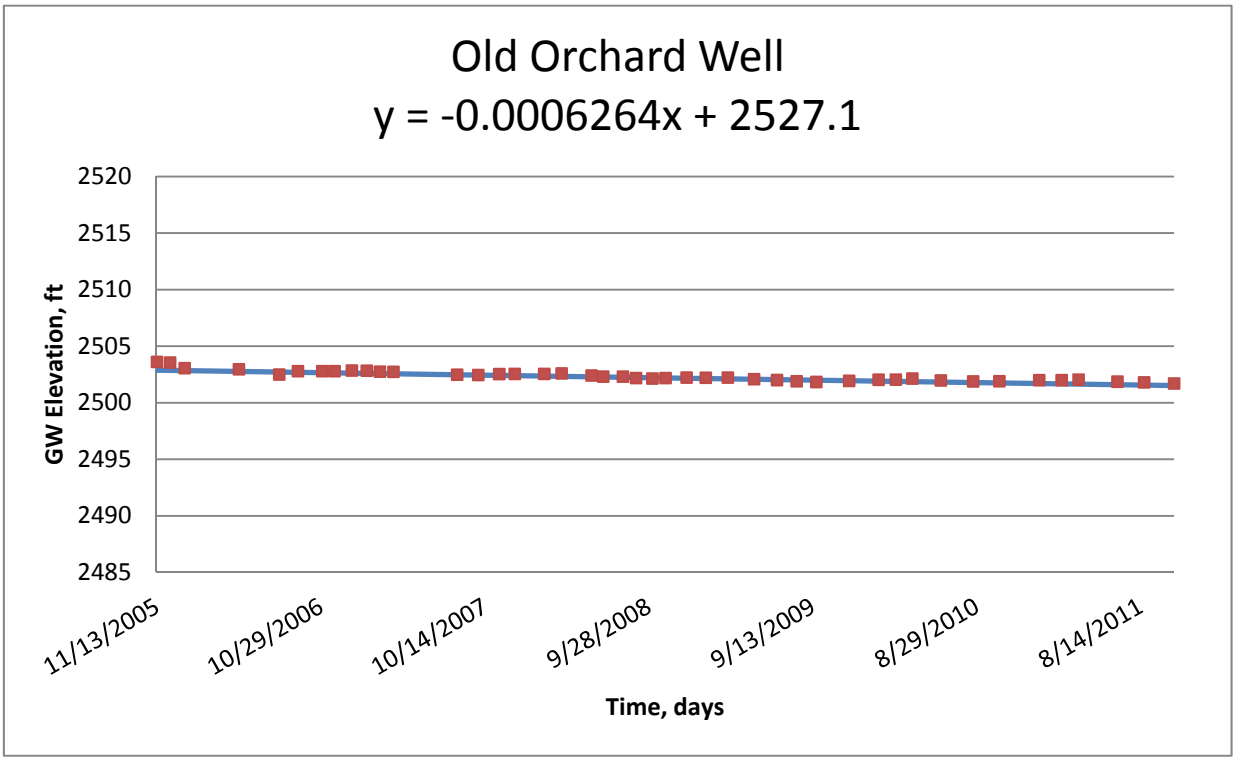


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: NWRPO

WATER SUPPLY - FIGURE 15
Hidden Hills Solar Electric Generating System (HHSEGS)

Water level trends in feet per day, between November 2005 and November 2011, for the Jeep Trail (0.60 ft/yr) and Old Orchard wells (-0.23 ft/yr).

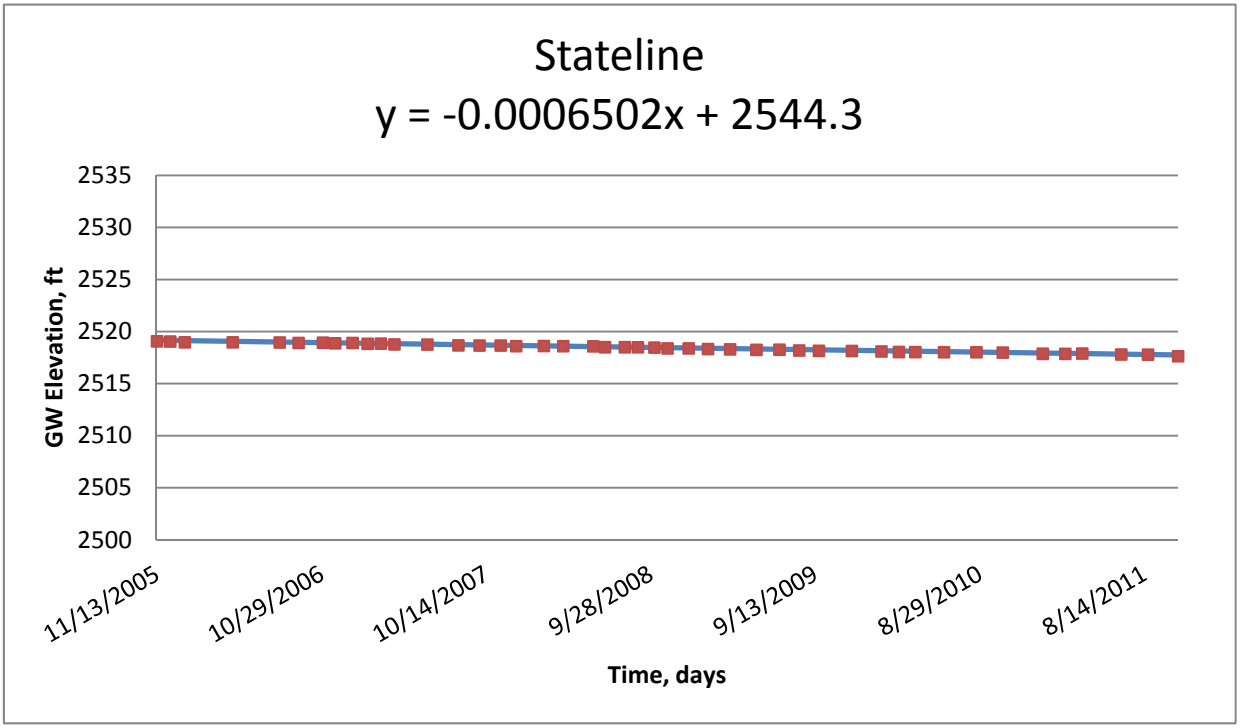


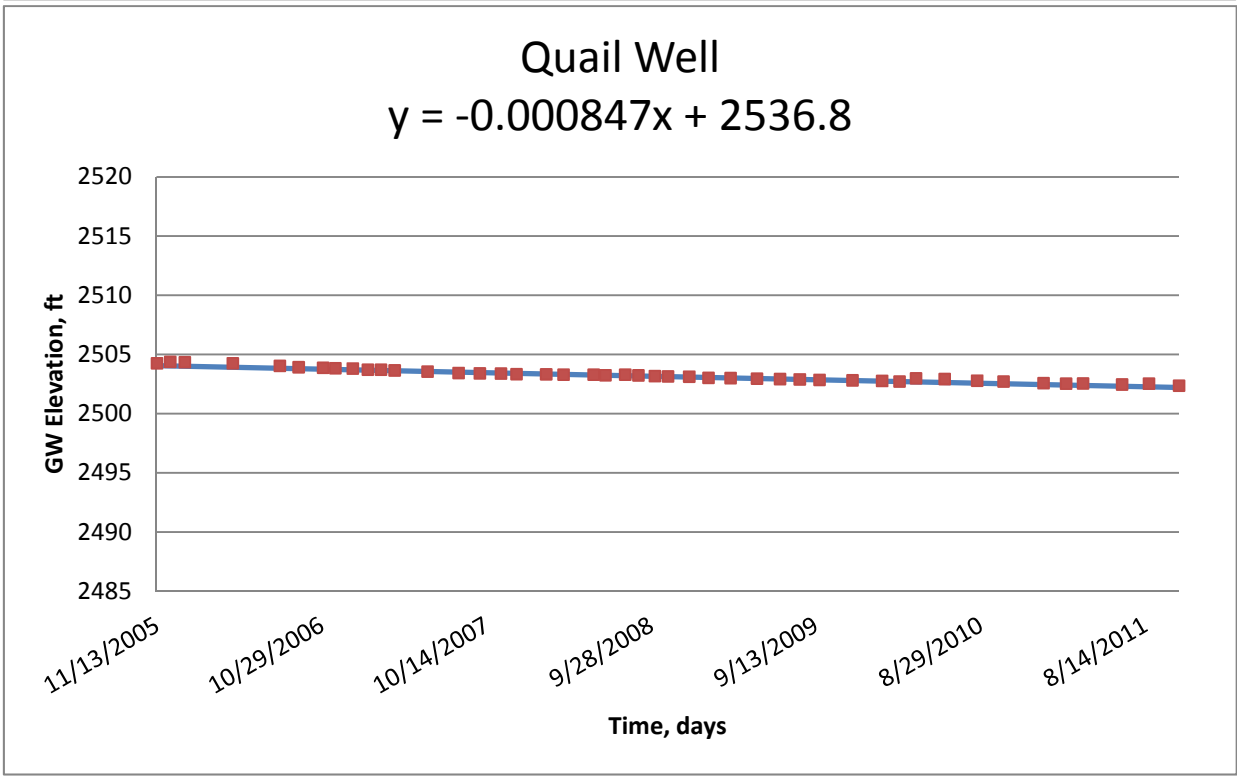


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: NWRPO

WATER SUPPLY - FIGURE 16
Hidden Hills Solar Electric Generating System (HHSEGS)

Water level trends in feet per day, between November 2005 and November 2011, for the Stateline (-0.24 ft/yr) and Quail (-0.31 ft/yr) wells.

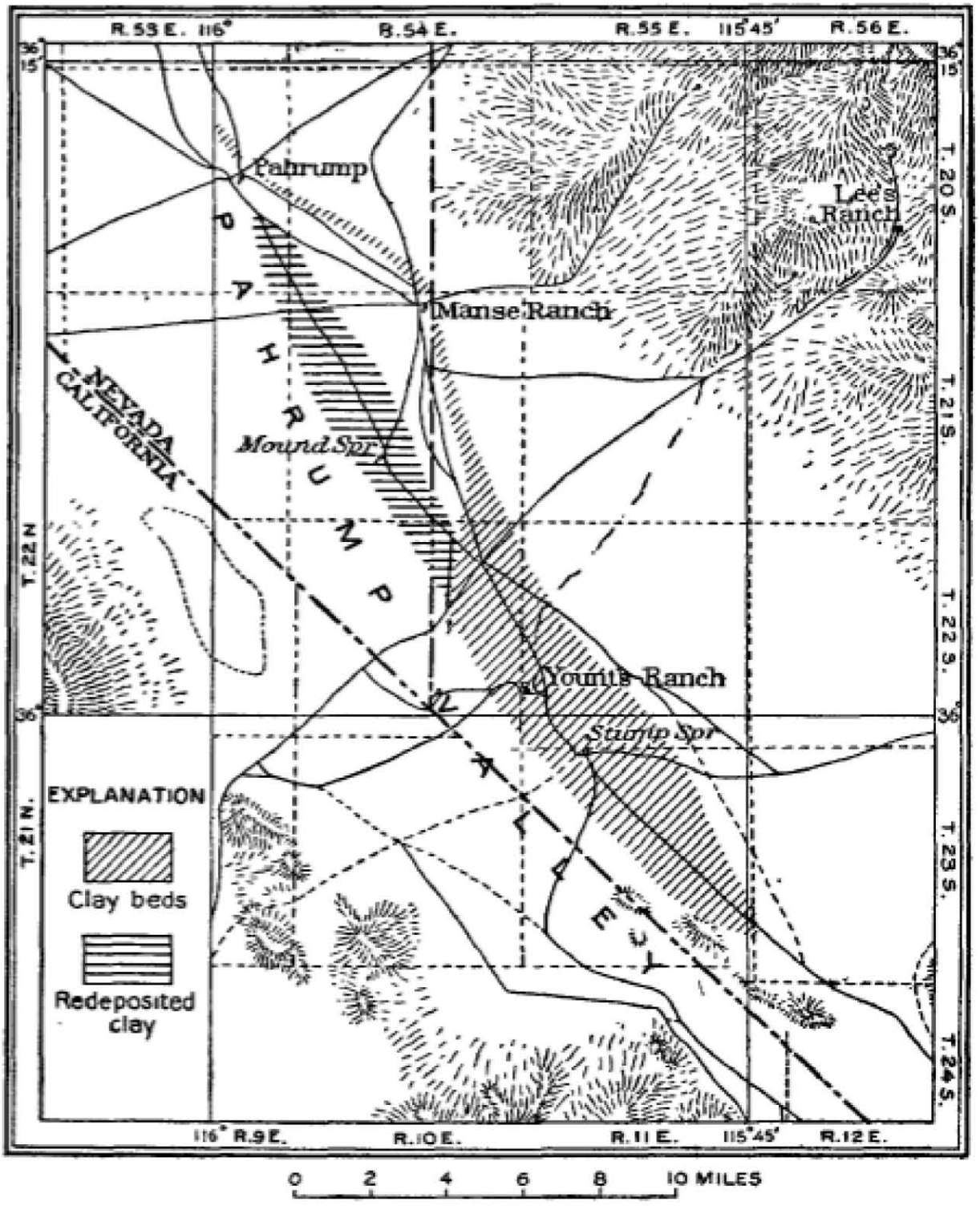




CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: NWRPO

WATER SUPPLY - FIGURE 17
Hidden Hills Solar Electric Generating System (HHSEGS)

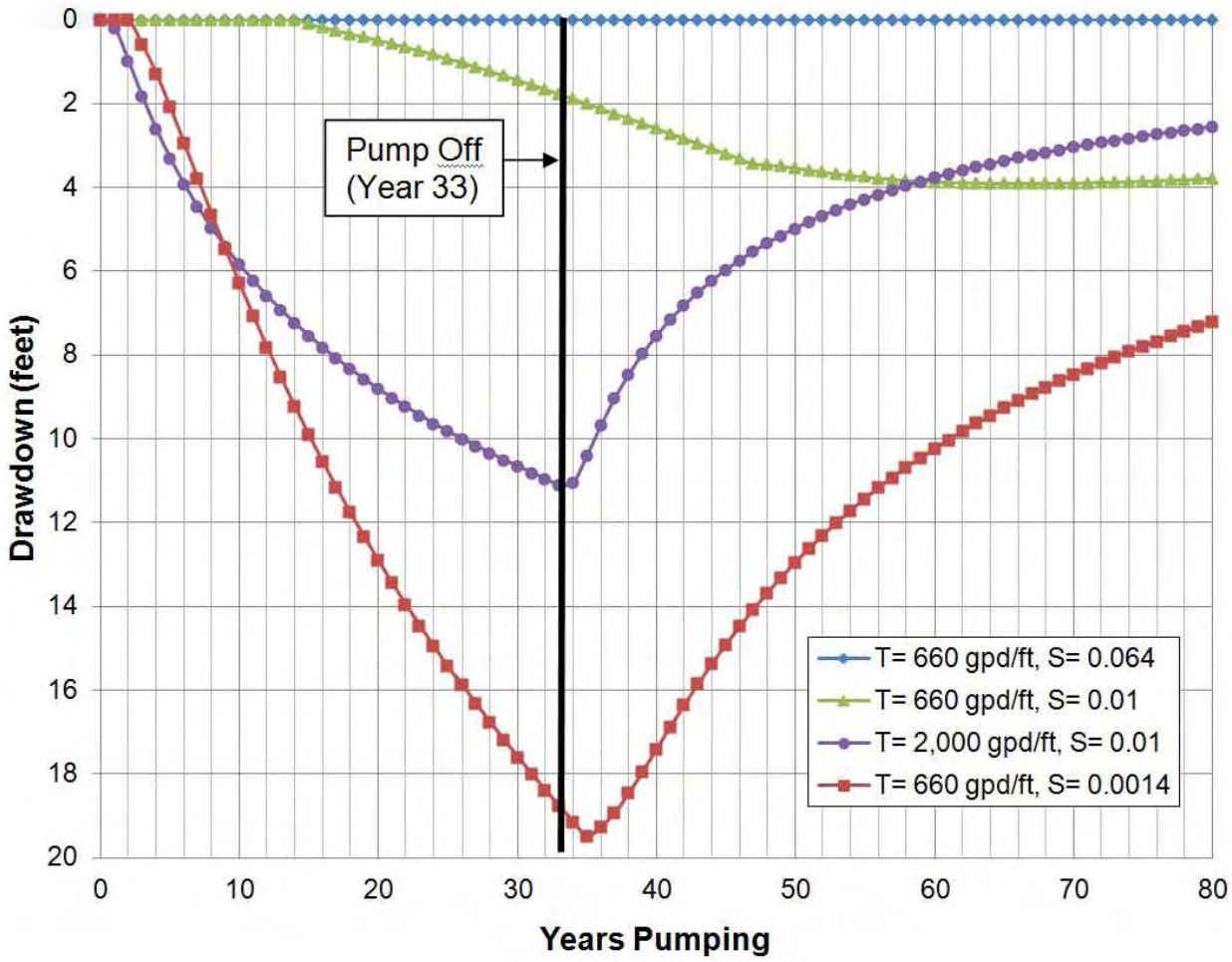
A significant exposure of clay bedding is observed around the Stump Springs region. The clay bedding is said to reach its maximum thickness of 50 feet near Stump Springs.



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: Grover, 1919

WATER SUPPLY - FIGURE 18
Hidden Hills Solar Electric Generating System (HHSEGS)

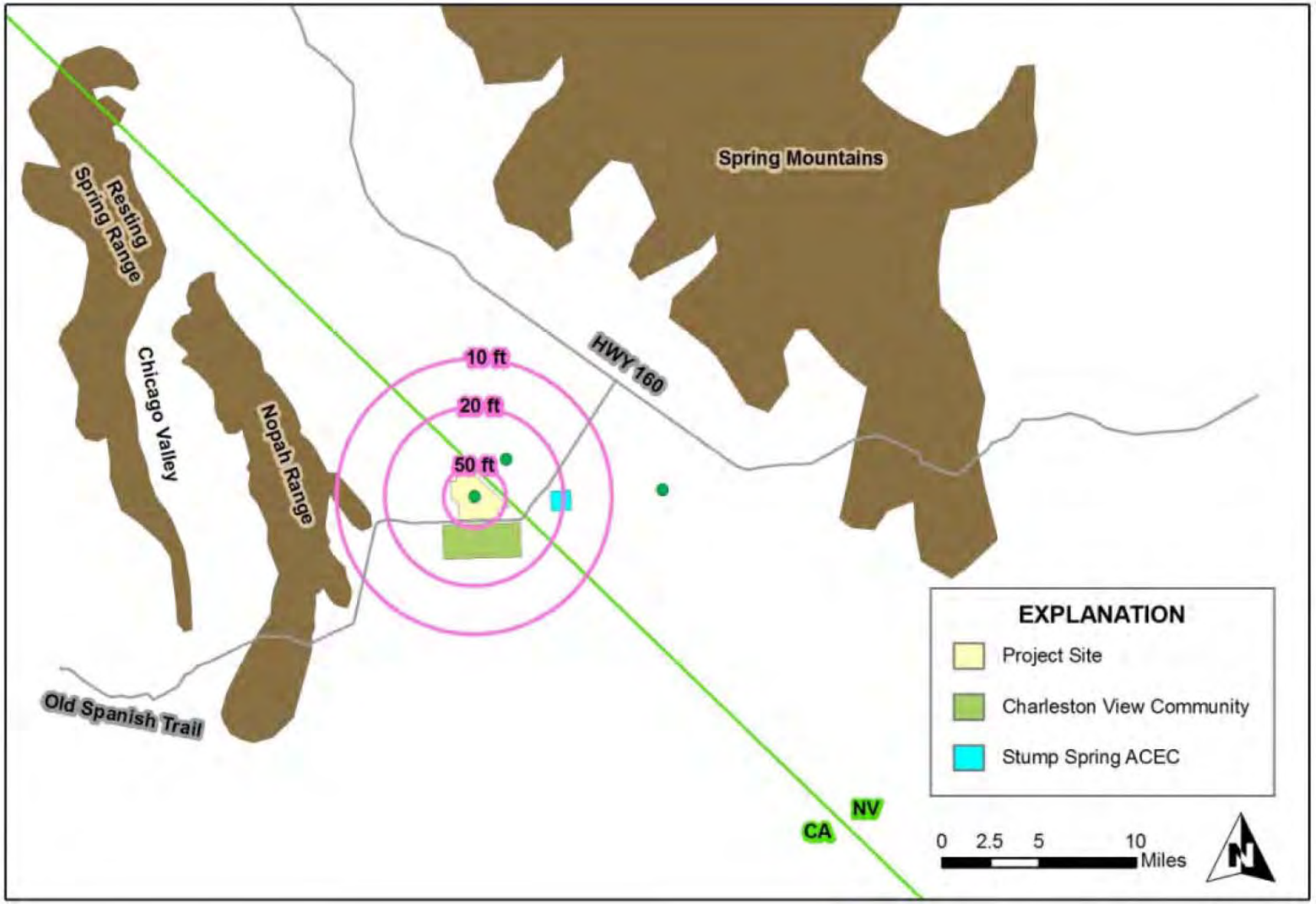
This graph shows potential impacts at Stump Spring (well) after 33 years of pumping at the rate of 87 gpm.



WATER SUPPLY – FIGURE 19

Hidden Hills Solar Electric Generating System (HHSEGS)

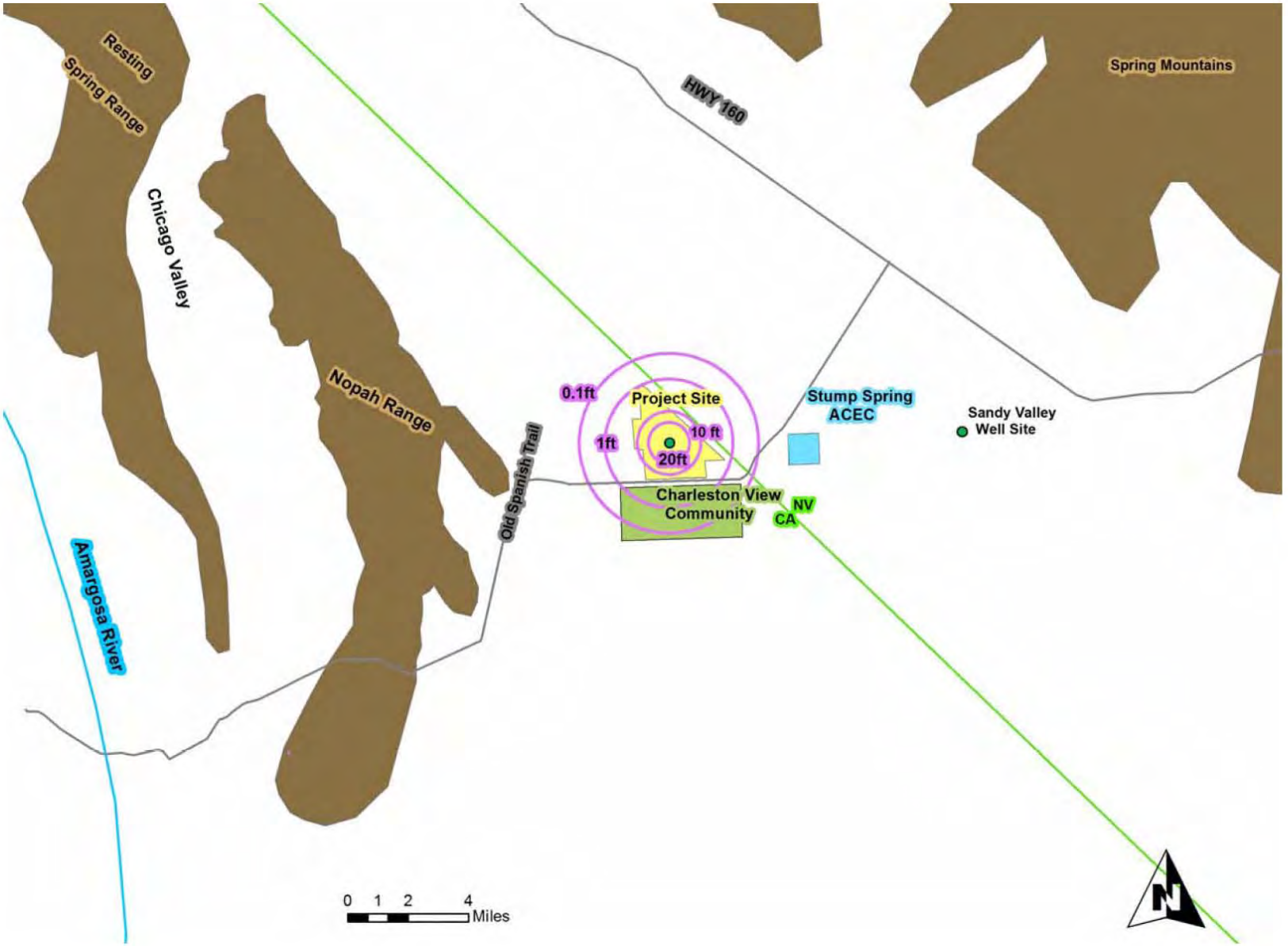
Estimated drawdown at groundwater dependent vegetation, worst-case scenario. Transmissivity: 660 gpd/ft, Storativity: 0.0014.



WATER SUPPLY - FIGURE 20

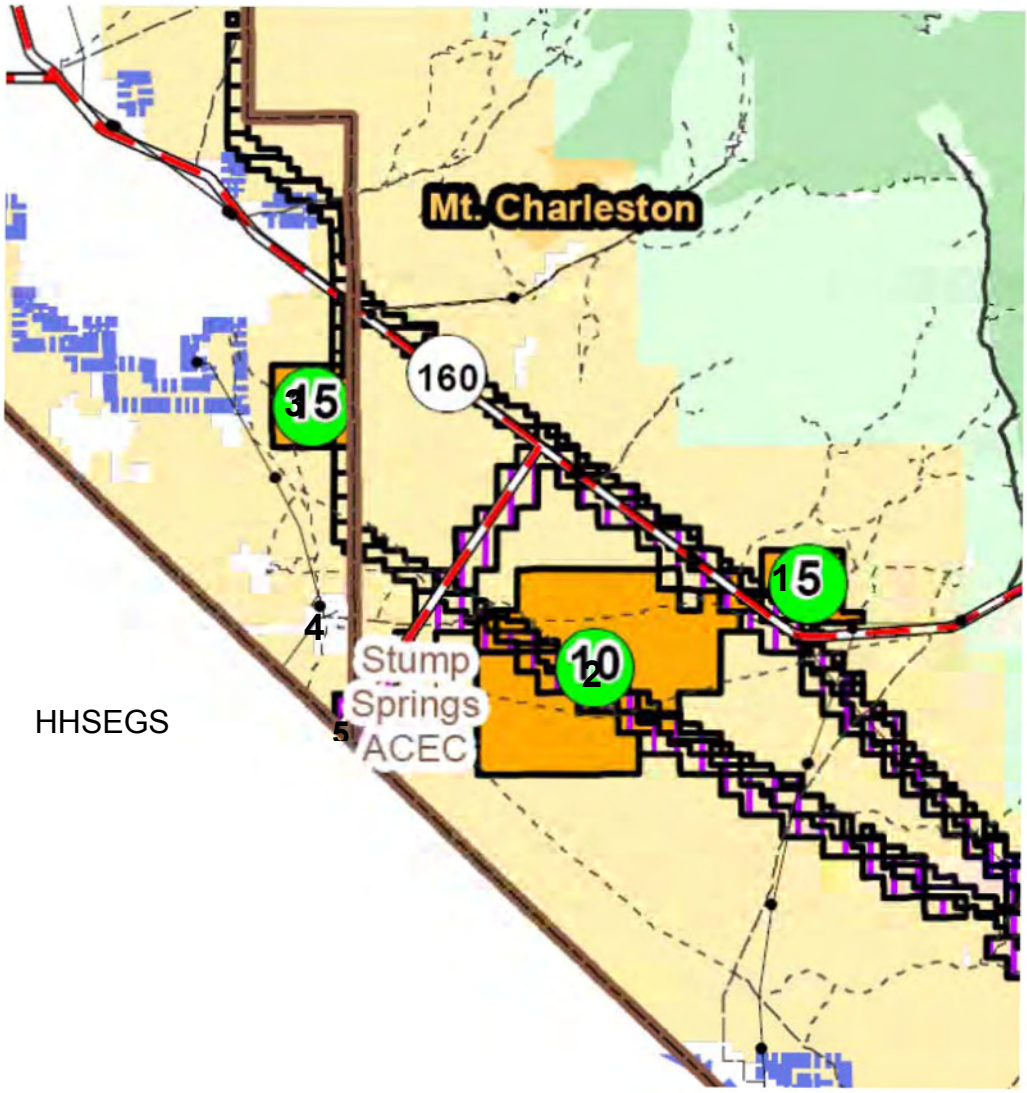
Hidden Hills Solar Electric Generating System (HHSEGS)

Estimated drawdown at groundwater dependent vegetation, best-case scenario. Transmissivity: 660 gpd/ft, Storativity: 0.064.



WATER SUPPLY - FIGURE 21

Hidden Hills Solar Electric Generating System (HHSEGS) –
Projects considered for cumulative impacts analysis

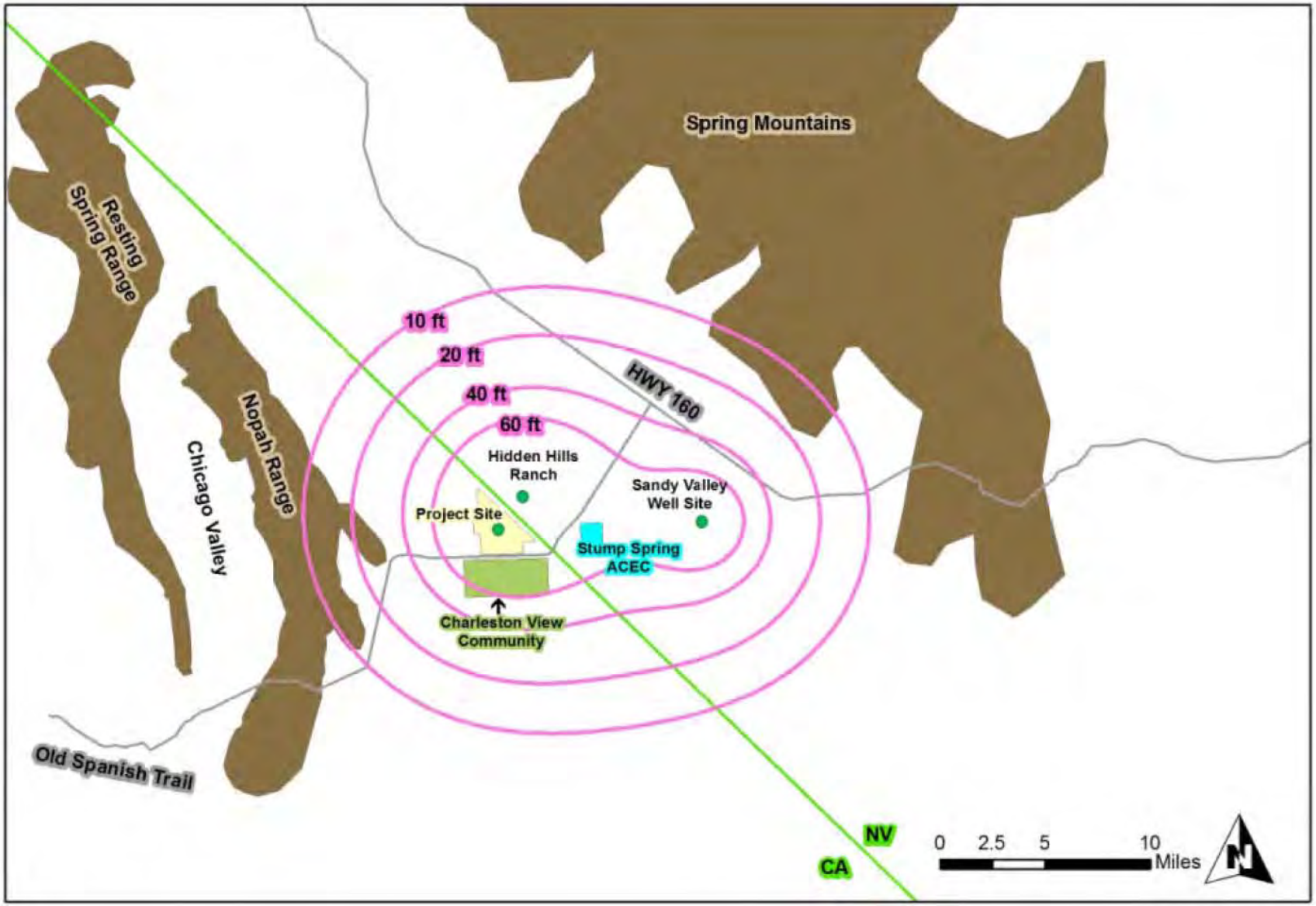


	Applicant	Project Name	County	Water Use (ac-ft/year)	Status
1	Pacific Solar Investments, Inc.	PSI Amargosa PV	Nye	0 (offsite)	DEIS-Plan Amendment
2	Bright Source Energy Solar Partners	Sandy Valley	Clark	170	application-POD
3	Element Power	PV Project	Clark	5-7	application-POD
4	Mary Lee Wiley Trust	Irrigation	Nye	211	NA
5	St. Therese Mission	Municipal	Inyo	18	NA

WATER SUPPLY - FIGURE 22

Hidden Hills Solar Electric Generating System (HHSEGS)

Proposed cumulative impacts of HHSEGS project. Transmissivity: 660 gpd/ft, Storativity: 0.0014.



WORKER SAFETY AND FIRE PROTECTION

Testimony of Geoff Lesh, PE, and Rick Tyler

SUMMARY OF CONCLUSIONS

Staff has reviewed the Hidden Hills Solar Energy Generation Project (HHSEGS or proposed project) in accordance with the requirements of the California Environmental Quality Act (CEQA). With respect to CEQA, staff concludes that if the applicant for the proposed HHSEGS project provides a Project Construction Safety and Health Program and a Project Operations and Maintenance Safety and Health Program, as required by Conditions of Certification **WORKER SAFETY-1** and **-2** and fulfils the requirements of Conditions of Certification **WORKER SAFETY-3** through **-5** the project would incorporate sufficient measures to ensure adequate levels of industrial safety and comply with applicable laws, ordinances, regulations, and standards.

The proposed conditions of certification provide assurance that the Construction Safety and Health Program and the Operations and Maintenance Safety and Health Program proposed by the applicant would be reviewed by the appropriate agency before implementation. The conditions also require verification that the proposed plans adequately assure worker safety and on-site fire protection and comply with applicable laws, ordinances, regulations, and standards.

Staff has considered the position of the Southern Inyo Fire Protection District (SIFPD) and all relevant information as well as past experience at other solar power plants in California. SIFPD resources (both personnel and equipment) are limited commensurate with the low population density of the area it serves. The SIFPD has indicated, before the recent project changes that effectively doubled the construction workforce and associated traffic, that emergency services would be significantly impacted (SIFPD 2012a) because of the magnitude of the proposed project and the large (relative to local population) workforce. The potential for unmitigated impacts resulting from new demands for SIFPD services as a result of construction and operation of HHSEGS is increased by the fire district not being financially supported by county revenues, and thus would not benefit from any taxes paid to the county.

Due to the minimal resources of the local SIFPD, staff agrees with the SIFPD that the likely emergency response requirements of HHSEGS would likely create a significant public impact.

Staff's conversations with both Fire Chief Larry Levy of SIFPD and Fire Chief Scott F. Lewis of Pahrump Valley Rescue Service (PVRS) have confirmed that there is a longstanding practice of providing mutual aide between their respective fire and EMS agencies. However, currently there is not a formal, signed mutual aid agreement between the two agencies. With ongoing growth in demand for response services in the areas caused by, among other things, solar energy plants, this informal practice could well be tested going forward, and cannot be relied upon in this siting case to enable the local fire department to maintain its level of service under increasing demands.

Assurance of the ability of the SIFPD to continue to provide its current level of response requires expansion of SIFPD's resources in equipment, location, and personnel to handle potential draw-down situations in which there would not be enough resources to provide adequate service response to near-simultaneous emergency incidents.

Mitigation of this risk to the public through the payments to, or agreements with, the, SIFPD by the applicant to address services augmentation is feasible, but has not yet been agreed to between the applicant and SIFPD. Staff understands that there are ongoing discussions between the applicant and SIFPD, but that thus far, with regards to potential impacts from construction and operation of HHSEGS, no agreements have been made. Therefore, staff is proposing mitigation to reduce these impacts to less than significant by requiring an initial payment to the SIFPD for capital and personnel support and an agreement with the SIFPD (see proposed Conditions of Certification **WORKER SAFETY-6** and **-7**.

Most of the transmission line and natural gas pipeline linears would be located in Nevada on United States Bureau of Land Management (BLM) land. Therefore, the environmental and permit review of impact from the Nevada portion of the linears would be conducted by BLM.

INTRODUCTION

The proposed action evaluated within this Final Staff Assessment (FSA) is for the construction and operation of the Hidden Hills Solar Electric Generating System (HHSEGS), a proposed solar-thermal electricity generation facility located on private lands, leased in southeastern Inyo County, California. Most of the transmission line and natural gas pipeline linears are located in Nevada on BLM land.

Worker safety and fire protection are regulated through laws, ordinances, regulations, and standards (LORS), at the federal, state, and local levels. Industrial workers at the facility operate equipment and handle hazardous materials daily and may face hazards that can result in accidents and serious injury. Protection measures are employed to eliminate or reduce these hazards or to minimize the risk through special training, protective equipment, and procedural controls.

The purpose of this FSA is to assess the worker safety and fire protection measures proposed by the HHSEGS and to determine whether the applicant has proposed adequate measures to:

- comply with applicable safety LORS;
- protect the workers during construction and operation of the facility;
- protect against fire; and
- provide adequate emergency response procedures.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Worker Safety and Fire Protection Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
Title 29, U.S. Code (U.S.C.) section 651 et seq. (Occupational Safety and Health Act of 1970)	This act mandates safety requirements in the workplace with the purpose of "[assuring] so far as possible every working man and woman in the nation safe and healthful working conditions and to preserve our human resources" (29 U.S.C. § 651).
Title 29, Code of Federal Regulation (C,F,R,), sections 1910.1 to 1910.1500 (Occupational Safety and Health Administration Safety and Health Regulations)	These sections define the procedures for promulgating regulations and conducting inspections to implement and enforce safety and health procedures to protect workers, particularly in the industrial sector.
Title 29, C.F.R., sections 1952.170 to 1952.175	These sections provide federal approval of California's plan for enforcement of its own Safety and Health requirements, in lieu of most of the federal requirements found in Title 29 C.F.R. sections 1910.1 to 1910.1500.
State	
Title 8, California Code of Regulations (Cal Code Regs.) all applicable sections (Cal/OSHA regulations)	These sections require that all employers follow these regulations as they pertain to the work involved. This includes regulations pertaining to safety matters during construction, commissioning, and operations of power plants, as well as safety around electrical components, fire safety, and hazardous materials use, storage, and handling.
Title 24, Cal Code Regs., section 3, et seq.	This section incorporates the current addition of the International Building Code.
Health and Safety Code section 25500, et seq.	This section presents Risk Management Plan requirements for threshold quantity of listed acutely hazardous materials at a facility.
Health and Safety Code sections 25500 to 25541	These sections require a Hazardous Material Business Plan detailing emergency response plans for hazardous materials emergency at a facility.
Local (or locally enforced	
None	

METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

Two issues are assessed in Worker Safety and Fire Protection:

1. The potential for impacts on the safety of workers during demolition, construction, and operations activities, and

2. Fire prevention/protection, emergency medical services (EMS) and response, and hazardous materials (hazmat) spill response during demolition, construction, and operations.

Worker safety issues are thoroughly addressed by the California Department of Occupational Safety and Health (Cal/OSHA) regulations. If all LORS are followed, workers will be adequately protected. Thus, the standard for staff's review and determination of significant impacts on workers is whether or not the applicant has

demonstrated adequate knowledge about and dedication to implementing all pertinent and relevant Cal/OSHA standards.

Regarding fire prevention matters, staff review and evaluate the on-site fire-fighting systems proposed by the applicant and the time needed for off-site local fire departments to respond to a fire, medical, or hazardous material emergency at the proposed power plant site. If on-site systems do not follow established codes and industry standards, staff identifies and recommends additional measures. Staff reviews and evaluates the local fire department capabilities and response time in each area and interviews the local fire officials to determine whether they feel adequately trained, staffed, and equipped to respond to the actual and potential needs of the proposed power plant. Staff then determines if the presence of the power plant would cause a significant impact on a local fire department. If it does, staff will identify and recommend that the applicant mitigate this impact by providing increased resources to the fire department.

Staff has also established methodology for use when a local fire department has identified either a significant incremental project impact to a local agency or a significant incremental cumulative impact to a local agency. Staff first conducts an initial review of the fire department's position and either agrees or disagrees with the fire department's determination that a significant impact would exist if the proposed power plant were built and operated. A process then starts whereby the project applicant can either accept the determination made by staff or refute the determination by providing a Fire and Emergency Services Needs Assessment and a Risk Assessment. The Fire and Emergency Services Needs Assessment would address fire response and equipment/staffing/location needs while the Risk Assessment would be used to establish that while an impact to the fire department might indeed exist, the risk (chance) of that impact occurring and causing injury or death may or may not be less than significant.

PROPOSED PROJECT

SETTING AND EXISTING CONDITIONS

The Hidden Hills Solar Electric Generating System (HHSEGS) is proposed for development by a wholly owned subsidiary of BrightSource Energy, Inc. (Applicant). As proposed, HHSEGS would be located on approximately 3,096 acres of privately owned land leased in Inyo County, California, adjacent to the Nevada border. The project site is approximately 8 miles south of Pahrump, Nevada, and approximately 45 miles northwest of Las Vegas, Nevada.

As proposed, HHSEGS would comprise two solar fields and associated facilities: the northern solar plant (Solar Plant 1) and the southern solar plant (Solar Plant 2). Each solar plant would generate 270 megawatts (MW) gross (250 MW net), for a total net output of 500 MW. Solar Plant 1 will occupy approximately 1,483 acres (or 2.3 square miles), and Solar Plant 2 will occupy approximately 1,510 acres (or 2.4 square miles). A 103-acre common area would be established on the southeastern corner of the site to accommodate an administration, warehouse, and maintenance complex, an onsite 138

kV switchyard and a natural gas metering station. A temporary construction laydown and parking area on the west side of the proposed project site would temporarily occupy approximately 180 acres.

ASSESSMENT OF DIRECT AND INDIRECT IMPACTS AND DISCUSSION OF MITIGATION

Worker Safety

Industrial environments are potentially dangerous during construction and operation of facilities. Workers at the proposed HHSEGS would be exposed to loud noises, moving equipment, trenches, and confined space entry and egress problems. The workers may experience falls, trips, burns, lacerations, and numerous other injuries. They have the potential to be exposed to falling equipment or structures, chemical spills, hazardous waste, fires, explosions, electrical sparks, and electrocution. It is important for the HHSEGS to have well-defined policies and procedures, training, and hazard recognition and control at its facility to minimize such hazards and protect workers. If the facility complies with all LORS, workers will be adequately protected from health and safety hazards.

Safety and Health Programs would be prepared by the applicant to minimize worker hazards during construction and operation. Staff uses the phrase “Safety and Health Program” to refer to the measures that would be taken to ensure compliance with the applicable LORS during the construction and operational phases of the project.

Construction Safety and Health Program

Workers at the HHSEGS would be exposed to hazards typical of construction and operation of a solar thermal electric power generating facility.

Construction Safety Orders are contained in Title 8 California Code of Regulations sections 1502, et seq. These requirements are promulgated by Cal/OSHA and would be applicable to the construction phase of the project. The Construction Safety and Health Program would include the following:

- Construction Injury and Illness Prevention Program (Cal Code Regs., tit. 8, § 1509)
- Construction Fire Prevention Plan (Cal Code Regs., tit. 8, § 1920)
- Personal Protective Equipment Program (Cal Code Regs., tit. 8, §§ 1514 — 1522)
- Emergency Action Program and Plan

Additional programs under General Industry Safety Orders (Cal Code Regs., tit. 8, §§ 3200 to 6184), Electrical Safety Orders (Cal Code Regs., tit. 8, §§2299 to 2974) and Unfired Pressure Vessel Safety Orders (Cal Code Regs., tit. 8, §§ 450 to 544) would include:

- Electrical Safety Program
- Motor Vehicle and Heavy Equipment Safety Program
- Forklift Operation Program

- Excavation/Trenching Program
- Fall Protection Program
- Scaffolding/Ladder Safety Program
- Articulating Boom Platforms Program
- Crane and Material Handling Program
- Housekeeping and Material Handling and Storage Program
- Respiratory Protection Program
- Employee Exposure Monitoring Program
- Hand and Portable Power Tool Safety Program
- Hearing Conservation Program
- Back Injury Prevention Program
- Ergonomics Program
- Heat and Cold Stress Monitoring and Control Program
- Hazard Communication Program
- Lock Out/Tag Out Safety Program
- Pressure Vessel and Pipeline Safety Program
- Solar Components Safe Handling Program

The Application for Certification (AFC) includes adequate outlines of the above programs (HHSG 2011a, § 5.16.4). Prior to the start of construction of HHSEGS, detailed programs and plans would be provided to the California Energy Commission compliance project manager (CPM) and to the SIFPD pursuant to the Condition of Certification **WORKER SAFETY-1**.

Operations and Maintenance Safety and Health Program

Prior to the start of operations at HHSEGS, the Operations and Maintenance Safety and Health Program would be prepared. This operational safety program would include the following programs and plans:

- Injury and Illness Prevention Program (Cal Code Regs., tit. 8, § 3203)
- Fire Protection and Prevention Program (Cal Code Regs., tit. 8, § 3221)
- Personal Protective Equipment Program (Cal Code Regs., tit. 8, §§ 3401 to 3411)
- Emergency Action Plan (Cal Code Regs., tit. 8, § 3220)

In addition, the requirements under General Industry Safety Orders (Cal Code Regs., tit. 8, §§ 3200 to 6184), Electrical Safety Orders (Cal Code Regs., tit. 8, §§2299 to 2974) and Unfired Pressure Vessel Safety Orders (Cal Code Regs., tit. 8, §§ 450 to 544) would be applicable to the project. Written safety programs for HHSEGS, which the

applicant would develop, would ensure compliance with the above-mentioned requirements.

The AFC includes adequate outlines of the Injury and Illness Prevention Program, Emergency Action Plan, Fire Prevention Program, and Personal Protective Equipment Program (HHSG 2011a, § 5.16.4.4). Prior to operation of HHSEGS, all detailed programs and plans would be provided to the CPM and SIFPD pursuant to Condition of Certification **WORKER SAFETY-2**.

Safety and Health Program Elements

As mentioned above, the applicant provided the proposed outlines for both a Construction Safety and Health Program and an Operations Safety and Health Program. The measures in these plans are derived from applicable sections of state and federal law. Both safety and health programs would comprise six more specific programs and would require major items detailed in the following paragraphs.

Injury and Illness Prevention Program

The IIPP would include the following components as presented in the AFC (HHSG 2011a, § 5.16.4):

- identity of person(s) with authority and responsibility for implementing the program; and
- safety and health policy of the plan.

Definition of work rules and safe work practices for construction activities

- system for ensuring that employees comply with safe and healthy work practices;
- system for facilitating employer-employee communications;
- procedures for identifying and evaluating workplace hazards and developing necessary program(s);
- methods for correcting unhealthy/unsafe conditions in a timely manner;
- safety procedures; and
- training and instruction.

Fire Prevention Plan

California Code of Regulations requires an Operations Fire Prevention Plan (Cal Code Regs., tit. 8, § 3221). The AFC outlines a proposed Fire Prevention Plan which is acceptable to staff with respect to CEQA (HHSG 2011a, § 5.16.2.3). The plan would accomplish the following:

- determine general program requirements (scope, purpose, and applicability);
- determine potential fire hazards;
- develop good housekeeping practices and proper handling and materials storage;
- determine potential ignition sources and control measures for these sources;

- determine persons responsible for equipment and system maintenance;
- locate portable and fixed fire-fighting equipment in suitable areas;
- establish and determine training and instruction requirements; and
- define recordkeeping requirements.

Staff proposes that the applicant submit a final Fire Prevention Plan to the SIFPD for review and comment and to the CPM for review and approval to satisfy proposed Conditions of Certification **WORKER SAFETY-1** and **-2**.

Personal Protective Equipment Program

California regulations require Personal Protective Equipment (PPE) and first aid supplies whenever hazards are present that, due to process, environment, chemicals or mechanical irritants, can cause injury or impair bodily function as a result of absorption, inhalation, or physical contact (Cal Code Regs., tit. 8, §§ 3380 to 3400). The HHSEGS operational environment would require PPE.

All safety equipment must meet National Institute of Safety and Health (NIOSH) or American National Standards Institute (ANSI) standards and would carry markings, numbers, or certificates of approval. Respirators must meet NIOSH and Cal/OSHA standards. Each employee must be provided with the following information pertaining to the protective clothing and equipment:

- proper use, maintenance, and storage;
- when to use the protective clothing and equipment;
- benefits and limitations; and
- when and how to replace the protective clothing and equipment.

The PPE Program ensures that employers comply with the applicable requirements for PPE and provides employees with the information and training necessary to protect them from potential workplace hazards.

Emergency Action Plan

California regulations require an Emergency Action Plan (Cal Code Regs., tit. 8, § 3220). The AFC contains a satisfactory outline for an emergency action plan (HHSG 2011a, § 5.16.4). The emergency action plan would accomplish the following:

- establish scope, purpose, and applicability;
- identify roles and responsibilities;
- determine emergency incident response training;
- develop emergency response protocols;
- specify evacuation protocols;
- define post emergency response protocols; and
- determine notification and incident reporting.

Written Safety Program

In addition to the specific plans listed above, additional LORS called *safe work practices* apply to the project. Both the Construction and the Operations Safety Programs would address safe work practices under a variety of programs. The components of these programs include, but are not limited to, the programs found under the heading "Construction Safety and Health Program" in this Worker Safety and Fire Protection section.

Safety Training Programs

Employees would be trained in the safe work practices described in the above-referenced safety programs.

Additional Safety Issues

WORKER EXPOSURE TO HERBICIDES

The applicant has indicated that workers will be adequately trained and protected, but has not included precautions against exposure to herbicides. Therefore, to ensure that workers are indeed protected, staff has identified and proposed additional requirements to Conditions of Certification **WORKER SAFETY-1** and **-2**. These requirements consist of the following provision:

- The development and implementation of Best Management Practices (BMP) for the storage and application of herbicides used to control weeds beneath and around the solar heliostats.

A BMP requiring proper herbicide storage and application will mitigate potential risks to workers from exposure to herbicides and reduce the chance that herbicides will contaminate either surface water or groundwater. Staff recommends that a BMP follow either the guidelines established by the U.S. EPA (EPA 1993), or more recent guidelines established by the State of California or U.S. EPA.

EYESIGHT PROTECTION FROM PHOTOCHEMICAL RETINAL DAMAGE

Photochemical retinal damage is associated with long-duration exposure times as well as lower-wavelength (higher-energy) light exposure. While retina pigment epithelium (RPE) and the neurosensory retina are protected from light-induced exposure by the absorption profile of the surrounding ocular structures (e.g., cornea, crystalline lens, macular pigments) and through retinal photoreceptor outer segment regeneration, photic injury is still possible due to photochemical retinal light toxicity mechanisms.

Photochemical injury is both dose-dependent and cumulative in nature. The cumulative time-dependent nature is that daily exposures can build up and can last many weeks. For example, it has been estimated that the half-life (when an exposure effect has decayed to approximately 37 percent) of the cumulative dose exposure effect is on the order of 30 days. This has significant implications for workers over many weeks that spend a significant amount of time in proximity to the high luminance environment of a solar field in the presence of the additional high natural ambient brightness of the desert environment.

When evaluating the implications of these effects on the viewer of the tower or the heliostats, it must be noted that the effect is directly related to the ambient and background light conditions. The Hidden Hills SEGF is located in a bright desert environment thereby increasing the potential chance for photochemical retinal damage. The cumulative daily exposure to workers to the ambient environment combined with the additional potential cumulative effects of heliostat and solar receiver steam generator (SRSG) exposure puts project workers at risk for photochemical retinal damage. This is due to the cumulative effect discussed above.

Thus, to ensure the safety of the workers and others within the project boundaries, personnel protection equipment (PPE), in the form of protective glasses will be provided. Protective glasses have been developed for workers engaged in intense solar field work, tower work, and intense close viewing of the SRSG.

The potential photochemical retinal hazards are calculated according to IEC 62471 standard (same as CIE S 009: 2002), titled: “Photobiological Safety of Lamps and Lamp Systems”, where the spectral values were taken from “ASTM G173-03 Reference Spectra Derived from SMARTS v. 2.9.2 (AM1.5)” and are the same as the “ISO 9845-1-1992.”

Therefore, staff recommends that the applicant include in their personal protective equipment (PPE) plans that will be elements of the Project Construction Safety and Health Program required by proposed Condition of Certification **Worker Safety-1** and the Project Operations and Maintenance Safety and Health Program required by proposed Condition of Certification **Worker Safety-2,** an Eyesight Protection from Retinal Damage Plan that is designed to insure that workers in the solar field receive and wear the appropriate protective sunglasses. This Eyesight Protection from Retinal Damage Plan would:

(1) identify and acquire the appropriate eye protection (EP) equipment based on the IEC 62471 standards in sufficient numbers to provide safety glasses for the workers engaged in solar field work, and tower work where the potential exists for heliostat solar reflective exposure or SRSG exposure during operations,

(2) establish the requirements and procedures for the donning and doffing of the EP by workers and provide training and,

(3) monitor worker use of the PPE and compliance with the EP procedures.

Refer to the **Traffic and Transportation** section or **Appendix TT1- Glint and Glare Safety Impact Assessment** of this PSA for a more complete and detailed discussion of this topic.

VALLEY FEVER (COCCIDIOIDOMYCOSIS)

Coccidioidomycosis or "Valley Fever" (VF) is primarily encountered in southwestern states, particularly in Arizona and California. It is caused by inhaling the spores of the fungus Coccidioides immitis, which are released from the soil during soil disturbance (e.g., during construction activities) or wind erosion. The disease usually affects the lungs and can have potentially severe consequences, especially in at-risk individuals such as the elderly, pregnant women, and people with compromised immune systems. Trenching, excavation, and construction workers are often the most exposed population. Treatment usually includes rest and antifungal medications. No effective vaccine currently exists for Valley Fever. VF is endemic to the San Joaquin Valley in California, which presumably gave this disease its common name. In California, the highest VF rates are recorded in Kern, Kings, and Tulare Counties, followed by Fresno and San Luis Obispo Counties. LA County, San Diego County, San Bernardino County, and Riverside County also have reported VF cases although much fewer.

Between 2001 and 2010, there was only one reported case of VF in Inyo County (in 2006). Staff believes that no special measures beyond the standard measures required by Cal-OHSA for respiratory protection are needed and thus proposes no condition of certification on this topic.

Additional Mitigation Measures

Protecting construction workers from injury and disease is among the greatest challenges in occupational safety and health. The following facts are reported by the National Institute for Occupational Safety and Health (NIOSH):

- More than 7 million persons work in the construction industry, representing 6 percent of the labor force. Approximately 1.5 million of these workers are self-employed.
- Of approximately 600,000 construction companies, 90 percent employ fewer than 20 workers. Few have formal safety and health programs.
- From 1980 to 1993, an average of 1,079 construction workers were killed on the job each year—more fatal injuries than in any other industry.
- Falls caused 3,859 construction worker fatalities (25.6 percent) between 1980 and 1993.
- Construction injuries account for 15 percent of workers' compensation costs.
- Assuring safety and health in construction is complex, involving short-term work sites, changing hazards, and multiple operations and crews working in close proximity.
- In 1990, Congress directed NIOSH to undertake research and training to reduce diseases and injuries among construction workers in the United States. Under this mandate, NIOSH funds both intramural and extramural research projects.

The hazards associated with the construction industry are thus well documented. These hazards increase in complexity in the multi-employer worksites typical of large, complex, industrial-type projects such as the construction of solar power plants. In order to reduce and/or eliminate these hazards, it has become standard industry practice to hire

a Construction Safety Supervisor to ensure a safe and healthful environment for all personnel. That this standard practice has reduced and/or eliminated hazards has been evident in the audits staff recently conducted of power plants under construction. The federal Occupational Safety and Health Administration (OSHA) has also entered into strategic alliances with several professional and trade organizations to promote and recognize safety professionals trained as Construction Safety Supervisors, Construction Health and Safety Officers, and other professional designations. The goal of these partnerships is to encourage construction subcontractors in four areas:

- to improve their safety and health performance;
- to assist them in striving for the elimination of the four hazards (falls, electrical, caught in/between and struck-by hazards), which account for the majority of fatalities and injuries in this industry and have been the focus of targeted OSHA inspections;
- to prevent serious accidents in the construction industry through implementation of enhanced safety and health programs and increased employee training; and
- to recognize those subcontractors with exemplary safety and health programs.

To date, there are no OSHA or Cal/OSHA requirements that an employer hire or provide for a Construction Safety Officer. OSHA and Cal/OSHA regulations do, however, require that safety be provided by an employer and the term *Competent Person* is used in many OSHA and Cal/OSHA standards, documents, and directives. A Competent Person is usually defined by OSHA as an individual who, by way of training and/or experience, is knowledgeable of standards, is capable of identifying workplace hazards relating to the specific operations, is designated by the employer, and has authority to take appropriate action. Therefore, in order to meet the intent of the OSHA standard to provide for a safe workplace during power plant construction, staff proposes Condition of Certification **WORKER SAFETY-3,** which would require the applicant/project owner to designate and provide for a power plant site Construction Safety Supervisor.

As discussed above, the hazards associated with the construction industry are well documented. These hazards increase in complexity in the multi-employer worksites typical of large, complex, industrial-type projects such as the construction of solar power plants.

Accidents, fires, and a worker death have occurred at Energy Commission-certified power plants in the past decade due to the failure to recognize and control safety hazards and the inability to adequately supervise compliance with occupational safety and health regulations. Safety problems have been documented by Energy Commission staff in safety audits conducted in 2005 at several power plants under construction. The findings of the staff audits include, but are not limited to, such safety oversights as:

- lack of posted confined space warning placards/signs;
- confusing and/or inadequate electrical and machinery lockout/tagout permitting and procedures;

- confusing and/or inappropriate procedures for handing over lockout/tagout and confined space permits from the construction team to commissioning team and then to operations;
- dangerous placement of hydraulic elevated platforms under each other;
- inappropriate placement of fire extinguishers near hotwork;
- dangerous placement of numerous power cords in standing water on the site, thus increasing the risk of electrocution;
- construction of an unsafe aqueous ammonia unloading pad;
- inappropriate and unsecure placement of above-ground natural gas pipelines inside the facility but too close to the perimeter fence; and
- lack of adequate employee- or contractor-written training programs addressing proper procedures to follow in the event of finding suspicious packages or objects either on or off site.

In order to reduce and/or eliminate these hazards, it is necessary for the Energy Commission to have a professional Safety Monitor on site to track compliance with Cal/OSHA regulations and periodically audit safety compliance during construction, commissioning, and the hand-over to operational status. These requirements are outlined in Condition of Certification **WORKER SAFETY-4**. A Safety Monitor, hired by the project owner, yet reporting to the Chief Building Official (CBO) and CPM, will serve as an "extra set of eyes" to ensure that safety procedures and practices are fully implemented at all power plants certified by the Energy Commission.

Fire Hazards

During construction and operation of the proposed HHSEGS project, there is the potential for both small fires and major structural fires. Electrical sparks, combustion of fuel oil, hydraulic fluid, mineral oil, insulating fluid at the power plant switchyard or flammable liquids, explosions, and over-heated equipment, may cause small fires. Major structural fires in areas without automatic fire detection and suppression systems are unlikely to develop at power plants. Compliance with all LORS and the proposed COCs would be adequate to assure protection from all fire hazards.

Staff reviewed the information provided in the AFC and reviewed correspondence from a representative of the SIFPD to determine if available fire protection services and equipment would adequately protect workers and to determine the project's impact on fire protection services in the area. Staff also reviewed the May 9, 2012 Fire Risk Assessment submitted by the applicant (CH2 2012z). The project would rely on both on-site fire protection systems and local fire protection services. The on-site fire protection system provides the first line of defense for small fires. In the event of a major fire, fire support services, including trained firefighters and equipment for a sustained response, would be provided by the SIFPD (CEC 2012h, SIFPD2012a, HHSG 2011a, §§ 5.10.3.6.2 and 5.16.4.7).

Construction

During construction, the permanent fire protection systems proposed for the HHSEGS would be installed as soon as practical; until then portable fire extinguishers would be placed throughout the site at appropriate intervals and periodically maintained. Safety procedures and training would be implemented according to the guidelines of the Construction Fire Protection and Prevention Plan.

The applicant has also indicated that it intends to construct and operate an above-ground fuel depot for motor vehicles on the site. The fuel depot will contain a maximum of 34,000 gallons of diesel fuel (HHSG 2011a, Table 5.5-3R1).

The fire protection measures that are required by code for the fuel depot and dispensing facility include:

- Chapter 22 of the 2010 California Fire Code: Motor Fuel-Dispensing Facilities and Repair Garages
- NFPA 30a: Code for Motor Fuel Dispensing Facilities and Repair Garages (2012 Edition)

Applicable sections of the 2010 California Fire Code (CFC) and NFPA 30a are very similar; however NFPA 30a contains more details for fuel tank design specifications and other requirements. The requirements listed in these codes include the materials to be used to construct fuel tanks, location of dispensing devices, spacing from other structures, fencing, physical protective barriers, shut-off valves, emergency relief venting, secondary containment, vapor and liquid detection systems with alarms, and other general design requirements.

NFPA 30a requires the following:

> 7.3.5 Fixed Fire Protection.
>
> 7.3.5.1 For an unattended, self-serve, motor fuel dispensing facility, additional fire protection shall be provided where required by the *authority having jurisdiction.(italics added)*
>
> 7.3.5.2 Where required, an automatic fire suppression system shall be installed in accordance with the appropriate NFPA standard, manufacturers' instructions, and the listing requirements of the systems.
>
> 9.2.5 Basic Fire Control.
>
> 9.2.5.1 Sources of Ignition. Smoking materials, including matches and lighters, shall not be used within 6m (20 ft) of areas used for fueling, servicing fuel systems.
>
> 9.2.5.2 Fire Extinguishers. Each motor fuel dispensing facility or repair garage shall be provided with fire extinguishers installed, inspected, and maintained as required by NFPA 10, *Standard for Portable Fire Extinguishers.* Extinguishers for outside motor fuel dispending areas shall be provided

according to the extra (high) hazard requirements for Class B hazards, except that the maximum travel distance to an 80 B:C extinguisher shall be permitted to be 30.48m (100 feet).

9.2.5.3 Fire Suppression Systems. Where required, automatic fire suppression systems shall be installed in accordance with appropriate NFPA standard, manufacturer's instructions, and the listing requirements of the systems.

The authority having jurisdiction is the Energy Commission and the SIFPD, which would review and comment on the fire detection and suppression plans for the fuel depot before it is built and operated.

The only fire protection measure explicitly listed in the California Fire Code is a requirement for fire extinguishers to be located within 75 feet of the fuel dispensing equipment. Neither the CFC nor the Inyo County code requires sprinkler systems for fuel dispensing facilities. Section 2203.2 of the CFC requires an approved, clearly identified and readily accessible emergency disconnect switch at an approved location to stop the transfer of fuel to the fuel dispensers in the event of a fuel spill or other emergency. Section 2205.3 requires spill control to prevent liquids spilled during dispensing operations from flowing into buildings and section 2206.5 requires that above-ground tanks be provided with secondary containment in the form of drainage control or placement of berms or dikes. The applicant has proposed to install secondary containment.

Staff assessed the proposed fuel depot and determined that the applicant intends to meet all codes and standards in their operations of the fuel depot. Proposed Condition of Certification **WORKER SAFETY-1** would require that the SIFPD review and the CPM review and approve the fire protection systems for the fuel depot.

Regarding the need for emergency response during construction and the impacts on the SIFPD, please see the discussion below.

Operation

The information in the AFC indicates that the project intends to meet the fire protection and suppression requirements of the 2010 California Fire Code, all applicable recommended NFPA standards (including Standard 850 addressing fire protection at electric generating plants), and all Cal/OSHA requirements, including providing a secondary access point for emergency response vehicles. The California Fire Code (24 CCR Part 9, chapter 5, section 503.1.2) requires that access to the site be reviewed and approved by the fire department. All power plants licensed by the Energy Commission have more than one access point to the power plant site. This is sound fire safety procedure and allows for fire department vehicles and personnel to access the site should the main gate be blocked.

Fire suppression elements in the proposed plant would include both fixed and portable fire extinguishing systems. The fire water would be stored in a 250,000 gallon water storage tank with a dedicated fire protection supply of 100,000 gallons, one tank in each

power block. The source of the water will be on-site wells (HHSG 2011a, Appendix 2F.3.1.4) Two sets of fire pumps, each consisting of one electric and one diesel-fueled backup firewater pump would ensure water supply to two fire protection water loops and an electric jockey pump would maintain pressure in the system (HHSG 2011a, § 2.2.9).

Fire hydrants would be installed throughout the site per California Fire Code requirements. Fixed fire suppression systems would be installed at determined fire risk areas such as the generator step-up transformers and turbine lube oil equipment. A sprinkler system would be installed at the steam turbine generator and in administrative buildings. In addition to the fixed fire protection system, appropriate class of service portable extinguishers and fire hydrants/hose stations would be located throughout the facility at code-approved intervals.

The fire protection system must have fire detection sensors and monitoring equipment that would trigger alarms and automatically actuate the suppression systems. Staff has determined that these systems will ensure adequate fire protection.

The applicant would be required by Conditions of Certification **WORKER SAFETY-1** and **-2** to provide the final construction and operations Fire Protection and Prevention Programs to staff and to the SIFPD prior to construction and operation of the project to confirm the adequacy of the proposed fire protection measures.

SIFPD Impacts

The project site is within the jurisdiction of the Southern Inyo Fire Protection District (SIFPD). SIFPD has one station in Tecopa and one temporary location in Charleston View. The Tecopa fire station would be the first responder for medical emergencies at the project site (CH2 2011e, p. 14). A response from the Tecopa Station, 27 miles from the project site, would take about 30 to 40 minutes (HHSG 2011a, § 5.5.4.3 and CEC 2012h). As of February 2012, SIFPD staff at the Tecopa station consisted of two personnel with Emergency Medical Technician-Basic (EMT-B) certification, one Firefighter II (FFII), two Firefighter I (FFI) in training, and four Entry Level Firefighter/First Responders. With the exception of the Fire Chief and the Administrative Officer, which are paid, SIFPD personnel are volunteers that respond on a 24-hour, 7-day per week basis. The SIFPD equipment consists of two Light Rescue Units, two Type 2 Engines, one Basic Life Support Ambulance and one Ambulance. (CH2 2012z, pg. 7-1) All firefighters in SIFPD have first response medical training called Basic Life Support (BLS) training. The Tecopa station has one ambulance staffed with three personnel and a fire truck staffed by two personnel, which would likely respond to emergencies at the project site. (CH2 2011e, p. 14, and CEC 2012h).

Staff's conversations with both Fire Chief Larry Levy of SIFPD and Fire Chief Scott F. Lewis of Pahrump Valley Rescue Service (PVRS) have confirmed that there is a longstanding practice of providing mutual aide between their respective fire and EMS agencies. However, currently there is not a formal, signed mutual aid agreement between the two agencies. With ongoing growth in demand for response services in the areas caused by, among other things, solar energy plants, this informal practice could

well be tested going forward, and cannot be relied upon in this siting case to enable the local fire services to maintain its level of service under its increasing demands.

In an email from Larry Levy, Acting Chief of the SIFPD (CEC 2012h), and in a letter from William D. Ross, who provides legal representation for the SIFPD (SIFPD2012a), it is stated that the HHSEGS project would have an impact on SIFPD's ability to maintain its level of service for fire, hazmat, and EMS emergencies to its service district. Note that this conclusion was reached before the recent project changes that effectively would double the construction workforce and associated traffic, and would likely increase the proposed project's impacts on EMS response.

Staff has considered the position of the SIFPD and all relevant information as well as past experience at existing solar power plants that are similar to, but smaller than, the proposed project. Staff reviewed the records of emergency responses of the San Bernardino County Fire Department (SBCFD) to the only three operating thermal solar power plants in the state. These are the Solar Electric Generating Station (SEGS) 1 & 2 in Daggett (operating since 1984), SEGS 3-7 at Kramer Junction (1989), and SEGS 8 & 9 at Harper Dry Lake (1989). Staff also reviewed what records were immediately available at the three solar plants. All sources stated that their records were incomplete and not comprehensive. Staff wishes to caution that since the number of thermal solar power plants is so few and their operating history so short, any conclusion as to accident incident rates is meaningless from a statistical perspective. Simply put, the data set is not robust enough to draw any conclusions about their safety records. Nevertheless, this information is provided for illustrative purposes.

Three types of fire department responses to the solar power plants were surveyed:

1. Plan reviews,

2. Hazmat and fire inspections, and

3. Emergency Response including medical, fire, rescue, and hazardous materials incidents.

Regarding visits to the sites for plan review during the years the plants were operating, the SBCFD made four visits to the Kramer Junction facility and one visit to the Harper Lake facility.

Regarding site visits for inspections, reviews, enforcement activities, and follow ups, the SBCFD made 10 inspections to Daggett since 2008, totaling 24 hours of time, 48 visits to Kramer Junction since 2003, totaling 128 hours of time, and 29 visits to Harper Lake since 2004, totaling 105 hours of time.

Regarding emergency response (including fire, rescue, medical and hazardous materials incidents), approximately 30 incidents occurred since 1998 that required the SBCFD (and other fire stations through mutual aid agreements) to respond to the three solar power plant sites. These include fires, fire alarm activations, injuries, medical emergencies, hazardous materials spills, complaints/calls from the public, and false alarms. However, the available records were incomplete as they did not include

documentation of a major fire that occurred at the SEGS 8 facility in January of 1990 that required a large part of the regional resources from four different fire districts including the San Bernardino County, Edwards Air Force Base, California Department of Forestry and Fire Protection (CDF), and the Kern County Fire Departments. This fire is the largest incident that has occurred at a solar thermal plant in California and demonstrates the magnitude of fire department resources that can be required to respond to a fire at a large thermal solar facility.

According to the Daggett solar plant records, only three incidents in the life of the plant required emergency services:

1. Feb 25, 1999: A heat transfer fluid (HTF) fire occurred in the HTF tanks. This was a major fire and the fire department allowed the fire to burn itself out over two days. There were no injuries, but extensive damage occurred.

2. Feb 28, 2000: An employee had a suspected heart attack (which was actually caused by drinking a whole bottle of hot sauce), and an ambulance responded from the fire department.

3. May 15-17, 2010: An HTF spill of about 60 gallons occurred in the solar field. The facility personnel cleaned it up on May 15 and reported it to San Bernardino County on the next business day, May 17. When receiving the report the dispatcher misunderstood the report and sent out a 911 call indicating a spill is in progress. The whole fire department showed up on scene.

According to information received from the Kramer Junction plant, the following incidents required fire department response:

1. August 2002 for an unknown hazmat incident.

2. In 2007 when 30,000 gallons of HTF spilled.

3. In Feb. 2009 when a flex hose failure and an HTF vapor cloud ignited. According to Kramer Junction plant officials, the fire department was not needed as plant staff had the situation under control. A concerned citizen had made a 911 call.

According to information received from the Harper Lake plant, only the January 1990 incident required fire department response. Another comparative example is the Ivanpah Solar Electric Generating Station (Ivanpah), a central receiving station power tower-type project, where construction has resulted in five calls over 19 months to San Bernardino County since construction commenced in October 2010, and its construction activities and workforce are similar to that of the HHSEGS. (CH2 2012z, pg. 8-2)

To summarize, relying on sparse data received from the SBCFD for only the past 10 years and not including the 1990 SEGS 8 fire, the department responded to about 30 incidents and emergencies at the nine solar units (at three locations) , including two fires and two hazardous materials spills. During the same period the SBCFD conducted approximately 90 inspections and visits for enforcement actions/plan reviews, totaling about 260 hours of personnel time. The incident rate, therefore, for all three power

plants would be 30 in 12 years or 2.5 emergency calls per year or 0.83 emergencies per solar plant per year.

Additionally, it is very important to note that the HHSEGS power plant (along with the other solar power plants) will be located in an extremely harsh desert environment. The ability of a fire fighter to perform duties while wearing a turn-out coat, heavy boots, and a respirator (self contained breathing apparatus) is limited under the best of circumstances. If conducting a rescue or fighting a fire that necessitates use of a respirator, the high-temperatures of the desert, which often exceed 115 degrees Fahrenheit (^{o}F), severely limit a fire fighter's ability to perform the duties to 15 minutes at a time. This severe time restriction necessitates the mobilization of more fire fighters to respond to the emergency.

Furthermore, emergency response would be needed during construction when construction worker crew sizes are large, reaching 2,293 workers per day (1,682 day shift and 611 swing shift) during Month 19 of construction. The fact that a fuel depot will be on-site also speaks to the need for emergency response capability. As was indicated above, SIFPD operates one year-round fire station in Tecopa, California that is 27 miles southwest of HHSEGS and has an approximate 30- to 40-minute response time. SIFPD indicated in communications in March and July of 2011that local firefighters are equipped to handle simple HazMat incidents, but that PVFRS and Nye County Emergency Services would need to be called in for assistance with more complex situations, although they do not currently have formal mutual aid agreements with SIFPD.

Staff has considered the position of the SIFPD and all relevant information as well as past experience at existing solar power plants. The fire, hazmat, and EMS needs at the proposed plant are real and would pose significant added demands on SIFPD's local fire protection and emergency medical services.

Proposed Mitigation

Certain tax exemptions for solar power plants reduce the tax revenues going to counties and local agencies that would normally be used to provide the resulting expansion in fire and emergency medical services needed to cover them. The SIFPD does not obtain significant funding from Inyo County and thus would not benefit from any taxes that would be paid to the county. Thus, the potential exists with such solar power plants to cause impacts on public safety as a result of usage and drawdown of local agency resources that provide needed services, such as fire and EMS response to protect the public during emergencies, especially in rural districts where resources are limited, and largely volunteer. In response to a staff inquiry related to Emergency Services dated September, 2011 (CEC 2012h), SIFPD Acting Fire Chief, Larry Levy, suggested that, "the most effective and immediate way for the project to bare its proportional share would be by way of a special tax." Acting Chief Levy went on to list a number of special tax mechanisms, including a Mello-Roos tax and a Fire Suppression Service Assessment.

Staff evaluated the potential and likely demands on the SIFPD with the proposed mitigations provided by the applicant. Staff concludes that there would be an intrinsically

lower fire risk at HHSEGS resulting from its use of water and steam, rather than a flammable organic heat transfer fluid (HTF) as is used in the existing operational solar-thermal power plants at Harper Lake, Kramer Junction, and Daggett. Additionally, the design of the HHSEGS solar field, consisting of solar heliostats (mirrors) and having no piping arrays carrying HTF will greatly reduce the potential for fire, EMS, and Hazmat service calls to SIFPD. Without HTF storage tanks and solar field piping arrays, staff has determined that the potential for a large conflagration does not exist at HHSEGS.

Staff understands that there are ongoing discussions between the applicant and SIFPD, but that thus far, with regards to potential impacts from construction and operation of HHSEGS, no actions have been taken and no agreements have been made. Therefore, staff is proposing mitigation to reduce these impacts to less than significant by requiring an initial payment to the SIFPD for capital and personnel support and an agreement with the SIFPD (see proposed Conditions of Certification **WORKER SAFETY-6 and -7**.

Emergency Medical Services Response

Staff conducted a statewide survey to determine the frequency of Emergency Medical Services (EMS) response to operating natural gas-fired power plants in California. The purpose of the analysis was to determine what impact, if any, power plants might have on local emergency services. Staff concluded that incidents at gas-fired power plants that require EMS response are infrequent and represent an insignificant impact on the local fire departments, except for instances where response times are high or a rural fire department has mostly volunteer fire-fighting staff. In such cases there is potential for draw-down situations to occur where there are insufficient resources to respond to all calls for emergency response.

Emergency Medical Services

At staff's request, the applicant provided a draft Fire and Emergency Services Risk and Needs Analysis (FESNA) on May 9, 2012 (CH2 2012z). The analysis suggests that by complying with LORS, the project would not create significant impacts on the local SIFPD or local emergency response resources, because any responses needed for fire, medical, or technical rescue needs would be sourced from either the Pahrump Valley Fire-Rescue Services (PVFRS) or Nye County Emergency Services (NCES) in Pahrump, Nevada. The mechanism of how these services would be sourced and paid for from another jurisdiction in the state of Nevada rather than from the local Authority Having Jurisdiction (AHJ), in this case SIFPD, has not been clearly established. Correspondence from Larry Levy, Acting Chief of the SIFPD (CEC 2012h), and William D. Ross, who provides legal representation for the SIFPD (SIFPD 2012a), states that the HHSEGS project would have an impact on SIFPD's ability to maintain its level of service for fire, hazmat, and EMS emergencies to its service district.

PVFRS has a long-standing practice of providing SIFPD mutual aid and response, but does not currently have a signed agreement. PVFRS has four stations, all located in Nevada and staffed with full-time and volunteer firefighters. All PVFRS staff has basic medical training. PVFRS has five ambulances and two medical squads distributed among their four stations. PVFRS' main station has two EMTs and one paramedic, as well as two advanced life support- (ALS) certified ambulances and one ALS-equipped medical squad vehicle (CEC 2011j). The estimated response time from Pahrump Valley

Fire Station No. 3 (12 mile distance) is approximately 15-20 minutes, and from Station No.1 (18 mile distance), it is estimated to be approximately 18-25 minutes (CH2 2012z, Table 7-1). PVFRS is the closest responder to the project site with ALS capabilities and is staffed 24 hours a day.

Nye County Emergency Services (NCES) has a HazMat team that operates out of Nye County Fire Department's Station 51 in Pahrump, which is 28 road miles from the project site, and has an approximate response time of 45 minutes. Station 51 is staffed with 15 to 20 volunteers who are trained as HazMat technicians. The team has the following equipment, as of April 2011: one HazMat truck with 25-foot trailer, one biohazard unit, one fire engine, and one ambulance (HHSG 2011a, Sect 5.5.4.3).

In response to staff's Emergency Medical Response Needs Assessment Form, SIFPD Acting Fire Chief, Larry Levy, stated that "it is the desire of SIFPD to enhance their EMS in the Charleston View area to provide response capabilities to the project site in the 5-10 minute range. This will require the acquisition of both facilities and equipment as well as the training of additional responders (CEC 2012h). SIFPD estimates that to achieve their desired response times they would need a three-bay station to house a new ambulance and existing fire apparatus in the project area and a minimum of two trained EMTs and four firefighters in the project area." Staff notes that emergency response times to Charleston View are currently in the range of 30 to 40 minutes from Tecopa. Charleston View is located adjacent to the HHSEGS entrances, where both construction worker commute traffic and materials transport trucks would both enter and exit the project site.

Off-site Vehicle Accidents

During the HHSEGS construction period, worker commute traffic and materials transport truck traffic could pose an increased risk for off-site, multi-injury road incidents and accidents. An evaluation of the potential for off-site vehicle accidents was completed by the Applicant, who reported accident rates on Tecopa Road obtained from the California Department of Transportation (Caltrans) and the Statewide Integrated Traffic Records System (that compiles incidents reported by the California Highway Patrol). (CH2 2012z, p. 51, Table 6-3 and 6-4). Based on these reported accidents that occurred on Inyo County roadways in the vicinity of the project for the years 2008, 2009 and 2010, it was estimated that 5 additional accidents would occur on surrounding roadways during the 29 month HHSEGS construction period. Hazards due to off-site vehicle accidents on the roadways in the project vicinity would be less than significant. In order to properly accommodate the increased worker commute traffic and materials transport truck traffic on Tecopa Road at HHSEGS' entry and exit locations, appropriate measures have been recommended by staff in the **Traffic and Transportation** section of this **FSA** and Condition of Certification**TRANS-2**.

Technical Rescue Incidents

Another potential risk associated with HHSEGS construction activities is technical rescue incidents, including high angle rescue, low angle rescue, and confined space rescue, also called "permit space" rescue. No such incidents have been reported as a result of Ivanpah construction activity in San Bernardino County, a similarly tall, central receiving station power tower-type project. In order to ensure that the demand for high

angle rescue, low angle rescue, and confined space “permit space” rescue on the HHSEGS project site would be less than significant, the incorporation of appropriate employer and employee practices and procedures are implemented in **WORKER SAFETY-3**.

The Occupational Safety & Health Administration (OSHA) provisions §1910.146 (k) and Appendix F contains requirements for practices and procedures to protect employees from the hazards associated with confined and elevated spaces, including procedures for hazards analysis, and the determination of an on-site rescue team or off-site emergency team services. The National Fire Protection Association (NFPA) has established the minimum job performance requirements necessary for off-site emergency rescue teams. NFPA 1670 standards establish levels of functional capability for successfully conducting even the most complex rescue operations. This standard was developed to define levels of preparation and operational capability that should be achieved by any authority having jurisdiction (AHJ) that has responsibility for technical rescue operations.

While the frequency of HHSEGS technical “permit space” emergency rescues is not expected to be significant, **WORKER SAFETY-1 (**Construction Emergency Action Plan) shall include specifics regarding the analysis of confined and elevated “permit spaces” and the process for determining an on-site rescue team, or an off-site rescue team. An on-site rescue team would be comprised of appropriately trained and designated employees, per §1910.146(k)(2). An off-site emergency rescue teams, per NFPA 1670 standards, would be personnel from either SIFPD (the authority having jurisdiction) or PVFRS (via a mutual aid agreement).

On-site Medical Emergencies

Additionally, staff has determined that the potential for both work-related and non-work-related heart attacks exists at power plants. In fact, staff’s research on the frequency of EMS response to gas-fired power plants shows that many of the responses for cardiac emergencies involved non-work-related incidences, including those involving visitors. The need for prompt response within a few minutes is well documented in the medical literature. Staff believes that the quickest medical intervention can only be achieved with the use of an on-site automatic external defibrillator (AED); the response from an off-site provider would take longer regardless of the provider location. This fact is also well documented and serves as the basis for many private and public locations (e.g., airports, factories, government buildings) maintaining on-site cardiac defibrillation devices. Therefore, staff concludes that, with the advent of modern cost-effective cardiac defibrillation devices, it is proper in a power plant environment to maintain such a device on site in order to treat cardiac arrhythmias resulting from industrial accidents or other non-work related causes.

Staff proposes Condition of Certification **WORKER SAFETY-5,** which would require that a portable AED be located on site, that all power plant employees on site during operations to be trained in its use, and that a representative number of workers on site during construction and commissioning also be trained in its use. For a more detailed analysis of EMS capabilities, impacts and suggested mitigation measures, please see the **Socioeconomics** section of this **FSA**.

Closure and Decommissioning Impacts and Mitigation

A closure of the proposed HHSEGS (either temporary or permanent) would follow a Facility Closure Plan prepared by the applicant and designed to minimize public health and environmental impacts. Decommissioning procedures would be consistent with all applicable LORS (HHSG 2011a, § 2.5.2). Staff expects that impacts from the closure and decommissioning process would represent a fraction of the impacts associated with the construction or operation of the proposed HHSEGS. Therefore based on staff's analysis for the construction and operation phases of this project and the closure plan requirements in the **General Conditions** section of this FSA, staff concludes that hazardous materials-related impacts from closure and decommissioning of the HHSEGS would be insignificant with respect to CEQA.

CUMULATIVE IMPACTS

Fire protection and emergency services demands caused by routine and emergency incidents at the proposed HHSEGS would continue for the expected 30-year life of the project. Staff considers that if the potential for direct impacts due to construction and operation of the proposed HHSEGS is mitigated to a level of insignificance, then the potential for cumulative impacts with other existing or foreseeable nearby facilities would also be sufficiently mitigated because any such impacts would occur independently of other facilities. However, staff cannot confirm that there would be no cumulative impacts until mitigation for direct impacts has been determined.

COMPLIANCE WITH LORS

Staff concludes that construction and operation of the HHSEGS project with staff's proposed mitigation in the conditions of certification would be in compliance with all applicable laws, ordinances, regulations, and standards (LORS) regarding long-term and short-term project impacts in the area of worker safety and fire protection.

CONCLUSIONS

Energy Commission staff (staff) has reviewed the Hidden Hills Solar Electric Generating System in accordance with the requirements of CEQA. With respect to CEQA, staff concludes that if the applicant for the proposed HHSEGS project provides a Project Construction Safety and Health Program and a Project Operations and Maintenance Safety and Health Program, as required by Conditions of Certification **WORKER SAFETY-1** and **-2** and fulfils the requirements of Conditions of Certification **WORKER SAFETY-3** through **-5** the project would incorporate sufficient measures to ensure adequate levels of industrial safety and comply with applicable laws, ordinances, regulations, and standards.

The proposed conditions of certification provide assurance that the Construction Safety and Health Program and the Operations and Maintenance Safety and Health Program proposed by the applicant would be reviewed by the appropriate agency before implementation. The conditions also require verification that the proposed plans

adequately assure worker safety and on-site fire protection and comply with applicable laws, ordinances, regulations, and standards.

Staff has considered the position of the Southern Inyo Fire Protection District and all relevant information as well as past experience at other solar power plants in California. SIFPD resources (both personnel and equipment), are limited, commensurate with the low population density of the area it serves. The SIFPD has indicated that it will be significantly impacted (CEC 2012h) because of the magnitude of the proposed project and the large (relative to local population) workforce. Due to the minimal resources of the local SIFPD, staff agrees with the SIFPD that the emergency response requirements of HHSEGS would likely create a significant public impact.

At staff's request, the applicant provided Fire and Emergency Services Risk and Needs Analyses (FESNA) on May 9, 2012 (CH2 2012z). The analyses suggest that by complying with LORS, the project will not create significant impacts on the local SIFPD or local emergency response resources because any responses needed for fire, medical, or technical rescue needs would be sourced from Pahrump Valley Fire-Rescue Services (PVFRS) in Pahrump, Nevada. The official mechanism by which these various services (including technical rescue) would be sourced and paid for from another jurisdiction, like PVFRS in the state of Nevada, rather than from the local Authority Having Jurisdiction (AHJ), in this case SIFPD, has not been established.

Staff's conversations with both Fire Chief Levy of SIFPD and Fire Chief Scott F. Lewis of Pahrump Valley Fire-Rescue Service (PVFRS) have confirmed that there is a longstanding practice of providing mutual aide between their respective fire and EMS agencies, however, there is not currently a formal, signed mutual aid agreement between the agencies. With ongoing growth in demand for response services in the areas caused by, among other things, solar energy plants, this casual practice could well be tested going forward, and cannot be relied upon in this siting case. Generally, mutual aid is reserved for and is requested only when the primary responding agency is unable to adequately respond, and is not considered to be a method for providing primary response.

Assurance of the ability of the SIFPD to continue to provide its current level of response to the public requires expansion of SIFPD's resources in equipment, location, and personnel in order to prevent potential draw-down situations in which there would not be enough resources to provide an adequate level of service response to potentially near-simultaneous emergency incidents (including off-site road accidents).

Staff understands that there are ongoing discussions between the applicant and SIFPD, but that thus far, with regards to potential impacts from construction and operation of HHSEGS, no actions have been taken and no agreements have been reached and made public. Therefore, staff is proposing mitigation to reduce these impacts to less than significant by requiring an initial payment to the SIFPD for capital and personnel support and an agreement with the SIFPD (see proposed Conditions of Certification **WORKER SAFETY-6 and -7**.

Most of the transmission line and natural gas pipeline linears would be located in Nevada on United State Bureau of Land Management (BLM) land. Therefore, the

environmental and permit review of impact from the Nevada portion of the linears would be conducted by BLM.

PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

The following conditions of certification meet the Energy Commission's responsibility to comply with the California Environmental Quality Act and serve as staff's recommendations for the Energy Commission to consider in its decision to avoid or reduce the severity of worker safety- and fire protection-related impacts to less than significant and for the project to conform to all applicable LORS.

WORKER SAFETY-1 The project owner shall submit to the Compliance Project Manager (CPM) a copy of the Project Construction Safety and Health Program containing the following:

- a Construction Personal Protective Equipment Program;
- a Construction Exposure Monitoring Program;
- a Construction Injury and Illness Prevention Program;
- a Construction Heat Stress Protection Plan that implements and expands on existing Cal OSHA regulations as found in 8 CCR 3395;
- a Construction Emergency Action Plan; and
- a Construction Fire Prevention Plan that includes the above-ground fuel depot.
- an Eyesight Protection from Retinal Damage Plan that is designed to insure that workers in the solar field receive and wear the appropriate protective sunglasses. This Eyesight Protection from Retinal Damage Plan would:

  (1) identify and acquire the appropriate eye protection (EP) equipment based on the IEC 62471 standards in sufficient numbers to provide safety glasses for the workers engaged in solar field work, and tower work where the potential exists for heliostat solar reflective exposure or SRSG exposure during operations,

  (2) establish the requirements and procedures for the donning and doffing of the EP by workers and provide training and,

  (3) monitor worker use of the PPE and compliance with the EP procedures.

Verification: The Construction Emergency Action Plan and the Fire Prevention Plan shall be submitted to the Southern Inyo Fire Protection District for review and comment 60 days prior to construction. The Personal Protective Equipment Program, the Exposure Monitoring Program, the Injury and Illness Prevention Program, and the Heat Stress Protection Plan shall be submitted to the CPM for review and approval of program compliance with all applicable safety orders 30 days prior to construction.

At least 30 days prior to the start of construction, the project owner shall submit to the CPM for review and approval a copy of the Project Construction Safety and Health Program.

WORKER SAFETY-2 The project owner shall submit to the CPM a copy of the Project Operations and Maintenance Safety and Health Program containing the following:

- an Operation Injury and Illness Prevention Plan;
- an Operation Heat Stress Protection Plan that implements and expands on existing Cal OSHA regulations (Cal. Code of Regs., tit. 8,§ 3395);
- a Best Management Practices (BMP) for the storage and application of herbicides;
- an Emergency Action Plan;
- Hazardous Materials Management Program;
- Fire Prevention Plan that includes the fuel depot should the project owner elect to maintain and operate the fuel depot during operations (8 Cal Code Regs. § 3221); and
- Personal Protective Equipment Program (Cal Code Regs.,tit. 8, §§ 3401—3411).
- an Eyesight Protection from Retinal Damage Plan that is designed to insure that workers in the solar field receive and wear the appropriate protective sunglasses. This Eyesight Protection from Retinal Damage Plan would:

  (1) identify and acquire the appropriate eye protection (EP) equipment based on the IEC 62471 standards in sufficient numbers to provide safety glasses for the workers engaged in solar field work, and tower work where the potential exists for heliostat solar reflective exposure or SRSG exposure during operations,

  (2) establish the requirements and procedures for the donning and doffing of the EP by workers and provide training and,

  (3) monitor worker use of the PPE and compliance with the EP procedures.

Verification: The Fire Prevention Plan and the Emergency Action Plan shall also be submitted to the Southern Inyo Fire Protection District for review and comment 60 days prior to the start of operations. The Operation Injury and Illness Prevention Plan, Heat Stress Protection Plan, BMP for Herbicides, and Personal Protective Equipment, and Personal Protective Equipment Program shall be submitted to the CPM for review and approval concerning compliance of the programs with all applicable safety orders 30 days prior to the start of operations.

At least 30 days prior to commercial operation, the project owner shall submit to the CPM for approval a copy of the Project Operations and Maintenance Safety and Health Program.

WORKER SAFETY-3 The project owner shall provide a site Construction Safety Supervisor (CSS) who, by way of training and/or experience, is knowledgeable of power plant construction activities and relevant laws, ordinances, regulations, and standards; is capable of identifying workplace hazards relating to the construction activities; and has authority to take appropriate action to assure compliance and mitigate hazards. The CSS shall:

- have overall authority for coordination and implementation of all occupational safety and health practices, policies, and programs;
- assure that the safety program for the project complies with all Cal/OSHA and federal regulations related to power plant projects;
- assure that all construction and commissioning workers and supervisors receive adequate safety training;
- complete accident and safety-related incident investigations and emergency response reports for injuries and inform the CPM of safety-related incidents; assure that all the plans identified in Conditions of Certification Worker Safety-1 and -2 are implemented; and,
- provide evidence that proper practices and procedures for the protection of employees involved in construction of the solar power tower, solar receiving steam generator, and/or confined and elevated (high angle) "permit spaces" occurs per federal and state standards (including OSHA §1910.146(k) and Cal/OSHA Standards Part 1910) and the equipment manufacturer's requirements.

Verification: The CSS shall submit in the monthly compliance report)MCR) a monthly safety inspection report to include:

- record of all employees trained for that month (all records shall be kept on site for the duration of project construction);
- summary report of safety management actions and safety-related incidents that occurred during the month;
- report of any continuing or unresolved situations and incidents that may pose danger to life or health; and
- report of accidents and injuries that occurred during the month.

At least 60 days prior to the start of site mobilization, the project owner shall submit to the CPM the name and contact information for the Construction Safety Supervisor (CSS). The contact information of any replacement CSS shall be submitted to the CPM within one business day after replacement.

WORKER SAFETY-4 The project owner shall make payments to the Chief Building Official (CBO) for the services of a Safety Monitor based upon a reasonable fee schedule to be negotiated between the project owner and the CBO. Those services shall be in addition to other work performed by the CBO. The Safety Monitor shall be selected by and report directly to the CBO and will be

responsible for verifying that the Construction Safety Supervisor, as required in Condition of Certification Worker Safety-3, implements all appropriate Cal/OSHA and Energy Commission safety requirements. The Safety Monitor shall conduct on-site safety inspections at intervals necessary to fulfill those responsibilities.

Verification: At least 60 days prior to the start of construction, the project owner shall provide proof of its agreement to fund the Safety Monitor services to the CPM for review and approval.

WORKER SAFETY-5 The project owner shall ensure that a portable automatic external defibrillator (AED) is located on site during construction and operations and shall implement a program to ensure that workers are properly trained in its use and that the equipment is properly maintained and functioning at all times. During construction and commissioning, the following persons shall be trained in its use and shall be on site whenever the workers that they supervise are on site: the Construction Project Manager or delegate, the Construction Safety Supervisor or delegate, and all shift foremen. During operations, all power plant employees shall be trained in its use. The training program shall be submitted to the CPM for review and approval.

Verification: At least 30 days prior to the start of site mobilization, the project owner shall submit to the CPM proof that a portable automatic external defibrillator (AED) exists on site and a copy of the training and maintenance program for review and approval.

WORKER SAFETY-6 The project owner shall either:

(1) Reach an agreement with the Southern Inyo Fire Protection District (SIFPD) regarding funding of its project-related share of capital and operating costs to improve fire protection/emergency response infrastructure and provide appropriate equipment as mitigation of project-related impacts on fire protection/emergency response services within the jurisdiction; or

(2) if no agreement can be reached, the project owner shall fund a study conducted by an independent contractor who shall be selected and approved by the CPM and would fulfill all mitigation identified in the independent fire needs assessment and a risk assessment. The study will evaluate the project's proportionate funding responsibility for the above-identified mitigation measures, with particular attention to emergency response and equipment/staffing/location needs.

Should the project owner pursue option (2), above, the study shall be conducted pursuant to the Fire Needs Assessment and Risk Assessment shall evaluate the following:

(a) The project's proportionate (incremental) contribution to potential cumulative impacts on the SIFPD and the project allocated costs of enhanced fire protection/emergency response services including the

fire response, hazardous materials spill/leak response, rescue, and emergency medical services necessary to mitigate such impacts;

(b) The extent that the project's contribution to local tax revenue will reduce impacts on local fire protection and emergency response services; and

(c) Recommend an amount of funding (and corresponding payment plan) that represents the project's proportional payment obligation for the above-identified mitigation measures.

Compliance Protocols shall be as follows:

(a) The study shall be conducted by an independent consultant selected by the project owner and approved by the CPM. The project owner shall provide the CPM with the names of at least three consultants, whether entities or individuals, from which to make a selection, together with statements of qualifications;

(b) The study shall be fully funded by the project owner.

(c) The project owner shall provide the protocols for conducting the independent study for review and comment by the SIFPD and review and approval by the CPM prior to the independent consultant's commencement of the study;

(d) The consultant shall not communicate directly with the project owner or SIFPD without express prior authorization from the CPM. When such approval is given, the CPM shall be copied on any correspondence between or among the project owner, SIFPD, and the consultant (including emails) and included in any conversations between or among the project owner, SIFPD and consultant; and

(e) The CPM shall verify that the study is prepared consistent with the approved protocols, ***or***

(3) If the project owner and SIFPD do not agree to the recommendations of the independent consultant's study, the Energy Commission CPM or designee shall, based on the results of the study and comments from the project owner and SIFPD, make the final determination regarding the funding to be provided to the SIFPD to accomplish the above-identified mitigation.

Site mobilization shall not occur until funding of mitigation occurs pursuant to either of the resolution options set forth above.

Verification: At least 30 days before construction, the project owner shall provide to the CPM:

(1) A copy of the individual agreement with the SIFPD or, if the owner joins a power generation industry association, a copy of the group's bylaws and a copy of the group's

agreement with the SIFPD; and evidence in each January Monthly Compliance Report that the project owner is in full compliance with the terms of such bylaws and/or agreement; ***or***
(2) a copy of the completed study showing the mitigation or the precise amount the project owner shall pay for mitigation; and documentation that the amount has been paid.

Annually thereafter, the owner shall provide TO the CPM verification of funding to the SIFPD, if annual payments were approved or recommended under either of the above-described funding resolution options.

WORKER SAFETY -7 The project owner shall provide a $200,000 payment to Southern Inyo Fire Protection District prior to the start of construction. This funding shall off-set any initial funding required by **WORKER SAFETY-6** above until the funds are exhausted. This offset will be based on a full accounting by the Southern Inyo Fire Protection District regarding the use of these funds.

Verification: At least 30 days prior to the start of construction the project owner shall provide documentation of the payment described above to the CPM. The CPM shall adjust the payments initially required by **WORKER SAFETY-6** based upon the accounting provided by the Southern Inyo Fire Protection District.

REFERENCES

CEC 2012h – California Energy Commission/S. Kerr (tn: 63659) Report of Conversation w/ Larry Levy, SIFPD re: medical needs. 2/15/2012

CH2 2012p – CH2MHill/J. Carrier (tn: 64558) Supplemental Data Response, Set 2, Boiler Optimization Plan and Design Change. 4/2/2012

CH2 2011e – CH2MHILL/J. Carrier (tn: 62057) Applicant's Attachment DR20-1 Omitted from Data Response Set 1A. 12/05/2011

CH2 2012d – CH2MHill/J. Carrier (tn: 63635) Applicant's Data Response, Set 2A. 02/09/2012

CH2 2012j – CH2MHill/ M. Finn (tn: 64163) Applicant's Data Response Set 1B-5. 3/15/2012

CH2 2012z – CH2MHill/J. Carrier (tn: 65119) Applicant's Data Response, Set 1C-3. Fire Risk Assessment. 5/08/2012

HHSG 2011a – BrightSource Energy/J. Woolard (tn: 61756) Application for Certification, Volume 1 & 2. 08/5/2011

HHSG 2011b – BrightSource Energy/C. Jensen (tn: 62125) Supplement to AFC for HHSEGS. 09/07/2011

HHSG 2011c – BrightSource Energy/C. Jensen (tn: 62322) AFC Supplement B. 09/23/2011

SIFPD2012a – Southern Inyo Fire Protection District (tn: 65013) Request for Listing of Interested Agency. 04/30/2012 -- Ross letter

VF2010 – State of California—Health and Human Services Agency California, Department of Public Health, Coccidioidomycosis Yearly Summary Report, 2001 – 2010

WORKER SAFETY / FIRE PROTECTION

List of Comment Letters

		WS/FP Comments?
1	Inyo County	
2	Bureau of Land Management	
3	National Park Service	
4	The Nature Conservancy	
5	Amargosa Conservancy	
6	Basin & Range Watch	
7	Pahrump Paiute Tribe	
8	Richard Arnold, Pahrump Piahute Tribe	
9	Big Pine Tribe of Owens Valley	
10	Intervenor Cindy MacDonald	**X**
11	Intervenor Center for Biological Diversity	
12	Intervenor, Old Spanish Trail Association	
13	Applicant, BrightSource Energy, Inc.	**X**

Comment #	DATE	COMMENT TOPIC	RESPONSE
10	**July 21, 2012**	**Intervenor Cindy MacDonald**	
10.1	**p. 2-5**	"Fire and Emergency Services" -- The applicant's intent to utilize Nevada for fire and emergency services has initiated jurisdictional disputes. It may also increase property taxes to landowners in the vicinity through provisions contained within the California Constitution, Section XIII A, sections 13910 through 13916. As a result, the infrastructure requirements for functional fire and emergency medical services necessary to protect and insure the public interest and safety in and around the proposed Hidden Hills Solar Electric Generating System site cannot be considered reasonably available.	Staff notes that the local fire department has indentified impacts to emergency services from the project. This is "drawdown," where exisiting emergency service users may not get their current level of emergency services if local resources are having to repond to emergencies relating to the power plant. Staff is recommending adoption of conditions of certification that would address these issues prior to start of construction. These agreements might include reliance on formal mutual aid agreements and new infrastructure, but would have to mitigate the effects of drawdown such that local resisdents could expect their current levels of emergency services. Concerns about increased parcel taxes are speculative.

Comment #	DATE	COMMENT TOPIC	RESPONSE
13	July 23, 2012	Applicant, BrightSource Energy, Inc.	
13.2	p. 331	suggested change to PSA page 4.16-15 SIFPD Impacts, after 1st paragraph, request to insert text explaining Applicant's interpretation of the difference in designs of their proprietary "power tower" technology and parabolic trough technology.	Staff included in the **FSA** a discussion of the effect of absence of HTF.
13.3	p. 332	suggested change to PSA page 4.16-17 SIFPD Impacts, after 1st paragraph. Applicant feels 0.83 emergencies per plant per year does not constitute "signficant" even in desert environment and objects to staff's assessment otherwise	Staff recognizes that an expected number of incidents cannot be determined from the existing, incomplete data. Whether higher levels of calls might occur remains unknown. Existing data is taken from smaller solar power plants and may not be predictive of the current siting case. The existing data does not include potential impacts on EMS services that would result from increased worker commute traffic. These impacts would be affected by the nature of the roads used, commute times, weather, etc. Finally, the significance of any impacts would depend on the resources and level of service demands on the local responders.
13.4	p. 332	suggested change to PSA page 4.16-17 SIFPD cts,last paragraph, 3rd Sentence, regarding response time, applicant recommends "approximately 40 minutes" be used instead of stated "30 to 50 minutes"	Staff prefers the added information provided by the estimated range of response times. Estimated ranges would be affected by experience of affects resulting from road conditions, weather, volunteer availability, etc.
13.5	p. 332	suggested change to PSA page 4.16-18 SIFPD Impacts,last paragraph, 3rd Sentence, regarding response time, applicant recommends "approximately 40 minutes" be used instead of stated "30 to 50 minutes" -- and that this is not a signficant impact. Moreover, state this is an "economic" not "environemntal" issue and therefore not an impact under CEQA.	Staff prefers the added information provided by the estimated range of response times. Staff considers that an incident requiring a large response at the proposed project for a prolonged duration, which might leave the fire department unable to effectively respond to emergency needs of the public, would be significant.

13.6	**p. 332**	question regarding PSA page 4.16-19 Emergency Medical Services Response, 2nd paragraph, 3rd sentence: is this only for the construction period?	Certainly the construction period creates the highest demand; needs beyond construction will be resolved by Conditions of Certification **Worker Safety-6** and **-7**.
13.7	**p. 332**	question regarding PSA page 4.16-20 Cumulative Impacts, 1st paragraph, 1st Sentence: which facilites are being referred in this first sentence, and are they within the SIFPD service area?	Potential issues will be resolved by Conditions of Certification **Worker Safety-6** and **-7**.

FACILITY DESIGN

Testimony of Shahab Khoshmashrab

SUMMARY OF CONCLUSIONS

The California Energy Commission staff concludes that the design, construction, and eventual closure of the project and its linear facilities would likely comply with applicable engineering laws, ordinances, regulations and standards. The proposed conditions of certification, below, would ensure compliance with these laws, ordinances, regulations and standards.

INTRODUCTION

Facility design encompasses the civil, structural, mechanical, and electrical engineering design of the Hidden Hills Solar Electric Generating System (HHSEGS). The purpose of this analysis is to:

- Verify that the laws, ordinances, regulations and standards (LORS) that apply to the engineering design and construction of the project have been identified;
- Verify that both the project and its ancillary facilities are sufficiently described, including proposed design criteria and analysis methods, in order to provide reasonable assurance that the project will be designed and constructed in accordance with all applicable engineering LORS, in a manner that also ensures the public health and safety;
- Determine whether special design features should be considered during final design to address conditions unique to the site which could influence public health and safety; and
- Describe the design review and construction inspection process and establish the conditions of certification used to monitor and ensure compliance with the engineering LORS, in addition to any special design requirements.

Subjects discussed in this analysis include:

- Identification of the engineering LORS that apply to facility design;
- Evaluation of the applicant's proposed design criteria, including identification of criteria essential to public health and safety;
- Proposed modifications and additions to the application for certification (AFC) necessary for compliance with applicable engineering LORS; and
- Conditions of certification proposed by staff to ensure that the project will be designed and constructed to ensure public health and safety and comply with all applicable engineering LORS.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

Lists of LORS applicable to each engineering discipline (civil, structural, mechanical, and electrical) are described in the AFC (HHSG 2011a, AFC Appendices 2A through 2G). Key LORS are listed in **Facility Design Table 1,** below:

FACILITY DESIGN Table 1
Key Engineering Laws, Ordinances, Regulations and Standards (LORS)

Applicable LORS	Description
Federal	Title 29 Code of Federal Regulations (CFR), Part 1910, Occupational Safety and Health standards
State	2010 (or the latest edition in effect) California Building Standards Code (CBSC) (also known as Title 24, California Code of Regulations)
Local	Inyo County regulations and ordinances
General	American National Standards Institute (ANSI) American Society of Mechanical Engineers (ASME) American Welding Society (AWS) American Society for Testing and Materials (ASTM)

Condition of Certification **MECH-2** requires the project owner to obtain approval of the pressure vessels from California Occupational Safety and Health Administration (Cal-OSHA) in order to satisfy Title 29 Code of Federal Regulations' safety requirements.

The following conditions of certification require the project to comply with the California Building Standards Code and Inyo County regulations and ordinances to ensure that the project would be built to applicable engineering codes and ensure public health and safety.

For the project to be built in a manner that would ensure public health and safety and operational integrity of project equipment, the LORS listed above in **FACILITY DESIGN Table 1** under the "**General**" heading, must also be met by the project. The LORS listed under this heading are only some of the key engineering standards applicable to the project; for a comprehensive list of engineering LORS, please see AFC Appendices 2A through 2G.

SETTING

HHSEGS would be located on approximately 3,277 acres of privately owned land leased in Inyo County, California, adjacent to the Nevada border. For more information on the site and its related project description, please see the **Project Description** section of this document. Additional engineering design details are contained in the AFC, Appendices A through F (HHSG 2011a), and the Boiler Optimization Plan, Attachment B (CH2 2012p).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The purpose of this analysis is to ensure that the project would be built to applicable engineering codes and ensure public health and safety. This analysis further verifies that applicable engineering LORS have been identified and that the project and its ancillary facilities have been described in adequate detail. It also evaluates the applicant's proposed design criteria, describes the design review and construction inspection process, and establishes conditions of certification that would monitor and ensure compliance with engineering LORS and any other special design requirements. These conditions allow both the California Energy Commission (Energy Commission) compliance project manager (CPM) and the applicant to adopt a compliance monitoring program that will verify compliance with these LORS.

SITE PREPARATION AND DEVELOPMENT

Staff has evaluated the proposed design criteria for grading, flood protection, erosion control, site drainage, and site access, in addition to the criteria for designing and constructing linear support facilities such as natural gas and electric transmission interconnections. The applicant proposes the use of accepted industry standards (see HHSG 2011a, Appendices 2A through 2G, for a representative list of applicable industry standards), design practices, and construction methods in preparing and developing the site. Staff concludes that this project, including its linear facilities, would most likely comply with all applicable site preparation LORS. To ensure compliance, staff proposes the conditions of certification listed below and in the **Geology and Paleontology** section of this document.

MAJOR STRUCTURES, SYSTEMS, AND EQUIPMENT

Major structures, systems, and equipment and their associated components are necessary for power production, costly or time consuming to repair or replace, are used for the storage, containment, or handling of hazardous or toxic materials, or could become potential health and safety hazards if not constructed according to applicable engineering LORS.

HHSEGS will be designed and constructed to the 2010 California Building Standards Code (CBSC), also known as Title 24, California Code of Regulations, which encompasses the California Building Code (CBC), California Building Standards Administrative Code, California Electrical Code, California Mechanical Code, California Plumbing Code, California Energy Code, California Fire Code, California Code for Building Conservation, California Reference Standards Code, and other applicable codes and standards in effect when the design and construction of the project actually begin. If the initial designs are submitted to the chief building official (CBO) for review and approval after the update to the 2010 CBSC takes effect, the 2010 CBSC provisions shall be replaced with the updated provisions.

Certain structures in a power plant may be required, under the CBC, to undergo dynamic lateral force (structural) analysis; others may be designed using the simpler static analysis procedure. In order to ensure that structures are analyzed according to their appropriate lateral force procedure, staff has included Condition of Certification

STRUC-1, below, which, in part, requires the project CBO's review and approval of the owner's proposed lateral force procedures before construction begins.

PROJECT QUALITY PROCEDURES

The applicant describes a quality program intended to inspire confidence that its systems and components will be designed, fabricated, stored, transported, installed, and tested in accordance with all appropriate power plant technical codes and standards (HHSG 2011a, AFC § 3.12.6, Appendices 2A through 2G). Compliance with design requirements will be verified through specific inspections and audits. Implementation of this quality assurance/quality control (QA/QC) program will ensure that HHSEGS is actually designed, procured, fabricated, and installed as described in this analysis.

COMPLIANCE MONITORING

Under Section 104.1 of the 2010 CBC, the CBO is authorized and directed to enforce all provisions of the CBC. The Energy Commission itself serves as the building official, and has the responsibility to enforce the code, for all of the energy facilities it certifies. In addition, the Energy Commission has the power to interpret the CBC and adopt and enforce both rules and supplemental regulations that clarify application of the CBC's provisions.

The Energy Commission's design review and construction inspection process conforms to CBC requirements and ensures that all facility design conditions of certification are met. As provided by Section 103.3 of the 2010 CBC, the Energy Commission appoints experts to perform design review and construction inspections and act as delegate CBOs on behalf of the Energy Commission. These delegates may include the local building official and/or independent consultants hired to provide technical expertise that is not provided by the local official alone. The applicant, through permit fees provided by the CBC, pays the cost of these reviews and inspections. While building permits in addition to Energy Commission certification are not required for this project, the applicant pays in lieu of CBC permit fees to cover the costs of these reviews and inspections.

Engineering and compliance staff will invite Inyo County or a third-party engineering consultant to act as CBO for this project. When an entity has been assigned CBO duties, Energy Commission staff will complete a memorandum of understanding (MOU) with that entity to outline both its roles and responsibilities and those of its subcontractors and delegates.

Staff has developed proposed conditions of certification to ensure the protection of public health and safety and compliance with engineering design LORS. Some of these conditions address the roles, responsibilities, and qualifications of the engineers who will design and build the proposed project (conditions of certification **GEN-1** through **GEN-8**). These engineers must be registered in California and sign and stamp every submittal of design plans, calculations, and specifications submitted to the CBO. These conditions require that every element of the project's construction (subject to CBO review and approval) be approved by the CBO before it is performed. They also require

that qualified special inspectors perform or oversee special inspections required by all applicable LORS.

While the Energy Commission and delegate CBO have the authority to allow some flexibility in scheduling construction activities, these conditions are written so that no element of construction (of permanent facilities subject to CBO review and approval) which could be difficult to reverse or correct can proceed without prior CBO approval. Elements of construction that are not difficult to reverse may proceed without approval of the plans. The applicant bears the responsibility to fully modify construction elements in order to comply with all design changes resulting from the CBO's subsequent plan review and approval process.

FACILITY CLOSURE

The removal of a facility from service (decommissioning) when it reaches the end of its useful life ranges from "mothballing," to the removal of all equipment and appurtenant facilities and subsequent restoration of the site. Future conditions that could affect decommissioning are largely unknown at this time.

In order to ensure that decommissioning will be completed in a manner that is environmentally sound, safe, and protects the public health and safety, the applicant shall submit a decommissioning plan to the Energy Commission for review and approval before the project's decommissioning begins. The plan shall include a discussion of:

- Proposed decommissioning activities for the project and all appurtenant facilities that were constructed as part of the project;
- All applicable LORS, local/regional plans, and proof of adherence to those applicable LORS and local/regional plans;
- The activities necessary to restore the site if the plan requires removal of all equipment and appurtenant facilities; and
- Decommissioning alternatives other than complete site restoration.

Satisfying the above requirements should serve as adequate protection, even in the unlikely event that the project is abandoned. Staff has proposed general conditions (see **General Conditions**) to ensure that these measures are included in the Facility Closure Plan.

CONCLUSIONS AND RECOMMENDATIONS

1. The laws, ordinances, regulations and standards (LORS) identified in the AFC and supporting documents directly apply to the project.

2. Staff has evaluated the proposed engineering LORS, design criteria, and design methods in the record, and concludes that the design, construction, and eventual closure of the project will likely comply with applicable engineering LORS.

3. The proposed conditions of certification will ensure that HHSEGS is designed and constructed in accordance with applicable engineering LORS. This will be

accomplished through design review, plan checking, and field inspections that will be performed by the CBO or other Energy Commission delegate. Staff will audit the CBO to ensure satisfactory performance.

4. Though future conditions that could affect decommissioning are largely unknown at this time, it can reasonably be concluded that if the project owner submits a decommissioning plan as required in the **General Conditions** portion of this document prior to decommissioning, decommissioning procedures will comply with all applicable engineering LORS.

Energy Commission staff recommends that:

1. The proposed conditions of certification be adopted to ensure that the project is designed and constructed in a manner that protects the public health and safety and complies with all applicable engineering LORS;

2. The project be designed and built to the 2010 CBSC (or successor standards, if in effect when initial project engineering designs are submitted for review); and

3. The CBO reviews the final designs, checks plans, and performs field inspections during construction. Energy Commission staff shall audit and monitor the CBO to ensure satisfactory performance.

CONDITIONS OF CERTIFICATION

GEN-1 The project owner shall design, construct, and inspect the project in accordance with the 2010 California Building Standards Code (CBSC), also known as Title 24, California Code of Regulations, which encompasses the California Building Code (CBC), California Building Standards Administrative Code, California Electrical Code, California Mechanical Code, California Plumbing Code, California Energy Code, California Fire Code, California Code for Building Conservation, California Reference Standards Code, and all other applicable engineering LORS in effect at the time initial design plans are submitted to the CBO for review and approval (the CBSC in effect is the edition that has been adopted by the California Building Standards Commission and published at least 180 days previously). The project owner shall ensure that all the provisions of the above applicable codes are enforced during the construction, addition, alteration, moving, demolition, repair, or maintenance of the completed facility. All transmission facilities (lines, switchyards, switching stations and substations) are covered in the conditions of certification in the **Transmission System Engineering** section of this document.

In the event that the initial engineering designs are submitted to the CBO when the successor to the 2010 CBSC is in effect, the 2010 CBSC provisions shall be replaced with the applicable successor provisions. Where, in any specific case, different sections of the code specify different materials, methods of construction or other requirements, the most restrictive shall

govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern.

The project owner shall ensure that all contracts with contractors, subcontractors, and suppliers clearly specify that all work performed and materials supplied comply with the codes listed above.

Verification: Within 30 days following receipt of the certificate of occupancy, the project owner shall submit to the CPM a statement of verification, signed by the responsible design engineer, attesting that all designs, construction, installation, and inspection requirements of the applicable LORS and the Energy Commission's decision have been met in the area of facility design. The project owner shall provide the CPM a copy of the certificate of occupancy within 30 days of receipt from the CBO.

Once the certificate of occupancy has been issued, the project owner shall inform the CPM at least 30 days prior to any construction, addition, alteration, moving, demolition, repair, or maintenance to be performed on any portion(s) of the completed facility that requires CBO approval for compliance with the above codes. The CPM will then determine if the CBO needs to approve the work.

GEN-2 Before submitting the initial engineering designs for CBO review, the project owner shall furnish the CPM and the CBO with a schedule of facility design submittals, and master drawings and master specifications list. The master drawings and master specifications list shall contain a list of proposed submittal packages of designs, calculations, and specifications for major structures, systems, and equipment. Major structures, systems, and equipment are structures and their associated components or equipment that are necessary for power production, costly or time consuming to repair or replace, are used for the storage, containment, or handling of hazardous or toxic materials, or could become potential health and safety hazards if not constructed according to applicable engineering LORS. The schedule shall contain the date of each submittal to the CBO. To facilitate audits by Energy Commission staff, the project owner shall provide specific packages to the CPM upon request.

Verification: At least 60 days (or a project owner- and CBO-approved alternative time frame) prior to the start of rough grading, the project owner shall submit to the CBO and to the CPM the schedule, and the master drawings and master specifications list of documents to be submitted to the CBO for review and approval. These documents shall be the pertinent design documents for the major structures, systems, and equipment defined above in Condition of Certification **GEN-2**. Major structures and equipment shall be added to or deleted from the list only with CPM approval. The project owner shall provide schedule updates in the monthly compliance report.

GEN-3 The project owner shall make payments to the CBO for design review, plan checks, and construction inspections, based upon a reasonable fee schedule to be negotiated between the project owner and the CBO. These fees may be consistent with the fees listed in the 2010 CBC, adjusted for inflation and other appropriate adjustments; may be based on the value of the facilities

reviewed; may be based on hourly rates; or may be otherwise agreed upon by the project owner and the CBO.

Verification: The project owner shall make the required payments to the CBO in accordance with the agreement between the project owner and the CBO. The project owner shall send a copy of the CBO's receipt of payment to the CPM in the next monthly compliance report indicating that applicable fees have been paid.

GEN-4 Prior to the start of rough grading, the project owner shall assign a California-registered architect, or a structural or civil engineer, as the resident engineer (RE) in charge of the project. All transmission facilities (lines, switchyards, switching stations, and substations) are addressed in the conditions of certification in the **Transmission System Engineering** section of this document.

The RE may delegate responsibility for portions of the project to other registered engineers. Registered mechanical and electrical engineers may be delegated responsibility for mechanical and electrical portions of the project, respectively. A project may be divided into parts, provided that each part is clearly defined as a distinct unit. Separate assignments of general responsibility may be made for each designated part.

The RE shall:

1. Monitor progress of construction work requiring CBO design review and inspection to ensure compliance with LORS;

2. Ensure that construction of all facilities subject to CBO design review and inspection conforms in every material respect to applicable LORS, these conditions of certification, approved plans, and specifications;

3. Prepare documents to initiate changes in approved drawings and specifications when either directed by the project owner or as required by the conditions of the project;

4. Be responsible for providing project inspectors and testing agencies with complete and up-to-date sets of stamped drawings, plans, specifications, and any other required documents;

5. Be responsible for the timely submittal of construction progress reports to the CBO from the project inspectors, the contractor, and other engineers who have been delegated responsibility for portions of the project; and

6. Be responsible for notifying the CBO of corrective action or the disposition of items noted on laboratory reports or other tests when they do not conform to approved plans and specifications.

The resident engineer (or his delegate) must be located at the project site, or be available at the project site within a reasonable period of time, during any hours in which construction takes place.

The RE shall have the authority to halt construction and to require changes or remedial work if the work does not meet requirements.

If the RE or the delegated engineers are reassigned or replaced, the project owner shall submit the name, qualifications and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of rough grading, the project owner shall submit to the CBO for review and approval, the resume and registration number of the RE and any other delegated engineers assigned to the project. The project owner shall notify the CPM of the CBO's approvals of the RE and other delegated engineer(s) within five days of the approval.

If the RE or the delegated engineer(s) is subsequently reassigned or replaced, the project owner has five days to submit the resume and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer within five days of the approval.

GEN-5 Prior to the start of rough grading, the project owner shall assign at least one of each of the following California registered engineers to the project: a civil engineer; a soils, geotechnical, or civil engineer experienced and knowledgeable in the practice of soils engineering; and an engineering geologist. Prior to the start of construction, the project owner shall assign at least one of each of the following California registered engineers to the project: a design engineer who is either a structural engineer or a civil engineer fully competent and proficient in the design of power plant structures and equipment supports; a mechanical engineer; and an electrical engineer. (California Business and Professions Code section 6704 et seq., and sections 6730, 6731 and 6736 require state registration to practice as a civil engineer or structural engineer in California). All transmission facilities (lines, switchyards, switching stations, and substations) are handled in the conditions of certification in the **Transmission System Engineering** section of this document.

The tasks performed by the civil, mechanical, electrical, or design engineers may be divided between two or more engineers, as long as each engineer is responsible for a particular segment of the project (for example, proposed earthwork, civil structures, power plant structures, equipment support). No segment of the project shall have more than one responsible engineer. The transmission line may be the responsibility of a separate California registered electrical engineer.

The project owner shall submit, to the CBO for review and approval, the names, qualifications, and registration numbers of all responsible engineers assigned to the project.

If any one of the designated responsible engineers is subsequently reassigned or replaced, the project owner shall submit the name,

qualifications and registration number of the newly assigned responsible engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer.

A. The civil engineer shall:

1. Review the foundation investigations, geotechnical, or soils reports prepared by the soils engineer, the geotechnical engineer, or by a civil engineer experienced and knowledgeable in the practice of soils engineering;

2. Design (or be responsible for the design of), stamp, and sign all plans, calculations, and specifications for proposed site work, civil works, and related facilities requiring design review and inspection by the CBO. At a minimum, these include: grading, site preparation, excavation, compaction, construction of secondary containment, foundations, erosion and sedimentation control structures, drainage facilities, underground utilities, culverts, site access roads and sanitary sewer systems; and

3. Provide consultation to the RE during the construction phase of the project and recommend changes in the design of the civil works facilities and changes to the construction procedures.

B. The soils engineer, geotechnical engineer, or civil engineer experienced and knowledgeable in the practice of soils engineering, shall:

1. Review all the engineering geology reports;

2. Prepare the foundation investigations, geotechnical, or soils reports containing field exploration reports, laboratory tests, and engineering analysis detailing the nature and extent of the soils that could be susceptible to liquefaction, rapid settlement or collapse when saturated under load;

3. Be present, as required, during site grading and earthwork to provide consultation and monitor compliance with requirements set forth in the 2010 CBC (depending on the site conditions, this may be the responsibility of either the soils engineer, the engineering geologist, or both); and

4. Recommend field changes to the civil engineer and RE.

This engineer shall be authorized to halt earthwork and to require changes if site conditions are unsafe or do not conform to the predicted conditions used as the basis for design of earthwork or foundations.

C. The engineering geologist shall:

1. Review all the engineering geology reports and prepare a final soils grading report; and

2. Be present, as required, during site grading and earthwork to provide consultation and monitor compliance with the requirements set forth in the 2010 CBC (depending on the site conditions, this may be the responsibility of either the soils engineer, the engineering geologist, or both).

D. The design engineer shall:

1. Be directly responsible for the design of the proposed structures and equipment supports;

2. Provide consultation to the RE during design and construction of the project;

3. Monitor construction progress to ensure compliance with engineering LORS;

4. Evaluate and recommend necessary changes in design; and

5. Prepare and sign all major building plans, specifications, and calculations.

E. The mechanical engineer shall be responsible for, and sign and stamp a statement with, each mechanical submittal to the CBO, stating that the proposed final design plans, specifications, and calculations conform to all of the mechanical engineering design requirements set forth in the Energy Commission's decision.

F. The electrical engineer shall:

1. Be responsible for the electrical design of the project; and

2. Sign and stamp electrical design drawings, plans, specifications, and calculations.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of rough grading, the project owner shall submit to the CBO for review and approval, resumes and registration numbers of the responsible civil engineer, soils (geotechnical) engineer and engineering geologist assigned to the project.

At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of construction, the project owner shall submit to the CBO for review and approval, resumes and registration numbers of the responsible design engineer, mechanical engineer, and electrical engineer assigned to the project.

The project owner shall notify the CPM of the CBO's approvals of the responsible engineers within five days of the approval.

If the designated responsible engineer is subsequently reassigned or replaced, the project owner has five days in which to submit the resume and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer within five days of the approval.

GEN-6 Prior to the start of an activity requiring special inspection, including prefabricated assemblies, the project owner shall assign to the project, qualified and certified special inspector(s) who shall be responsible for the special inspections required by the 2010 CBC. All transmission facilities (lines, switchyards, switching stations, and substations) are handled in conditions of certification in the **Transmission System Engineering** section of this document.

A certified weld inspector, certified by the American Welding Society (AWS), and/or American Society of Mechanical Engineers (ASME) as applicable, shall inspect welding performed on-site requiring special inspection (including structural, piping, tanks and pressure vessels).

The special inspector shall:

1. Be a qualified person who shall demonstrate competence, to the satisfaction of the CBO, for inspection of the particular type of construction requiring special or continuous inspection;

2. Inspect the work assigned for conformance with the approved design drawings and specifications;

3. Furnish inspection reports to the CBO and RE. All discrepancies shall be brought to the immediate attention of the RE for correction, then, if uncorrected, to the CBO and the CPM for corrective action; and

4. Submit a final signed report to the RE, CBO, and CPM, stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance with the approved plans, specifications, and other provisions of the applicable edition of the CBC.

Verification: At least 15 days (or project owner- and CBO-approved alternative time frame) prior to the start of an activity requiring special inspection, the project owner shall submit to the CBO for review and approval, with a copy to the CPM, the name(s) and qualifications of the certified weld inspector(s), or other certified special inspector(s) assigned to the project to perform one or more of the duties set forth above. The project owner shall also submit to the CPM a copy of the CBO's approval of the qualifications of all special inspectors in the next monthly compliance report.

If the special inspector is subsequently reassigned or replaced, the project owner has five days in which to submit the name and qualifications of the newly assigned special

inspector to the CBO for approval. The project owner shall notify the CPM of the CBO's approval of the newly assigned inspector within five days of the approval.

GEN-7 If any discrepancy in design and/or construction is discovered in any engineering work that has undergone CBO design review and approval, the project owner shall document the discrepancy and recommend required corrective actions. The discrepancy documentation shall be submitted to the CBO for review and approval. The discrepancy documentation shall reference this condition of certification and, if appropriate, applicable sections of the CBC and/or other LORS.

Verification: The project owner shall transmit a copy of the CBO's approval of any corrective action taken to resolve a discrepancy to the CPM in the next monthly compliance report. If any corrective action is disapproved, the project owner shall advise the CPM, within five days, of the reason for disapproval and the revised corrective action to obtain CBO's approval.

GEN-8 The project owner shall obtain the CBO's final approval of all completed work that has undergone CBO design review and approval. The project owner shall request the CBO to inspect the completed structure and review the submitted documents. The project owner shall notify the CPM after obtaining the CBO's final approval. The project owner shall retain one set of approved engineering plans, specifications, and calculations (including all approved changes) at the project site or at another accessible location during the operating life of the project. Electronic copies of the approved plans, specifications, calculations, and marked-up as-builts shall be provided to the CBO for retention by the CPM.

Verification: Within 15 days of the completion of any work, the project owner shall submit to the CBO, with a copy to the CPM, in the next monthly compliance report, (a) a written notice that the completed work is ready for final inspection, and (b) a signed statement that the work conforms to the final approved plans. After storing the final approved engineering plans, specifications, and calculations described above, the project owner shall submit to the CPM a letter stating both that the above documents have been stored and the storage location of those documents.

Within 90 days of the completion of construction, the project owner shall provide to the CBO three sets of electronic copies of the above documents at the project owner's expense. These are to be provided in the form of "read only" (Adobe .pdf 6.0 or newer version) files, with restricted (password-protected) printing privileges, on archive quality compact discs.

CIVIL-1 The project owner shall submit to the CBO for review and approval the following:

1. Design of the proposed drainage structures and the grading plan;

2. An erosion and sedimentation control plan;

3. A construction storm water pollution prevention plan (SWPPP);

4. Related calculations and specifications, signed and stamped by the responsible civil engineer; and

5. Soils, geotechnical, or foundation investigations reports required by the 2010 CBC.

Verification: At least 15 days (or project owner- and CBO-approved alternative time frame) prior to the start of site grading the project owner shall submit the documents described above to the CBO for design review and approval. In the next monthly compliance report following the CBO's approval, the project owner shall submit a written statement certifying that the documents have been approved by the CBO.

CIVIL-2 The resident engineer shall, if appropriate, stop all earthwork and construction in the affected areas when the responsible soils engineer, geotechnical engineer, or the civil engineer experienced and knowledgeable in the practice of soils engineering identifies unforeseen adverse soil or geologic conditions. The project owner shall submit modified plans, specifications, and calculations to the CBO based on these new conditions. The project owner shall obtain approval from the CBO before resuming earthwork and construction in the affected area.

Verification: The project owner shall notify the CPM within 24 hours when earthwork and construction is stopped as a result of unforeseen adverse geologic/soil conditions. Within 24 hours of the CBO's approval to resume earthwork and construction in the affected areas, the project owner shall provide to the CPM a copy of the CBO's approval.

CIVIL-3 The project owner shall perform inspections in accordance with the 2010 CBC. All plant site-grading operations, for which a grading permit is required, shall be subject to inspection by the CBO.

If, in the course of inspection, it is discovered that the work is not being performed in accordance with the approved plans, the discrepancies shall be reported immediately to the resident engineer, the CBO, and the CPM. The project owner shall prepare a written report, with copies to the CBO and the CPM, detailing all discrepancies, non-compliance items, and the proposed corrective action.

Verification: Within five days of the discovery of any discrepancies, the resident engineer shall transmit to the CBO and the CPM a non-conformance report (NCR), and the proposed corrective action for review and approval. Within five days of resolution of the NCR, the project owner shall submit the details of the corrective action to the CBO and the CPM. A list of NCRs, for the reporting month, shall also be included in the following monthly compliance report.

CIVIL-4 After completion of finished grading and erosion and sedimentation control and drainage work, the project owner shall obtain the CBO's approval of the final grading plans (including final changes) for the erosion and sedimentation control work. The civil engineer shall state that the work within his/her area of responsibility was done in accordance with the final approved plans.

Verification: Within 30 days (or project owner- and CBO-approved alternative time frame) of the completion of the erosion and sediment control mitigation and drainage work, the project owner shall submit to the CBO, for review and approval, the final grading plans (including final changes) and the responsible civil engineer's signed statement that the installation of the facilities and all erosion control measures were completed in accordance with the final approved combined grading plans, and that the facilities are adequate for their intended purposes, along with a copy of the transmittal letter to the CPM. The project owner shall submit a copy of the CBO's approval to the CPM in the next monthly compliance report.

STRUC-1 Prior to the start of any increment of construction, the project owner shall submit plans, calculations and other supporting documentation to the CBO for design review and acceptance for all project structures and equipment identified in the CBO-approved master drawing and master specifications lists. The design plans and calculations shall include the lateral force procedures and details as well as vertical calculations.

Construction of any structure or component shall not begin until the CBO has approved the lateral force procedures to be employed in designing that structure or component.

The project owner shall:

1. Obtain approval from the CBO of lateral force procedures proposed for project structures;

2. Obtain approval from the CBO for the final design plans, specifications, calculations, soils reports, and applicable quality control procedures. If there are conflicting requirements, the more stringent shall govern (for example, highest loads, or lowest allowable stresses shall govern). All plans, calculations, and specifications for foundations that support structures shall be filed concurrently with the structure plans, calculations, and specifications;

3. Submit to the CBO the required number of copies of the structural plans, specifications, calculations, and other required documents of the designated major structures prior to the start of on-site fabrication and installation of each structure, equipment support, or foundation;

4. Ensure that the final plans, calculations, and specifications clearly reflect the inclusion of approved criteria, assumptions, and methods used to develop the design. The final designs, plans, calculations, and specifications shall be signed and stamped by the responsible design engineer; and

5. Submit to the CBO the responsible design engineer's signed statement that the final design plans conform to applicable LORS.

Verification: At least 60 days (or project owner- and CBO-approved alternative time frame) prior to the start of any increment of construction of any structure or component

listed in the CBO-approved master drawing and master specifications list, the project owner shall submit to the CBO the above final design plans, specifications and calculations, with a copy of the transmittal letter to the CPM.

The project owner shall submit to the CPM, in the next monthly compliance report, a copy of a statement from the CBO that the proposed structural plans, specifications, and calculations have been approved and comply with the requirements set forth in applicable engineering LORS.

STRUC-2 The project owner shall submit to the CBO the required number of sets of the following documents related to work that has undergone CBO design review and approval:

1. Concrete cylinder strength test reports (including date of testing, date sample taken, design concrete strength, tested cylinder strength, age of test, type and size of sample, location and quantity of concrete placement from which sample was taken, and mix design designation and parameters);

2. Concrete pour sign-off sheets;

3. Bolt torque inspection reports (including location of test, date, bolt size, and recorded torques);

4. Field weld inspection reports (including type of weld, location of weld, inspection of non-destructive testing (NDT) procedure and results, welder qualifications, certifications, qualified procedure description or number (ref: AWS); and

5. Reports covering other structural activities requiring special inspections shall be in accordance with the 2010 CBC.

Verification: If a discrepancy is discovered in any of the above data, the project owner shall, within five days, prepare and submit an NCR describing the nature of the discrepancies and the proposed corrective action to the CBO, with a copy of the transmittal letter to the CPM. The NCR shall reference the condition(s) of certification and the applicable CBC chapter and section. Within five days of resolution of the NCR, the project owner shall submit a copy of the corrective action to the CBO and the CPM.

The project owner shall transmit a copy of the CBO's approval or disapproval of the corrective action to the CPM within 15 days. If disapproved, the project owner shall advise the CPM, within five days, the reason for disapproval, and the revised corrective action to obtain CBO's approval.

STRUC-3 The project owner shall submit to the CBO design changes to the final plans required by the 2010 CBC, including the revised drawings, specifications, calculations, and a complete description of, and supporting rationale for, the proposed changes, and shall give to the CBO prior notice of the intended filing.

Verification: On a schedule suitable to the CBO, the project owner shall notify the CBO of the intended filing of design changes, and shall submit the required number of sets of revised drawings and the required number of copies of the other above-mentioned documents to the CBO, with a copy of the transmittal letter to the CPM. The project owner shall notify the CPM, via the monthly compliance report, when the CBO has approved the revised plans.

STRUC-4 Tanks and vessels containing quantities of toxic or hazardous materials exceeding amounts specified in the 2010 CBC shall, at a minimum, be designed to comply with the requirements of that chapter.

Verification: At least 30 days (or project owner- and CBO-approved alternate time frame) prior to the start of installation of the tanks or vessels containing the above specified quantities of toxic or hazardous materials, the project owner shall submit to the CBO for design review and approval final design plans, specifications, and calculations, including a copy of the signed and stamped engineer's certification.

The project owner shall send copies of the CBO approvals of plan checks to the CPM in the following monthly compliance report. The project owner shall also transmit a copy of the CBO's inspection approvals to the CPM in the monthly compliance report following completion of any inspection.

MECH-1 The project owner shall submit, for CBO design review and approval, the proposed final design, specifications and calculations for each plant major piping and plumbing system listed in the CBO-approved master drawing and master specifications list. The submittal shall also include the applicable QA/QC procedures. Upon completion of construction of any such major piping or plumbing system, the project owner shall request the CBO's inspection approval of that construction.

The responsible mechanical engineer shall stamp and sign all plans, drawings, and calculations for the major piping and plumbing systems, subject to CBO design review and approval, and submit a signed statement to the CBO when the proposed piping and plumbing systems have been designed, fabricated, and installed in accordance with all of the applicable laws, ordinances, regulations and industry standards, which may include, but are not limited to:

- American National Standards Institute (ANSI) B31.1 (Power Piping Code);
- ANSI B31.2 (Fuel Gas Piping Code);
- ANSI B31.3 (Chemical Plant and Petroleum Refinery Piping Code);
- ANSI B31.8 (Gas Transmission and Distribution Piping Code);
- NACE R.P. 0169-83;
- NACE R.P. 0187-87;
- NFPA 56;
- Title 24, California Code of Regulations, Part 5 (California Plumbing Code);

- Title 24, California Code of Regulations, Part 6 (California Energy Code, for building energy conservation systems and temperature control and ventilation systems);
- Title 24, California Code of Regulations, Part 2 (California Building Code); and
- Inyo County codes.

The CBO may deputize inspectors to carry out the functions of the code enforcement agency.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of any increment of major piping or plumbing construction listed in the CBO-approved master drawing and master specifications list, the project owner shall submit to the CBO for design review and approval the final plans, specifications, and calculations, including a copy of the signed and stamped statement from the responsible mechanical engineer certifying compliance with applicable LORS, and shall send the CPM a copy of the transmittal letter in the next monthly compliance report.

The project owner shall transmit to the CPM, in the monthly compliance report following completion of any inspection, a copy of the transmittal letter conveying the CBO's inspection approvals.

MECH-2 For all pressure vessels installed in the plant, the project owner shall submit to the CBO and California Occupational Safety and Health Administration (Cal-OSHA), prior to operation, the code certification papers and other documents required by applicable LORS. Upon completion of the installation of any pressure vessel, the project owner shall request the appropriate CBO and/or Cal-OSHA inspection of that installation.

The project owner shall:

1. Ensure that all boilers and fired and unfired pressure vessels are designed, fabricated, and installed in accordance with the appropriate section of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, or other applicable code. Vendor certification, with identification of applicable code, shall be submitted for prefabricated vessels and tanks; and

2. Have the responsible design engineer submit a statement to the CBO that the proposed final design plans, specifications, and calculations conform to all of the requirements set forth in the appropriate ASME Boiler and Pressure Vessel Code or other applicable codes.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of on-site fabrication or installation of any pressure vessel, the project owner shall submit to the CBO for design review and approval, the above listed documents, including a copy of the signed and stamped engineer's certification, with a copy of the transmittal letter to the CPM.

The project owner shall transmit to the CPM, in the monthly compliance report following completion of any inspection, a copy of the transmittal letter conveying the CBO's and/or Cal-OSHA inspection approvals.

MECH-3 The project owner shall submit to the CBO for design review and approval the design plans, specifications, calculations, and quality control procedures for any heating, ventilating, air conditioning (HVAC) or refrigeration system. Packaged HVAC systems, where used, shall be identified with the appropriate manufacturer's data sheets.

The project owner shall design and install all HVAC and refrigeration systems within buildings and related structures in accordance with the CBC and other applicable codes. Upon completion of any increment of construction, the project owner shall request the CBO's inspection and approval of that construction. The final plans, specifications and calculations shall include approved criteria, assumptions, and methods used to develop the design. In addition, the responsible mechanical engineer shall sign and stamp all plans, drawings and calculations and submit a signed statement to the CBO that the proposed final design plans, specifications and calculations conform with the applicable LORS.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of construction of any HVAC or refrigeration system, the project owner shall submit to the CBO the required HVAC and refrigeration calculations, plans, and specifications, including a copy of the signed and stamped statement from the responsible mechanical engineer certifying compliance with the CBC and other applicable codes, with a copy of the transmittal letter to the CPM.

ELEC-1 Prior to the start of any increment of electrical construction for all electrical equipment and systems 110 Volts or higher (see a representative list, below) the project owner shall submit, for CBO design review and approval, the proposed final design, specifications, and calculations. Upon approval, the above listed plans, together with design changes and design change notices, shall remain on the site or at another accessible location for the operating life of the project. The project owner shall request that the CBO inspect the installation to ensure compliance with the requirements of applicable LORS. All transmission facilities (lines, switchyards, switching stations, and substations) are handled in conditions of certification in the **Transmission System Engineering** section of this document.

A. Final plant design plans shall include:

1. one-line diagram for the 13.8 kV, 4.16 kV and 480 V systems;
2. system grounding drawings;
3. lightning protection system; and
4. hazard area classification plan.

B. Final plant calculations must establish:

1. short-circuit ratings of plant equipment;

2. ampacity of feeder cables;

3. voltage drop in feeder cables;

4. system grounding requirements;

5. coordination study calculations for fuses, circuit breakers and protective relay settings for the 13.8 kV, 4.16 kV and 480 V systems;

6. system grounding requirements;

7. lighting energy calculations; and

8. 110 volt system design calculations and submittals showing feeder sizing, transformer and panel load confirmation, fixture schedules and layout plans.

C. The following activities shall be reported to the CPM in the monthly compliance report:

1. Receipt or delay of major electrical equipment;

2. Testing or energization of major electrical equipment; and

3. A signed statement by the registered electrical engineer certifying that the proposed final design plans and specifications conform to requirements set forth in the Energy Commission decision.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of each increment of electrical construction, the project owner shall submit to the CBO for design review and approval the above listed documents. The project owner shall include in this submittal a copy of the signed and stamped statement from the responsible electrical engineer attesting compliance with the applicable LORS, and shall send the CPM a copy of the transmittal letter in the next monthly compliance report.

REFERENCES

CH2 2012p – CH2MHill/J. Carrier (tn: 64558) Supplemental Data Response, Set 2, Boiler Optimization Plan and Design Change. 4/2/2012

HHSG 2011a – J. Woolard (tn: 61756) Application for Certification, Volume 1 & 2. 08/5/2011

FACILITY DESIGN

List of Comment Letters

		Facility Design Comments?
1	Inyo County	
2	Bureau of Land Management	
3	National Park Service	
4	The Nature Conservancy	
5	Amargosa Conservancy	
6	Basin & Range Watch	
7	Pahrump Paiute Tribe	
8	Richard Arnold, Pahrump Piahute Tribe	
9	Big Pine Tribe of Owens Valley	
10	Intervener Cindy MacDonald	**X**
11	Intervener Center for Biological Diversity	
12	Intervener, Old Spanish Trail Association	
13	Applicant, BrightSource Energy, Inc.	**X**

Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
10	**July 21, 2012**	**Intervener Cindy MacDonald**	
10.1	**p. 7-1 #1**	Laws requiring evaluation and verification during CEQA or AFC process.	The California Building Code gives the CEC the authority and the responsibility to ensure every power plant project under its jurisdiction complies with all the applicable engineering laws, ordinances, regulations, and standards (LORS). **Facility Design** was developed by the CEC staff in order to ensure power plant projects' compliance with engineering LORS. However, it is not a CEQA requirement. CEQA does not require the development of the Facility Design section.

10.2	**p. 7-1 #2**	How does the PSA assessment conform to CEQA or AFC process?	**Facility Design** is intended for project compliance with engineering LORS; it is not a CEQA requirement. The assessment is prepared with the expectation that a power plant must be built to comply with the building code (and all other related engineering LORS) in order to function as a facility that will operate in a safe manner as required by the California Building Code. The staff assessment assumes the project will threaten life safety if not built in accordance with those LORS. This is why the building code was created in the first place. Thus, no there assessment is needed. As a part of staff's evaluation of the project features staff ensures that the applicant is aware of the applicable engineering LORS and has confirmed that it will comply with them (as described in its AFC Appendices 2A through 2G). Assessing whether or not the project will actually comply with those LORS is accomplished through the CoCs via the CEC's delegate Chief Building Official's (CBO's) review and inspection process and the oversight provided by the CPM and the CEC's engineering staff.
10.3	**p. 7-1 #3**	How does CEC verify components integrity when designs have not been prepared yet?	The frame work is already laid out; that is the engineering LORS. The CBO will ensure through design review and on-site inspection that the project is built in compliance with all the applicable LORS. The effective way to ensure project compliance with those LORS is through the CBO's design review and inspection process once the project is issued a license to construct. Whether the plans are approved prior to or after licensing, on-site inspection must be performed during construction and construction cannot be completed until the project adheres to the final, approved as-builts plans.

10.4	**p. 7-2 #4**	How does CEC ensure LORS are met when design elements are to be announced?	Regardless of what equipment is to be used, the California Building Standards Code, the most stringent code used by the industry, has various requirements that ensure any project in California is built to withstand all natural hazards. This will be done through the various CoCs. For example, **CIVIL-1** will require approval of grading and drainage plans prior to commencement of actual grading; and actual grading will be inspected by the CBO to ensure the building code requirements have been met. The CBO will ensure, through design review and on-site inspection, that the project is built in compliance with all the applicable LORS. Please also see the above response to Comment 10.3.
10.5	**p. 7-2 #5**	How does CEC ensure impacts are mitigated without reviewing design elements?	The CBO will ensure, through design review and on-site inspection, that the project is built in compliance with all the applicable LORS. No project feature requiring engineering review will be allowed to be constructed until the CBO's professional engineers have reviewed and approved the plans/specifications for that feature. Other impacts to natural resources are discussed in **Soils and Surface Water** and **Water Supply** sections of this **FSA**. Please also see the above responses to Comments 10.1 through10.4.
10.6	**p. 7-2 #6**	How does CEC determine potentially significant impacts if project components have not been evaluated.	No significance criteria applies to **Facility Design**, as this section is not required by CEQA. However, as explained above, no project feature requiring engineering review will be allowed to be constructed until the CBO's professional engineer has reviewed and approved the plans/specifications for that feature.
10.7	**p. 7-2 #7**	How does CEC determine effectiveness of mitigation measures if project elements are not been evaluated prior to the final decision.	No project feature requiring engineering review will be allowed to be constructed until the CBO's professional engineers have reviewed and approved the plans/specifications for that feature. Please also see other responses above.

10.8	**p. 7-2 #8**	How does CEC determine site suitability if project elements have not been evaluated prior to the final decision?	No project feature requiring engineering review will be allowed to be constructed until it goes through the CBO review and inspection process. For example, grading and drainage plans will be approved by the CBO's qualified engineers prior to construction. First, geotechnical and hydrology reports are prepared with recommendations for mitigation measures. Foundations, grading, and drainage plans will then be developed based on those recommendations. Lastly, the CBOs California-registered engineers will review and approve those plans prior to start of construction, and the CBO's inspector will then ensure appropriate implementation of those plans during construction.
10.9	**p. 7-2 #9**	Given the lack of information and oversight, how can CEC ensure compliance?	Please see the above responses.
10.10	**p. 12-3 #8**	What is the reason(s) for the differing design elements description and discrepancy?	**Traffic and Transportation** (pg. 622 of PSA) took information from AFC, **Project Description**, Section 2.1.2.4. **Soils and Surface Water** (pg. 571 of PSA) took information from the Preliminary Construction SWPPP-DESCP (Appendix 5.15A of AFC) in two locations: Post-construction Hydrology Calculations (Attachment H, pg 706) and Grading and Drainage (Attachment I, pg 897).
10.11	**p. 12-3 #9**	Which one of these design descriptions is currently accurate?	Because the applicant's post-construction calculations used 10 foot wide concentric drive zones around each solar tower, staff considers this to be currently accurate.
10.12	**p. 12-3 #10**	Which one of these design elements is incorporated in the AFC files and where is it located?	**Traffic and Transportation** (pg. 622 of PSA) took information from AFC, Project Description, Section 2.1.2.4. **Soils and Surface Water** (pg. 571 of PSA) took information from the Preliminary Construction SWPPP-DESCP (Appendix 5.15A of AFC) in two locations: Post-construction Hydrology Calculations (Attachment H, pg 706) and Grading and Drainage (Attachment I, pg 897).

10.13	**p. 12-4 #11**	How many roads circle the power towers for each plant under *each* design element?	Because the circular layout of each solar field is contained within two irregular shapes, the number of roads surrounding each tower varies depending on direction from the solar tower. The "Civil Overall Site Plan" (AFC, Appendix 5.15A, Pg. 897, www.energy.ca.gov/sitingcases/hiddenhills/documents/applicant/afc/Volume-2-Appendixes/) shows the layout of 10-foot wide dirt roads. Solar Plant 1 would have 13 complete circles, but as many as 41 roads. Solar Plant 2 would have 8 complete circles, but as many as 33 roads. The applicant has not submitted site plans showing 12-foot wide dirt roads within the solar fields.
10.14	**p. 12-4 #12**	What is the projected total surface in acreage values for *each* of these maintenance road design elements and what is the difference in values between them? Example, 20-ft roads result in 500 acres of disturbance, 10-ft roads result in 1,000 acres of disturbance.	Because the applicant's post-construction calculations used 10 foot wide concentric drive zones around each solar tower, staff considers this to be currently accurate. Staff did not assess the project using 20 foot wide concentric drive zones. 1 acre = 43,560 square feet Paved roads: 16 acres = 696,960 square feet Fully graded dirt roads (12' & 20'): 18.2 acres = 792,792 square feet Partially graded dirt roads (10'): 171 acres = 7,448,760 square feet
10.15	**p. 12-4 #13**	Do changes in acreage values for maintenance paths/drive zones result in changes to the number of installed heliostats/mirrors? If so, by how many?	No change in number of heliostats necessary.
10.16	**p. 12-4 #14**	What are the differences in impacts to the Low Impact Design element of the proposed project if the 20-ft drive zones are utilized versus the 10-ft maintenance paths?	Difference in impacts not necessary for speculative increase in width of drive zones; instead, staff analyzes planned facility design aspects, which are 10-ft maintenance paths and 20-ft drive zones.
10.17	**p. 12-4 #15**	What are the differences between sheet flow, drainage and surface run off between these two design elements?	See the **Soils & Surface Water** section of this **FSA** for deatiled discussions on sheet flow, drainage and surface run off.

10.18	**p. 12-4 #16**	Which of the two designs provide the highest level of environmental protection and/or the least amount of environmental impacts and by what degree?	CEQA does not require comparative analyses on degrees of environmental impact(s).
Comment # 13	**DATE**	**COMMENT TOPIC**	**RESPONSE**
	July 23, 2012	**Applicant, BrightSource Energy**	
13.1	**p. 179**	Staff to use the CBO website in lieu of submittals to the CPM.	Staff does not agree with this change. The website does not satisfy the CEC's internal compliance monitoring process. For this monitoring process to be in effect, individual hard copies need to be submitted. These paper copies will then be attached, by the CPM, to the tracking sheet and submitted to the technical staff for review and approval.
13.2	**p. 180**	"Verification" designation missing from CoCs	Staff has corrected this in the **FSA**.
13.3	**p.180**	Request to change References on pg.5.1-21 of PSA	Staff has made this change in the **FSA.**

GEOLOGY AND PALEONTOLOGY

Testimony of Casey Weaver, CEG

SUMMARY OF CONCLUSIONS

The proposed Hidden Hills Solar Electric Generating System (HHSEGS) site is located in an active geologic area along the border between Southern California and Southern Nevada, approximately 45 miles west of Las Vegas Nevada and 57 miles southeast of Death Valley, California. Because of its geologic setting, the site could be subject to strong levels of earthquake-related ground shaking. The closest known active fault is a segment of the Pahrump Valley Fault Zone which is located approximately 1,500 feet northeast of the proposed project site (**Geological Resources - Figure 1**). Additional active faults in the vicinity of the project site are the Garlock fault (35 miles southwest of the site) and the Southern Death Valley fault zone (38 miles to the southwest) (**Geological Resources - Figure 2**). The potential significant effects of strong ground shaking on the HHSEGS structures must be mitigated through structural designs required by the most recent edition of the California Building Code (CBC 2010). CBC 2010 requires that structures be designed to resist seismic stresses from ground acceleration and, to a lesser extent, liquefaction potential.

In addition to strong seismic shaking, the project may be subject to soil failure caused by hydrocollapse, formation of soil fissures and/or dynamic compaction. A design-level geotechnical investigation required for the project by the CBC 2010, and proposed **FACILITY DESIGN CONDITIONS OF CERTIFICATION GEN-1**, **GEN-5** and **CIVIL-1**, would present standard engineering design requirements for mitigation of strong seismic shaking and potential excessive settlement due to collapsible soils, formation of soil fissures and/or dynamic compaction.

There are no known viable geologic or mineralogical resources at the proposed HHSEGS site. Unique geological features (paleosprings) that exist east of the site are associated with fault scarps belonging to segments of the Pahrump Valley fault zone. There is no evidence of the existence of paleosprings on the site. However, channels and associated deposits formed by flows from these springs may traverse the site. Paleontological resources have been documented within 3 miles of the project, but no significant fossils were found during field explorations at the project site or near ancillary facilities (HHSG 2011a § 5.8). Potential impacts to paleontological resources due to construction activities would be mitigated through worker training and monitoring by qualified paleontologists, as required by proposed **CONDITIONS OF CERTIFICATION PAL-1** through **PAL-7**.

Based on this information, Energy Commission staff concludes that the potential adverse cumulative impacts to project facilities from geologic hazards during its design life, if any, are less than significant. Similarly, staff concludes the potential adverse cumulative impacts to potential geologic, mineralogic, and paleontologic resources from the construction, operation, and closure of the proposed project, if any, are less than significant. It is staff's opinion that the proposed HHSEGS can be designed and constructed in accordance with all applicable laws, ordinances, regulations, and

standards (LORS), and in a manner that both protects environmental quality and assures public safety.

INTRODUCTION

In this section, California Energy Commission (Energy Commission) staff discusses the potential impacts of geologic hazards on the proposed HHSEGS facility as well as the HHSEGS's potential impact on geologic, mineralogic, and paleontologic resources. Staff's objective is to identify resources that could be significantly adversely affected, evaluate the potential of the project construction and operation to significantly impact the resources and provide mitigation measures as necessary to ensure that there would be no significant adverse impacts to geological and paleontological resources during the project construction, operation, and closure and to ensure that operation of the plant would not expose occupants to high-probability geologic hazards. A brief geological and paleontological overview is provided. The section concludes with staff's proposed conditions of certification - *i.e*., monitoring and mitigation measures that, if implemented, would reduce any project impacts to geologic hazards and geologic, mineralogic, and paleontologic resources to insignificant levels.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

Applicable laws, ordinances, regulations and standards (LORS) are listed in the application for certification (AFC) (HHSG 2011a § 5.8). The following briefly describes the current LORS for both geologic hazards and resources and mineralogic and paleontologic resources.

Geology and Paleontology Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	***Portions of the utility corridor are on federal land***
National Environmental Policy Act (NEPA) of 1969	NEPA establishes a public, interdisciplinary framework for Federal decision-making and ensures that federal agencies take environmental factors into account when considering Federal actions.
Antiquities Act of 1906	Provides for protection of objects of antiquity on federal lands.
Omnibus Public Land Management Act of 2009, Title VI—Department of the Interior Authorizations, Subtitle D—Paleontological Resources Preservation	Directs the secretaries of the Interior and Agriculture to manage paleontological resources on BLM and USFS land using scientific principles and expertise, and to inventory paleontological resources on those lands.

Applicable Law	Description
State	
California Building Code (2010)	The California Building Code (CBC 2010) includes a series of standards that are used in project investigation, design, and construction (including seismicity, grading and erosion control). The CBC has adopted provisions in the International Building Code (IBC, 2009).
Alquist-Priolo Earthquake Fault Zoning Act, Public Resources Code (PRC), section 2621–2630	Mitigates against surface fault rupture of known active faults beneath occupied structures. Requires disclosure to potential buyers of existing real estate and a 50-foot setback for new occupied buildings.
The Seismic Hazards Mapping Act, PRC section 2690–2699	Areas are identified that are subject to the effects of strong ground shaking, such as liquefaction, landslides, tsunamis, and seiches.
CEQA, Appendix G Environmental Checklist Form	Asks if project would have impacts on paleontological resources or a unique geological feature.
Local	
County of Inyo General Plan	Compliance with the Public Safety Element of the General Plan. The Plan does not specifically address paleontological resources. However, it places emphasis on the preservation of historic and prehistoric resources and values.
Standards	
Society for Vertebrate Paleontology (SVP), 1995	The "Measures for Assessment and Mitigation of Adverse Impacts to Non-Renewable Paleontological Resources: Standard Procedures" is a set of procedures and standards for assessing and mitigating impacts to vertebrate paleontological resources. The measures were adopted in October 1995 by the SVP, a national organization of professional scientists.
Bureau of Land Management (BLM) Instructional Memorandum 2008-009	Provides up-to-date methodologies for assessing paleontological sensitivity and management guidelines for paleontological resources on lands managed by the Bureau of Land Management.

SETTING

The proposed HHSEGS project will be located on approximately 3,277 acres of privately-owned land leased in Inyo County, California, adjacent to the Nevada border. The site is approximately 8 miles directly south of Pahrump, Nevada (with a driving distance of 28 miles), and approximately 45 miles west of Las Vegas, Nevada. As detailed in the **PROJECT DESCRIPTION** section of this final staff assessment (**FSA)**, HHSEGS will include the construction of the 500 MW power plant (consisting of Solar Plant 1, Solar Plant 2 and a common area), natural gas supply lines, sewer and storm

water collection and conveyance features, transmission lines, and water supply infrastructure.

REGIONAL SETTING

HHSEGS lies in the Pahrump Valley, within the Basin and Range physiographic province (Cook 2004) (**Geological Resources - Figure 3**). The province extends south from southeastern Oregon between the Sierra Nevada and the Wasatch Range of Utah, and then east from the Peninsular Range of southern California to the Guadalupe Mountains of West Texas. A portion of this region, lying primarily in Nevada and western Utah, is called the Great Basin because all waterways drain internally to dry basins. No streams lying within the Great Basin reach the Pacific Ocean or the Gulf of California.

For much of the Paleozoic (about 550 to 240 million years ago), the region was characterized as a relatively shallow marine environment. Sediments laid down in this marine environment were primarily fine gain carbonates but also included sands and silts. Subsequent metamorphism converted these marine sediments to limestone, sandstone, dolomite, and limited shales.

A hiatus (a period of no geologic record) separates the Paleozoic marine rocks from Early Mesozoic non-marine estuarine and continental sediments. Following deposition of the non-marine sediments, a period of crustal compression occurred in the Late Mesozoic. Evidence of this compressional tectonic regime is displayed as the Keystone Thrust in the Spring Mountains east of the site. Here a large crustal slab of Paleozoic rock has been thrust over a layer of much younger Jurassic sandstone, each crustal slab being many thousands of feet thick (Burchfiel 1974).

Beginning in the Miocene (about 22 million years ago), the Basin and Range province was created as the Earth's crust stretched, thinned, and then broke the metamorphosed rocks into some 400 mountain blocks that partly rotated from their originally horizontal positions (Cook 2004). Normal and strike-slip faulting, as well as associated volcanic activity, transformed the landscape to the basin-and-range type topography typical of the Mojave region today.

Late in the development of the Basin and Range province, and continuing into the Quaternary (the last 2 million years), uplift of the Sierra Nevada, as well as Transverse and Peninsular Ranges of California, led to a strengthened rain shadow and progressive desertification in the Great Basin as precipitation declined in the interior (HHSG 2011a § 5.8).

PROJECT SITE DESCRIPTION

The project site is located in the southern portion of Pahrump Valley, an internally drained basin bound by the Resting Spring and Nopah Ranges on the west and northwest, by the Kingston Range on the southwest, and by the Spring Mountains on the east. Pahrump Dry Lake lies about 3 miles northwest of the HHSEGS site. To the southeast, a low divide separates Pahrump Valley from Sandy Valley while, to the northeast, another low divide separates it from Stewart Valley. To the north, the Last Chance Range separates the Pahrump Valley from the Amargosa Desert. The nearest

community to the site is the township of Pahrump, Nevada, which is located approximately 8 miles to the north. The site is bordered by paved Old Spanish Trail Highway (also known as Tecopa Road) to the south, unpaved Quartz Street to the west, the California-Nevada border to the east, and an unpaved road along the northern border. Numerous unpaved roads also extend in a north-south and east-west grid pattern across the site from a 1950's housing subdivision that was never constructed.

The subject property is approximately 3,097 acres in size with a high elevation of approximately 2,675 feet on the east side, and low elevation of approximately 2,585 feet on the west side of the property (Ninyo 2011). The topography across the site is relatively planar to slightly undulatory with a gentle slope from east to west.
The site is undeveloped and covered with sparse native and invasive desert vegetation. This vegetation consists primarily of shrubs and grasses. Existing improvements in the site area include the Old Spanish Trail Highway, which borders the site to the south, and an abandoned peach orchard along the southern property border adjacent to Old Spanish Trail Highway at Silver Road. The abandoned orchard occupies approximately 10 acres, and is presently marked by dead fruit trees, sporadic evergreens and other vegetation. A groundwater well that has recently been serviced is located in the abandoned orchard area.

Several ephemeral (typically dry) drainage washes extend across the eastern portion of the project site, originating in Nevada and flowing westerly into California. Field observations indicate that water runoff generally drains toward the west via sheet-flow and within these natural drainage channels.

As part of the preliminary on-site geotechnical investigation, exploratory borings drilled to maximum depths of 20 feet did not encounter groundwater (Ninyo 2011). During this on-site investigation, four existing nonfunctioning groundwater wells (including the well in the abandoned orchard) were discovered and groundwater levels were measured within the wells. Depth to groundwater in these wells ranged from approximately 110 feet below ground surface (bgs) to 130 bgs (Ninyo 2011).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

This section assesses two types of impacts. The first is the potential impacts the proposed facility could have on existing geologic, mineralogic, and paleontologic resources in the area. The second is the potential geologic hazards, which could adversely affect the proper functioning of the proposed facility and create life/safety concerns.

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

The California Environmental Quality Act (CEQA) guidelines, Appendix G, provide a checklist of questions that lead agencies typically address when assessing impacts related to geologic and mineralogic resources, and effects of geologic hazards.

- Section (V) (c) includes guidelines that determine if a project will either directly or indirectly destroy a unique paleontological resource or site, or a unique geological feature.

- Sections (VI) (a), (b), (c), (d), and (e) focus on whether or not the project would expose persons or structures to geologic hazards.
- Sections (XI) (a) and (b) concern the project's effects on mineral resources.

To assess potential impacts on unique geologic features and effects on mineral resources, staff has reviewed geologic and mineral resource maps for the surrounding area, as well as site-specific information provided by the applicant, to determine if geologic and mineralogic resources exist in the area (**Geological Resources - Figure 4**).

To assess potential impacts on paleontological resources, staff reviewed existing paleontologic information and reviewed the information obtained from the applicant's requested records searches from the San Bernardino County Museum for the surrounding area. The University of California (at Berkeley) Museum of Paleontology's website, which gives generalized information for locality records of their collection, was consulted as well (UCMP 2008). Site-specific information generated by the applicant for the proposed HHSEGS was also reviewed. All research was conducted in accordance with accepted assessment protocol (BLM 2008 and SVP 1995) to determine whether any known paleontologic resources exist in the general area. If present or likely to be present, conditions of certification which outline required procedures to mitigate adverse affects to potential resources are proposed as part of the project's approval.

The California Building Standards Code (CBSC) and CBC 2010 provide geotechnical and geological investigation and design guidelines, which engineers must follow when designing a facility. As a result, the criterion used to assess the significance of a geologic hazard includes evaluating each hazard's potential impact on the design, construction, and operation of the proposed facility. Geologic hazards include faulting and seismicity, liquefaction, dynamic compaction, hydrocompaction, subsidence, expansive soils, landslides, tsunamis, seiches, and others as may be dictated by site-specific conditions.

DIRECT/INDIRECT IMPACTS AND MITIGATION

An assessment of the potential impacts to geologic, mineralogic, and paleontologic resources, and from geologic hazards is provided below. The assessment of impacts is followed by a summary of potential impacts that may occur during construction and operation of the project and provides recommended conditions of certification that would ensure potential impacts are mitigated to a level that is less than significant. The recommended conditions of certification would allow the Energy Commission's compliance project manager (CPM) and the applicant to adopt a compliance monitoring scheme ensuring ongoing compliance with LORS applicable to geologic hazards and the protection of geologic, mineralogic, and paleontologic resources.

GEOLOGIC AND MINERALOGIC RESOURCES

No known oil or gas reserves were identified to be present in the project vicinity (CDC 2010). There is no indication that oil, gas, or geothermal resources underlie HHSEGS or the surrounding area.

Numerous hard rock mines are located in the hills surrounding the project site. Since the late 1800's, the mines have produced primarily gold, silver and copper (Kral 1951). To the west of the site in the Nopah range, the Shoshone Mines Unit contains a gold-copper bearing porphyry and along with gold and copper has produced lead, zinc, and silver (Dixon 1990). To the northeast near the northern end of Pahrump Valley, in the low hills west of Spring Mountain, lies the Johnnie District. The Johnnie district is noted for its gold-quartz veins and associated gold-placer deposits (Southern 2005). To the southwest of the project site, the Tecopa area is rich in silver. Additional mines to the south-southwest of the site are mined for talc.

The State of California Department of Mines and Geology (now known as the California Geological Survey) uses Mineral Resource Zone (MRZ) classifications to indicate the presence (or lack thereof) of measured or inferred mineral resources on lands across the state. The classifications identified by the CDMG for the HHSEGS project area include MRZ-3b and MRZ-4 (CDMG 1993). These classifications are defined as follows:

MRZ-3b – Areas underlain by inferred mineral occurrence.

MRZ-4 – No known mineral occurrences.

In the vicinity of the project site, MRZ-3b was mapped across the entire Pahrump Valley for "sodium compounds". As stated in SR-167 (CDMG, 1993), these specific resources "have low mineralization density, no production has occurred, and there is a low potential for undiscovered resources." In addition to the MRZ-3b designation, the entire Pahrump Valley area was also mapped as MRZ-4, (no known mineral occurrence), for hydrothermal mineral deposits (gold, silver, copper, lead, and zinc).

Based on the information above, it is staff's opinion that the project would not have any significant adverse direct or indirect impacts to potential geologic and mineralogic resources.

PALEONTOLOGIC RESOURCES

Over at least the last 700,000 years (Middle Pleistocene to Recent), warm-desert environments typical of the present have been the exception rather than the rule (HHSG 2011a § 5.8-7). Interglaciations, like the current Holocene (the last 10,000 years), last for relatively brief periods of time while intervening glaciations typically extend for more than 50,000 years. This is important in considering paleontological resources because, during these extended glacial periods, the project region was occupied by steppe shrubs and coniferous woodlands rather than today's desert scrub (Spaulding 1985; 1990). During these glacial periods, runoff into the valleys formed perennial lakes, increased recharge to local aquifers, raised the water tables, and basin margin artesian spring systems flowed (HHSG 2011a §5.8-9). Pond and marsh environments, and well-vegetated "phreatophyte flats" were commonly associated with discharge from the basin-margin artesian spring systems and, the older the spring, the greater the extent of the spring-fed environments. This is important in considering paleontological resources because these valley bottom riparian habitats attracted now-extinct Pleistocene megafauna, and their remains can be common in some ancient lake (lacustrine) and paleospring sediments (HHSG 2011a §5.8-9). During these glacial periods, perennial

lakes were established throughout the Basin Range province. It is likely that similar lakes existed within the Pahrump Valley.

Both lacustrine sediments and paleospring deposits can be fossiliferous. Examples of fossiliferous lacustrine deposits include the fossil beds of Lake Manix and more limited fossil occurrences in the beds of Lake Tecopa (HHSG 2011a §5.8-9). Examples of fossiliferous paleospring deposits include those from Tule Springs in the Las Vegas Valley. The faunal assemblage fossils most often discovered in these deposits are primarily the grazing members of the extinct Pleistocene megafauna including mammoth (Mammuthus columbi), camel (Camelops hesternus), at least two species of horse (Equus spp.), and giant llama (Hemiauchenia sp.) (HHSG 2011a §5.8-9). These fossils are most commonly encountered in the Pleistocene deposits where spring pond sediments are most extensive. While less extensive, fossils in early Holocene deposits would be from near the time of the mass extinction of the Pleistocene megafauna, and therefore, be of critical scientific interest (HHSG 2011a §5.8-9).

The potential for a geologic unit on a site to yield scientifically significant, nonrenewable paleontological resources is referred to as its paleontological sensitivity (SVP 1995). Paleontological sensitivity is a qualitative assessment made by a professional paleontologist taking into account the paleontological potential of the stratigraphic units present, the local geology and geomorphology, and any other local factors that may suggest a probability of encountering fossils. According to the Society of Vertebrate Paleontology standard guidelines, sensitivity comprises (1) the potential for a geological unit to yield abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, vertebrate, invertebrate, or paleobotanical remains, and (2) the importance of recovered evidence for new and significant taxonomic, phylogenetic, paleoecological, or stratigraphic data (SVP 1995). The Bureau of Land Management (BLM) has developed a potential fossil yield classification system that offers a more detailed system of evaluating the likelihood that a given geological unit may yield fossils (BLM and Chirstensen 2007). This system is described in detail, and also summarized in **Geology and Paleontology Table 2**.

Geology and Paleontology Table 2
SVP Paleontological Sensitivity Ratings (Sensitivity) and Equivalent Potential Fossil Yield Classifications (PFYC) Consistent with BLM Guidelines

Sensitivity (PFYC)	**Definition**
High and Very High (PFYC 4, 5)	Assigned to geological formations known to contain paleontological resources that include rare, well-preserved, and/or fossil materials important to on-going paleoclimatic, paleobiological and/or evolutionary studies. They have the potential to produce, or have produced vertebrate remains that are the particular research focus of many paleontologists, and can represent important educational resources as well.

Geology and Paleontology Table 2
SVP Paleontological Sensitivity Ratings (Sensitivity) and Equivalent Potential Fossil Yield Classifications (PFYC) Consistent with BLM Guidelines

Sensitivity (PFYC)	**Definition**
Moderate and Unknown (PFYC 3a, 3b)	Stratigraphic units that have yielded fossils that are moderately well-preserved, are common elsewhere, and/or that are stratigraphically long-ranging would be assigned a moderate rating. This evaluation can also be applied to strata that have an unproven but strong potential to yield fossil remains based on its stratigraphy and/or geomorphologic setting.
Low (PFYC 2)	Sediment that is relatively recent, or that represents a high-energy subaerial depositional environment where fossils are unlikely to be preserved. A low abundance of invertebrate fossil remains, or reworked marine shell from other units, can occur but the paleontological sensitivity would remain low due to their lack of potential to serve as significant scientific or educational purposes.
Very Low and Zero (PFYC 1)	Stratigraphic units with very low potential include pyroclastic flows and sediments heavily altered by pedogenesis. Most igneous rocks have zero paleontological potential. Other stratigraphic units deposited subaerially in a high energy environment (such as alluvium) may also be assigned a marginal or zero sensitivity rating. Manmade fill is also considered to possess zero (no) paleontological potential.

Source: HHSEGS 2011

The results of a records search conducted by San Bernardino County Museum suggested that paleolake or paleospring sediments might be widespread across the site (HHSG 2011a, Appendix 5.8A). In an attempt to evaluate the likelihood of project development to impact paleontological resources during site excavations, the applicant's Paleontological Resources Specialist (PRS) conducted an initial 5 day long site survey followed by a day of monitoring the excavation of 10 geotechnical test pits in the project area (HHSG 2011a §5.8-10).

The site survey focused on areas of high albedo (white and near-white) which comprise exposures of the older, fine-grained and carbonate-rich basin fill material. During the site survey, a number of bleached bone fragments were located but these proved upon testing to be recent. No mineralized bone (suggestive of fossilization) was discovered. Tufa nodules (formed by spring discharge) were commonly discovered as lag concentrate in some areas, and at least one tufa ledge was noted. However, no direct evidence of ground water discharge (paleosprings) was located on the site. No paleontological resources were found during the surficial survey (HHSG 2011a §5.8-10).

In addition to the site survey, backhoe test pit excavations and spoils were monitored to check for fossil material encountered and to identify sediment at depth that might

possess high paleontological sensitivity. During the initial survey and subsequent field investigation, it was noted that a blanket of Holocene, alluvial silty sand appears to mantle older, more indurated, carbonate-rich, light-colored silty clay to clayey sand. The older sediments display strong soil development at depth, and are likely of Pleistocene age (HHSG 2011a §5.8-9).

The stratigraphy of soils exposed in the geotechnical test pits appears consistent with a model of recent (post-Pleistocene and likely late Holocene), sandy alluvium encroaching from the east and covering an older surface, which may be of Pleistocene age (HHSG 2011a §5.8-10). Gastropod shells, bone fragments, relatively well-sorted gravel lenses, and carbonized wood are indicators of paleospring deposits, but none were encountered in the test pits.

No paleontological resources, or records of previous fossil finds, were found within one mile of the HHSEGS and no paleontological resources were encountered during the excavation of the geotechnical test pits.

Based on the absence of discovering paleontological resources while monitoring geotechnical test pit excavations, conducting pedestrian surveys of areas where fine-grained, carbonate-rich sediment is exposed at the surface, and repeated survey of the most promising areas by the project PRS, the applicant concluded that the alluvium of the project area is considered to possess low paleontological sensitivity (PFYC 2) (HHSG 2011a, §5.8-6).

While the applicant considers the likelihood of encountering paleontological resources during construction to be low, significant paleontological resources associated with subsurface lacustrine deposits and paleospring environments have been discovered in the region (HHSG 2011a, Appendix 5.8A). Paleosprings have been identified along the Stateline fault to the east of the site, and it is likely that water emanating from those springs flowed across the site. Depending on the ancient volume and rate of flow, paleospring deposits could exist beneath the site.

In the “Paleontology Literature and Records Review” conducted by the San Bernardino County Museum (SBCM) for this project, it was stated that “excavation into undisturbed subsurface lake and/or spring sediments in the Pahrump Valley has a high potential to impact significant paleontologic resources” (HHSG 2011a, Appendix 5.8A). The SBCM review recommended monitoring of excavation in areas identified as likely to contain paleontologic resources. Staff concurs with this recommendation. Therefore, staff considers monitoring of construction activities in accordance with the proposed conditions of certification is necessary. Proposed Conditions of Certification **PAL-1** to **PAL-7** are designed to mitigate any potential paleontological resource impacts, as discussed above, to a less than significant level. Essentially, these conditions would require a worker education program in conjunction with monitoring of proposed earthwork activities by qualified professional paleontologists (paleontologic resource specialist; PRS). Staff believes these conditions would also address the intent of the Inyo County General Plan, which places emphasis on the preservation of historic and prehistoric resources and values (HHSG 2011a §5.8-15).

Earthwork would be halted in the immediate area of the find at any time potential fossils are recognized by either the paleontological monitor or the worker. When properly implemented, the conditions of certification would yield a net gain to the science of paleontology since fossils that would not otherwise have been discovered can be collected, identified, studied, and properly curated. A paleontological resource specialist would be retained for the proposed project by the applicant to produce a monitoring and mitigation plan, conduct the worker training, and provide the on-site monitoring. During the monitoring, the PRS can petition the Energy Commission for a change in the monitoring protocol. Most commonly, this would be a request for lesser monitoring after sufficient monitoring has been performed to ascertain that there is little chance of finding significant fossils. In other cases, the PRS can propose increased monitoring due to unexpected fossil discoveries or in response to repeated out-of-compliance incidents by the earthwork contractor.

Based on the information above, it is staff's conclusion that the project would not have any significant adverse direct or indirect impacts to paleontological resources.

GEOLOGICAL HAZARDS

The AFC provides documentation of potential geologic hazards at the proposed HHSEGS plant site (HHSG 2011a §5-4). Review of the AFC, coupled with staff's independent research, indicates that the possibility of geologic hazards at the plant site, during its practical design life, would be low. However, geologic hazards, such as potential for strong seismic shaking, subsidence (including ground fissuring), expansive clay soils and settlement due to hydrocompaction, compressible soils and dynamic compaction, would need to be addressed in a project geotechnical report per CBC 2010 requirements.

Staff's independent research included the review of available geologic maps, reports, and related data of the proposed HHSEGS plant site. Geological information from the California Geological Survey (CGS), California Division of Mines and Geology (CDMG), and other governmental organizations was reviewed. Staff's analysis of this information is provided below.

Faulting and Seismicity

The HHSEGS site is located in southwestern California in an area that is tectonically dominated by translational slippage between the North American and Pacific crustal plates. On a broad scale, the North American-Pacific tectonic plate boundary in California is a transform shear that extends from the Gulf of California to Cape Mendocino. The width of shear extends from the eastern border of California and into western Nevada, to several miles west of the coast of California. Traversing the length of California, the San Andreas fault zone is the most noteworthy of the fault zones within this transform shear boundary. Fully 60 percent of the relative plate motion occurs along the San Andreas fault zone (Faulds 2008). The remainder of the shear is taken up by the associated faults within this plate boundary. With increasing distance west of the San Andreas, the continental crust (and the faults contained within it) becomes more a part of the Pacific plate and shares its northwesterly absolute motion. With increasing distance east of the San Andreas, the continental crust (and the faults contained within

it) becomes more a part of the North American plate and shares its southeasterly absolute motion.

The area of faulting to the east of the San Andreas is referred to as the Eastern California shear zone (Guest 2007). The Eastern California shear zone is an important component of the Pacific–North America plate boundary. This region of active, predominantly strike-slip, deformation extends from the southern Mojave Desert along the east side of the Sierra Nevada and into western Nevada. The Eastern California Shear Zone is thought to accommodate nearly a quarter (10 to 12 mm/yr) of relative plate motion between the Pacific and North America plates (Frankel 2008).
The project site lies within the Eastern California Shear Zone (ECSZ). Named faults within the ECSZ in the project vicinity include from west to east, the Owens Valley, Panamint Valley, Death Valley and Stateline fault zones (**Geological Resources - Figure 2**).

The Owens Valley fault, located along the western boundary of the ECSZ traverses the central part of the Owens Valley, extending 100 km from the northern shore of Owens Lake to just north of Big Pine. The fault exhibits impressive strike-slip geomorphic features, including pressure ridges, sag ponds, echelon scarps, vegetation lineaments, fault scarps, and groundwater barriers (Beanland 1994).

The Southern Panamint Valley fault zone is delineated by well-defined geomorphic evidence characteristic of both dextral strike-slip and normal dip-slip displacement along north to northwest-striking faults. The Southern Panamint Valley fault zone is delineated by two or more parallel traces. The eastern traces are characterized by geomorphic features indicative of normal dip-slip offset such as well-defined scarps on latest Pleistocene and Holocene alluvial fans along the prominent west-facing bedrock range front, vertically offset drainages, and faceted spurs (Bryant 1989). Western traces are delineated by geomorphic features indicative of Holocene strike-slip offset such as deflected drainages, linear ridges, side hill benches, closed depressions, ponded alluvium, and well-defined linear scarps on Holocene alluvium, linear toughs, and linear tonal contrasts on Holocene alluvium (Bryant 1989).

The Southern Death Valley fault zone is characterized by oblique slip, with a lateral component of a few hundred meters. Movement along these traces has formed normal faults and gentle-to-isoclinal folds that have uplifted fan gravel and lacustrine sediments as much as 200 m above the modern alluvial fan surface.

The Stateline Fault forms the eastern boundary of the ECSZ and marks the transition from stable North America to its mobile western margin (Guest 2007, Hislop, 2011). This 200 km long fault system lies just east of the project site (**Geological Resources - Figure 1**). Recent geologic mapping has documented approximately 30 km of dextral offset along the fault over approximately the last13 thousand years, which translates to a minimum long-term geologic slip rate of approximately 2.5 mm/year (Guest 2007). Understanding the spatial and temporal evolution of the Stateline Fault is important for seismic hazard assessment in the region and for use in models describing the development of the ECSZ.

The segment of the Stateline fault within the project area is referred to as the Pahrump Valley fault zone (Shields 1997). The Pahrump Valley fault zone (PVFZ) is active and represents a potential seismic hazard for the region. The PVFZ is the longest seismogenic structure within 100 km of the Pahrump area. Additional segments of the PVFZ extend north through Stewart Valley into Ash Meadows and the southern Amargosa Desert (Shields 1997). To the south, it extends through Mesquite Valley and possibly into Sandy and even Ivanpah Valleys (Louie 1997). Combining as many as six segments over a total length of more than 100 km, the PVFZ may be able to produce a magnitude 7 event (Louie 1997, Shields 1997).

In southern Pahrump Valley, the PVFZ divides into three fault-line scarps, each dissected by headward erosion of the uplifted playa and alluvial surfaces (Anderson 1998). These scarps are located approximately 2,000, 4,000, and 5,000 meters northeast from the center of the site. The scarp closest to the site has the sharpest features and is geomorphically the youngest scarp, with about 10 m of relief. The scarps further east from the site are about twice as high, have gentler slopes and appear more eroded. Their subdued geomorphic expression indicates they are older and their last scarp forming earthquake occurred previous to that of the westernmost scarp.

The Alquist-Priolo Earthquake Fault Zoning Act of 1994 (formerly known as the Alquist-Priolo Special Studies Zone Act of 1972) stipulates that no structure for human occupancy may be built within an Earthquake Fault Zone until geologic investigations demonstrate that the site is free of fault traces that are likely to rupture with surface displacement. Earthquake Fault Zones include faults considered to have been active during Holocene time and to have a relatively high potential for surface rupture (CGS 2008). No active faults are shown on published maps as crossing the boundary of new construction on the proposed HHSEGS power plant site or associated linear facilities. Similar to the rest of southern California, the project vicinity has a number of sources of seismicity. One of the largest historical earthquakes in California (estimated Mw 7.5), occurred in 1872 along the Owens Valley fault, approximately 130 miles northwest of the site.

There have been two significant earthquakes in the region within the last 15 years. The 1992 Landers event ruptured along a series of faults in the central portion of the Eastern California Shear Zone, about 124 miles southwest of the project site. This moment magnitude (Mw) 7.3 event was accompanied by significant ground rupture, with over 18 feet of slip noted at certain locations, and over 3 feet of slip noted over 53 miles of the rupture. In 1999, less than 7 years later, a Mw 7.1 event occurred on the Bullion and Lavic Lake faults (referred to as the Hector Mine Earthquake). These events were located approximately 98 miles to the southwest of the project site. The overall length of ground rupture has been estimated at 28 miles with significant slip (greater than an inch or so) occurring over a distance of about 22 miles. Maximum displacement was estimated at 17 feet of right slip and an average slip of approximately 8 to 10 feet. Preliminary estimates of ground motion based on probabilistic seismic hazard analyses have been calculated for the project site using the USGS Earthquake Hazards application called the U.S. Seismic “DesignMaps” Web Application (**Geology and Paleontology Table 3**). This application produces seismic hazard curves, uniform hazard response spectra, and seismic design values. The values provided by this application are based upon data from the 2008 USGS National Seismic Hazard

Mapping Project. These design parameters are for use with the 2012 International Building Code, the 2010 ASCE-7 Standard, the 2009 NEHRP Provisions, and their respective predecessors.

These parameters are project-specific and, based on HHSEGS's location, were calculated using latitude and longitude inputs of 35.985 degrees north and 115.901 degrees west, respectively. Other inputs for this application are the site "type" which is based on the underlying geologic materials and the "Structure Risk Category". The assumed site class for HHSEGS is "D", which is applicable to stiff soil. These parameters can be updated as appropriate following the results presented in a project-specific geotechnical investigation report performed for the site. The assumed "Structure Risk Category" is "III", which is based on its inherent risk to people and the need for the structure to function following a damaging event. Risk categories range from I (non essential) to IV (critical). Examples of risk category I include agriculture facilities, minor storage facilities, etc., while examples of category IV include fire stations, hospitals, nuclear power facilities, etc.

The ground acceleration values presented are typical for the area. Other developments in the adjacent area will also be designed to accommodate strong seismic shaking. The potential for and mitigation of the effects of strong seismic shaking during an earthquake should be addressed in a project-specific geotechnical report, per CBC 2010 requirements, and proposed **FACILITY DESIGN CONDITIONS OF CERTIFICATION GEN-1**, **GEN-5** and **CIVIL-1**. Compliance with these conditions of certification would ensure the project is built to current seismic standards and potential impacts would be mitigated to insignificant levels in accordance with current standards of engineering practice.

Geology and Paleontology Table 3
PLANNING LEVEL 2010 CBC SEISMIC DESIGN PARAMETERS MAXIMUM CONSIDERED EARTHQUAKE, ASCE 7 STANDARD

Parameter	Value
Assumed Site Class	D
Structure Risk Category	III - Substantial
SS – Mapped Spectral Acceleration, Short (0.2 Second) Period	0.484 g
S1 – Mapped Spectral Acceleration, Long (1.0 Second) Period	0.198 g
Fa – Site Coefficient, Short (0.2 Second) Period	1.413
Fv – Site Coefficient, Long (1.0 Second) Period	2.009
SDS – Design Spectral Response Acceleration, Short (0.2 Second) Period	0.456 g
SD1 – Design Spectral Response Acceleration, Long (1.0 Second) Period	0.265 g
SMS – Spectral Response Acceleration, Short (0.2 Second) Period	0.684 g
SM1 – Spectral Response Acceleration, Long (1.0 Second) Period	0.397 g

ASCE = American Society of Civil Engineers
Values from USGS 2010b

Liquefaction

Liquefaction is a phenomenon whereby loose, saturated, granular soils lose their inherent shear strength because of excess pore water pressure build-up, such as that generated during repeated cyclic loading from an earthquake. A low relative density of the granular materials, shallow groundwater table, long duration, and high acceleration of seismic shaking are some of the factors favorable to cause liquefaction.

The presence of predominantly cohesive or fine-grained materials and/or absence of saturated conditions can preclude liquefaction. Liquefaction hazards are usually manifested in the form of buoyancy forces during liquefaction, increase in lateral earth pressures due to liquefaction, horizontal and vertical movements resulting from lateral spreading, and post-earthquake settlement of the liquefied materials.

The depth to ground water on the proposed HHSEGS site is approximately 130 feet below ground surface (HHSG 2011a §5.15-12). Based on site observations and review of information presented in the preliminary geotechnical report (Ninyo 2011), subsurface conditions at the site are not likely to be conducive to liquefaction. However, ground water levels should be confirmed, and the liquefaction potential on the proposed HHSEGS site should be addressed in a project-specific geotechnical report, per CBC 2010 requirements and proposed **FACILITY DESIGN CONDITIONS OF CERTIFICATION GEN-1**, **GEN-5** and **CIVIL-1**.

Lateral Spreading

Lateral spreading of the ground surface can occur within liquefiable beds during seismic events. Lateral spreading generally requires an abrupt change in slope, such as a nearby steep hillside or deeply eroded stream bank, but can also occur on gentle slopes. Other factors such as distance from the epicenter, magnitude of the seismic event, and thickness and depth of liquefiable layers also affect the amount of lateral spreading. The HHSEGS site is underlain by predominantly unsaturated, cohesive, fine-grained materials that are not typically associated with liquefaction. However, ground water levels should be confirmed and the liquefaction potential of underlying beds beneath the proposed HHSEGS site should be addressed in a project-specific geotechnical report, per CBC 2010 requirements and proposed **FACILITY DESIGN CONDITIONS OF CERTIFICATION GEN-1, GEN-5** and **CIVIL-1**.

Dynamic Compaction

Dynamic compaction of soils results when relatively unconsolidated granular materials experience vibration associated with seismic events. The vibration causes a decrease in soil volume, as the soil grains tend to rearrange into a more dense state (an increase is soil density). The decrease in volume can result in settlement of overlying structural improvements.

The potential for and mitigation of the effects of dynamic compaction of proposed site native and fill soils during an earthquake should be addressed in a project-specific geotechnical report, per CBC 2010 requirements and proposed **FACILITY DESIGN CONDITIONS OF CERTIFICATION GEN-1**, **GEN-5** and **CIVIL-1**. Common mitigation methods would include deep foundations (driven piles; drilled shafts) for severe

conditions, geogrid reinforced fill pads for moderate severity and over-excavation and replacement for areas of minimal hazard.

Hydrocompaction

Hydrocompaction (also known as hydro-collapse) is generally limited to young soils that were deposited rapidly in a saturated state, most commonly by a flash flood. The soils dry quickly, leaving an unconsolidated, low density deposit with a high percentage of voids. Foundations built on these types of compressible materials can settle excessively, particularly when landscaping irrigation dissolves the weak cementation that is preventing the immediate collapse of the soil structure. As stated in the preliminary geotechnical report, “some of the encountered native soils were slightly too moderately gypsiferous and slightly too highly porous, with poreholes up to approximately 1/4-inch in diameter” (Ninyo 20011). Conclusions in the preliminary geotechnical report suggest site soils are subject to a high collapse potential and should be considered unsuitable for support of structures and improvements in their existing condition (Ninyo 2011). The potential for and mitigation of the effects of hydrocompaction of site soils should be addressed in a project-specific geotechnical report, per CBC 2010 requirements and proposed **FACILITY DESIGN CONDITIONS OF CERTIFICATION GEN-1**, **GEN-5** and **CIVIL-1**. Typical mitigation measures would include over-excavation/replacement, mat foundations or deep foundations, depending on severity and foundation loads.

Subsidence

Local subsidence or settlement may occur when areas containing compressible soils are subjected to foundation loads. Conclusions presented in the preliminary geotechnical report indicate surficial soils have high porosity. These soils are considered to be prone to settlement and should be considered unsuitable for support of structures and improvements in their existing condition (Ninyo 2011).

Settlement can also occur in poorly consolidated soils during ground shaking. Earthquake-induced settlement can cause distress to structures supported on shallow foundations, damage to utilities that serve pile-supported structures, and damage to utility lines that are commonly buried at shallow depths (Kramer 1996). During settlement, the soil materials are physically rearranged by the shaking to result in a less stable alignment of the individual grains. Settlement of sufficient magnitude to cause significant structural damage is normally associated with rapidly deposited alluvial soils, or improperly founded or poorly compacted fill.

Within the project vicinity, the greatest subsidence hazard is posed by the occurrence of earth fissures. Earth fissures are surface expressions of deep fracture systems typically caused by groundwater withdrawal that exceeds aquifer recharge (Snelson 2005). Generally, the surface expressions of earth fissures are not identified until surface flows from flash flooding or over-watering enter the fissure causing erosion of the fissure sidewalls. These ground failures can be exacerbated by faults at depth, shallow bedrock, and/or differential compaction (Snelson 2005).

Earth fissures can be up to several feet wide and deep, and thousands of feet long. The initial stage of development of the earth fissure is a narrow crack in the soil, which forms

due to tensional forces sometimes related to groundwater withdrawal and associated land subsidence. Erosion processes, such as gullying and subsurface water migration during periods of heavy runoff, widen and deepen the crack into a ground fissure. Due to underground erosion, or piping, tunnel-like features and other subsurface voids form along the ground cracks. When the soils above the voids erode and collapse, sinkholes, linear depressions, and/or trench-like features occur at the ground surface.

Earth fissures have been documented within the Pahrump Valley and have been responsible for significant damage to structures in the city of Pahrump (dePolo 1999). It is believed that subsidence in these areas is likely related to groundwater overdraft. These fissures could be exacerbated by both surface and groundwater flow and by local seismicity.

The nearest mapped ground fissure zone is located approximately 8 miles north of the project site. Ground lineations in Pahrump Valley sediments, which may be indicative of ground fissuring, were also noted approximately 2 miles west and 6 miles northwest of the project site (dePolo 2003).

During site reconnaissance associated with the preliminary geotechnical evaluation, numerous ground surface lineations, which appear to have been caused by ground fissures, were identified (Ninyo 2011). These lineations ranged from a few inches to several feet wide and were up to hundreds of yards long. The lineations generally extended in north-south and northwest-southeast directions across the site. The lineations were observed to be associated with an increase in vegetation, eroded or loose soil, relatively slight depressions in the ground surface, and, in a few areas, ground cracks up to approximately 2 inches wide and a few inches deep (Ninyo 2011).

The potential for and mitigation of the effects of subsidence of site soils should be addressed in a project-specific geotechnical report, per CBC 2010 requirements and proposed **FACILITY DESIGN CONDITIONS OF CERTIFICATION GEN-1**, **GEN-5** and **CIVIL-1**. Typical mitigation measures would include over-excavation/replacement, mat foundations or deep foundations, depending on severity and foundation loads. Precipitation runoff control should be utilized to prevent infiltration of surface water into existing or suspected earth fissure areas. Analysis of and mitigation for subsidence potential caused by groundwater withdrawal is presented in the Water Resources and Supply section of this document.

Expansive Soils

Soil expansion occurs when clay-rich soils with an affinity for water exist in-place at a moisture content below their plastic limit. The addition of moisture from irrigation, precipitation, capillary tension, water line breaks, etc. causes the clay soils to absorb water molecules into their structure, which in turn causes an increase in the overall volume of the soil. This increase in volume can correspond to excessive movement (heave) of overlying structural improvements. The potential for and mitigation of the effects of expansive soils on the proposed site should be addressed in a project-specific geotechnical report, per CBC 2010 requirements and proposed **FACILITY DESIGN CONDITIONS OF CERTIFICATION GEN-1**, **GEN-5** and **CIVIL-1**. Mitigation would normally be accomplished by over-excavation and replacement of the expansive soils.

For deep-seated conditions, deep foundations are commonly used. Lime-treated (chemical modification) is often used to mitigate expansive clays in pavement areas.

Landslides

Landslides occur when masses of rock, earth, or debris move down a slope, including rock falls, deep failure of slopes, and shallow debris flows. Landslides are influenced by human activity (mining and construction of buildings, railroads, and highways) and natural factors (geology, precipitation, and topography). Frequently, they accompany other natural hazards. Although landslides sometimes occur during earthquake activity, earthquakes are rarely their primary cause.

The most common cause of a landslide is an increase in the down slope gravitational stress applied to slope materials (oversteepening). This may be produced either by natural processes or human activities. Undercutting of a valley wall by stream erosion is a common way in which slopes may be naturally oversteepened. Other ways include excessive rainfall or irrigation on a cliff or slope.

The site is relatively flat and located substantial distances from steep terrain. Therefore, the site is not subject to landslide hazards.

Tsunamis and Seiches

Tsunamis are large-scale seismic-sea waves caused by offshore earthquakes, landslides and/or volcanic activity. Seiches are waves generated within enclosed water bodies such as bays, lakes or reservoirs caused by seismic shaking, rapid tectonic uplift, basin bottom displacement and/or land sliding. The proposed power plant site is located approximately 200 miles inland from the coast. There is no water bodies located at an elevation above the project site within the project vicinity. Therefore, the site is not subject to either tsunami of seiche hazards. For further analysis see the **SOIL RESOURCES AND WATER RESOURCES** sections.

The design-level geotechnical investigation required for the proposed project by the CBC 2010 and proposed **FACILITY DESIGN CONDITIONS OF CERTIFICATION GEN-1**, **GEN-5** and **CIVIL-1** should provide standard engineering design recommendations for mitigation of seismic shaking, ground subsidence (including fissuring), expansive clay soils, liquefaction and excessive settlement due to compressible soils or dynamic compaction, as appropriate.

OPERATION IMPACTS AND MITIGATION

Operation of the proposed plant facilities should not have any adverse impact on geologic, mineralogic, or paleontologic resources. Once the plant is constructed and operating, there would be no further disturbances that could affect these resources. Potential geologic hazards, including strong ground shaking, ground subsidence (including fissuring), liquefaction settlement due to compressible soils, hydrocompaction, or dynamic compaction, and the possible presence of expansive clay soils can be effectively mitigated through facility design such that these potential hazards should not affect future operation of the facility. Compliance with **CONDITIONS OF CERTIFICATION GEN-1, GEN-5** and **CIVIL-1** in the **FACILITY DESIGN** section of

this **FSA** would ensure the project is constructed to current seismic building standards and potential impacts would be mitigated in accordance with current standards of engineering practice.

CUMULATIVE IMPACTS AND MITIGATION

No geologic and mineralogic resources have been identified in the project area. The site has not been identified as containing a significant mineral deposit that should be protected and is several miles from the closest identified mineral resource (hard rock mines). Development of this project is not expected to lead to a significantly cumulative effect on geologic and mineralogic resources within the project area.

Paleontological resources have been documented in the general area of the proposed project and in sediments similar to those that are present on the site. However, to date, none have been found on the plant site or along project linear routes within California during cursory field studies of the HHSEGS. If significant paleontological resources are uncovered during construction they would be protected and preserved in accordance with **CONDITIONS OF CERTIFICATION PAL-1** to **PAL-7**. These conditions would also mitigate any potential cumulative impacts.

The proposed HHSEGS would be situated in an active geologic environment. Strong ground shaking potential must be mitigated through foundation and structural design as required by the CBC 2010. The potential for ground subsidence and fissuring must be addressed and mitigated through appropriate facility design. Expansive materials, as well as compressible soils and soils that may be subject to settlement due to dynamic compaction, must be addressed and mitigated in accordance with a design-level geotechnical investigation as required by the CBC 2010, and proposed **CONDITIONS OF CERTIFICATION GEN-1**, **GEN-5**, and **CIVIL-1** under the **FACILITY DESIGN** section of this **FSA.**

FACILITY CLOSURE

Future facility closure activities would not be expected to impact geologic or mineralogic resources since no such resources are known to exist at either the project location or along its proposed linears. In addition, the decommissioning and closure of the proposed project should not negatively affect geologic, mineralogic, or paleontologic resources since the majority of the ground disturbed during plant decommissioning and closure would have been already disturbed, and mitigated as required, during construction and operation of the project.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Staff has not received any agency or public comments regarding geologic hazards, geologic or mineral resources, or paleontology at this time. However, Preliminary Staff Assessment (PSA) comments were received from the applicant, BrightSource Energy. These PSA Response to Comments can be reviewed in **Appendix 1**.

PROPOSED FINDINGS OF FACT

Based on our analysis of the project, we propose the following findings:

1. Several northwest-striking active and potentially active faults are present in the project area.

2. Since no active faults are known to cross the boundary of new construction at the project site, the project is not subject to the set-back requirements mandated by the Alquist-Priolo Special Studies Zone Act.

3. The primary geologic hazards that could affect the project include strong earthquake-related ground shaking and ground subsidence caused by earth fissuring and possibly from groundwater withdrawal.

4. **CONDITIONS OF CERTIFICATION GEN-1**, **GEN-4**, **GEN-5**, and **CIVIL-1** of the **FACILITY DESIGN** section require the project owner to conduct a site-specific geotechnical investigation, which confirms the soil profile, including composition and depth of fill materials as well as subsurface information such as groundwater depth and the location of expansive clays beneath the project footprint, before project design can be finalized.

5. **CONDITIONS OF CERTIFICATION GEN-1**, **GEN-4**, **GEN-5**, and **CIVIL-1** of the **FACILITY DESIGN** section require the project owner to design the project to current engineering standards to ensure that potential geologic hazards to the project will be adequately mitigated.

6. The evidence assumes that liquefaction, lateral spreading, dynamic compaction, landslides, flooding, tsunamis, and seiches pose low or negligible project risks but this assumption must be confirmed by the site-specific geotechnical investigation referenced in **FINDINGS #4** and **#5.**

7. There is no evidence of existing or potential geologic or mineralogic resources at the project site or along the linear alignments.

8. Although many paleontologic sites are documented within three miles of the site, there are no records documenting paleontologic finds on the HHSEGS site or along the project's linear alignments.

9. Any potential impacts to newly discovered paleontologic resources during excavation and construction, will be mitigated to a level of less than significant by the project owner's implementation of a Paleontological Monitoring and Mitigation Plan, including a Worker Environmental Awareness Program, and employ an on-site Paleontologic Resource Specialist with authority to halt construction activities when paleontologic resources are identified.

10. There is no evidence that project construction or operation will result in cumulative impacts to geologic, mineralogic, or paleontologic resources.

CONCLUSIONS

The applicant would be able to comply with applicable LORS, provided that the proposed conditions of certification are followed. The proposed design and construction of the project should have no adverse impact with respect to geologic, mineralogic, and paleontologic resources. Staff proposes to ensure compliance with applicable LORS through the adoption of the proposed conditions of certification listed below.

It is staff's opinion that the likelihood of encountering paleontologic resources would be high in areas where lacustrine and paleospring deposits occur. Staff would consider reducing monitoring intensity, at the recommendation of the project PRS, following examination of sufficient, representative excavations to fully understand site stratigraphy.

PROPOSED CONDITIONS OF CERTIFICATION

General Conditions of Certification with respect to engineering geology are proposed under Conditions of Certification **GEN-1, GEN-5**, and **CIVIL-1** in the **FACILITY DESIGN** section. Proposed paleontological Conditions of Certification **PAL-1** through **PAL-7** follow.

PAL-1 The project owner shall provide the compliance project manager (CPM) with the resume and qualifications of the proposed Paleontological Resource Specialist (PRS) for review and approval. If the approved PRS is replaced prior to completion of project mitigation and submittal of the Paleontological Resources Report, the project owner shall obtain CPM approval of a replacement PRS. The project owner shall keep resumes on file for qualified Paleontological Resource Monitors (PRMs). If a PRM is replaced, the resume of the replacement PRM shall also be provided to the CPM for review and approval.

The PRS resume shall include the names and phone numbers of references. The resume shall also demonstrate to the satisfaction of the CPM the appropriate education and experience to accomplish the required paleontological resource tasks.

As determined by the CPM, the PRS shall meet the minimum qualifications for a vertebrate paleontologist as described in the Society of Vertebrate Paleontology (SVP) guidelines of 1995. The experience of the PRS shall include the following:

1. Institutional affiliations, appropriate credentials, and college degree;

2. Ability to recognize and collect fossils in the field;

3. Local geological and biostratigraphic expertise;

4. Proficiency in identifying vertebrate and invertebrate fossils; and

5. At least three years of paleontological resource mitigation and field experience in California and at least one year of experience leading paleontological resource mitigation and field activities.

The project owner shall ensure that the PRS obtains qualified paleontological resource monitors to monitor as the PRS deems necessary on the project. Paleontologic Resource Monitors (PRMs) shall have the equivalent of the following qualifications:

- BS or BA degree in geology or paleontology and one year of experience monitoring in California; or
- AS or AA in geology, paleontology, or biology and four years' experience monitoring in California; or
- Enrollment in upper division classes pursuing a degree in the fields of geology or paleontology and two years of monitoring experience in California.

Verification: (1) At least 60 days prior to the start of ground disturbance, the project owner shall submit a resume and statement of availability of its designated PRS for on-site work.

(2) At least 20 days prior to ground disturbance, the PRS or project owner shall provide a letter with resumes naming anticipated monitors for the project, stating that the identified monitors meet the minimum qualifications for paleontological resource monitoring required by the condition. If additional monitors are obtained during the project, the PRS shall provide additional letters and resumes to the CPM. The letter shall be provided to the CPM no later than one week prior to the monitor's beginning on-site duties.

(3) Prior to the termination or release of a PRS, the project owner shall submit the resume of the proposed new PRS to the CPM for review and approval.

PAL-2 The project owner shall provide to the PRS and the CPM, for approval, maps and drawings showing the footprint of the power plant, construction lay down areas, and all related facilities. Maps shall identify all areas of the project where ground disturbance is anticipated. If the PRS requests enlargements or strip maps for linear facility routes, the project owner shall provide copies to the PRS and CPM. The site grading plan and plan and profile drawings for the utility lines would be acceptable for this purpose. The plan drawings should show the location, depth, and extent of all ground disturbances and be at a scale between 1 inch = 40 feet and 1 inch = 100 feet range. If the footprint of the project or its linear facilities change, the project owner shall provide maps and drawings reflecting those changes to the PRS and CPM.

If construction of the project proceeds in phases, maps and drawings may be submitted prior to the start of each phase. A letter identifying the proposed schedule of each project phase shall be provided to the PRS and CPM. Before work commences on affected phases, the project owner shall notify the PRS and CPM of any construction phase scheduling changes.

At a minimum, the project owner shall ensure that the PRS or PRM consults weekly with the project superintendent or construction field manager to confirm area(s) to be worked the following week, and until ground disturbance is completed.

Verification: At least 30 days prior to the start of ground disturbance, the project owner shall provide the maps and drawings to the PRS and CPM.

If there are changes to the footprint of the project, revised maps and drawings shall be provided to the PRS and CPM at least 15 days prior to the start of ground disturbance.

If there are changes to the scheduling of the construction phases, the project owner shall submit a letter to the CPM within 5 days of identifying the changes.

PAL-3 The project owner shall ensure that the PRS prepares, and the project owner submits to the CPM for review and approval, a paleontological resources monitoring and mitigation plan (PRMMP) to identify general and specific measures to minimize potential impacts to significant paleontological resources. Approval of the PRMMP by the CPM shall occur prior to any ground disturbance. The PRMMP shall function as the formal guide for monitoring, collecting, and sampling activities, and may be modified with CPM approval. This document shall be used as the basis of discussion when on-site decisions or changes are proposed. Copies of the PRMMP shall reside with the PRS, each monitor, the project owner's on-site manager, and the CPM.

The PRMMP shall be developed in accordance with the guidelines of the Society of Vertebrate Paleontology (SVP, 1995) and shall include, but not be limited, to the following:

1. Assurance that the performance and sequence of project-related tasks, such as any literature searches, pre-construction surveys, worker environmental training, fieldwork, flagging or staking, construction monitoring, mapping and data recovery, fossil preparation and collection, identification and inventory, preparation of final reports, and transmittal of materials for curation will be performed according to PRMMP procedures;

2. Identification of the person(s) expected to assist with each of the tasks identified within the PRMMP and the conditions of certification;

3. A thorough discussion of the anticipated geologic units expected to be encountered, the location and depth of the units relative to the project when known, and the known sensitivity of those units based on the occurrence of fossils either in that unit or in correlative units;

4. An explanation of why, how, and how much sampling is expected to take place and in what units. Include descriptions of different sampling procedures that shall be used for fine-grained and coarse-grained units;

5. A discussion of the locations of where the monitoring of project construction activities is deemed necessary, and a proposed plan for monitoring and sampling;

6. A discussion of procedures to be followed in the event of a significant fossil discovery, halting construction, resuming construction, and how notifications will be performed;

7. A discussion of equipment and supplies necessary for collection of fossil materials and any specialized equipment needed to prepare, remove, load, transport, and analyze large-sized fossils or extensive fossil deposits;

8. Procedures for inventory, preparation, and delivery for curation into a retrievable storage collection in a public repository or museum, which meet the Society of Vertebrate Paleontology's standards and requirements for the curation of paleontological resources;

9. Identification of the institution that has agreed to receive data and fossil materials collected, requirements or specifications for materials delivered for curation, and how they will be met, and the name and phone number of the contact person at the institution; and

10. A copy of the paleontological conditions of certification.

Verification: At least 30 days prior to ground disturbance, the project owner shall provide a copy of the PRMMP to the CPM for review and approval. The PRMMP shall include an affidavit of authorship by the PRS, and acceptance of the PRMMP by the project owner evidenced by a signature.

PAL-4 Prior to ground disturbance and for the duration of construction activities involving ground disturbance, the project owner and the PRS shall prepare and conduct weekly CPM-approved training for the following workers: project managers, construction supervisors, foremen and general workers involved with or who operate ground-disturbing equipment or tools. Workers shall not excavate in sensitive units prior to receiving CPM-approved worker training. Worker training shall consist of an initial in-person PRS training during the project kick-off, for those mentioned above. Following initial training, a CPM-approved video or in-person training may be used for new employees. The training program may be combined with other training programs prepared for cultural and biological resources, hazardous materials, or other areas of interest or concern. No ground disturbance shall occur prior to CPM approval of the Worker Environmental Awareness Program (WEAP), unless specifically approved by the CPM.

The WEAP shall address the possibility of encountering paleontological resources in the field, the sensitivity and importance of these resources, and legal obligations to preserve and protect those resources.

The training shall include:

1. A discussion of applicable laws and penalties under the law;

2. Good quality photographs or physical examples of vertebrate fossils for project sites containing units of high paleontologic sensitivity;

3. Information that the PRS or PRM has the authority to halt or redirect construction in the event of a discovery or unanticipated impact to a paleontological resource;

4. Instruction that employees are to halt or redirect work in the vicinity of a find and to contact their supervisor and the PRS or PRM;

5. An informational brochure that identifies reporting procedures in the event of a discovery;

6. A WEAP certification of completion form signed by each worker indicating that he/she has received the training (see attached form); and

7. A sticker that shall be placed on hard hats indicating that environmental training has been completed.

Verification: At least 30 days prior to ground disturbance, the project owner shall submit the proposed WEAP to the CPM for review and approval. The WEAP shall include the brochure with the set of reporting procedures for workers to follow.

At least 30 days prior to ground disturbance, the project owner shall submit the script and final video to the CPM for approval if the project owner is planning to use a video for interim training.

If the owner requests an alternate paleontological trainer, the resume and qualifications of the trainer shall be submitted to the CPM for review and approval prior to installation of an alternate trainer. Alternate trainers shall not conduct training prior to CPM authorization.

In the monthly compliance report (MCR), the project owner shall provide copies of the WEAP certification of completion forms with the names of those trained and the trainer or type of training (in-person or video) offered that month. The MCR shall also include a running total of all persons who have completed the training to date.

PAL-5 The project owner shall ensure that the PRS and PRM(s) monitor consistent with the PRMMP all construction-related grading, excavation, trenching, and augering in areas where potential fossil-bearing materials have been identified, both at the site and along any constructed linear facilities associated with the project. In the event that the PRS determines full-time monitoring is not necessary in locations that were identified as potentially fossil-bearing in the PRMMP, the project owner shall notify and seek the concurrence of the CPM.

The project owner shall ensure that the PRS and PRM(s) have the authority to halt or redirect construction if paleontological resources are encountered.

The project owner shall ensure that there is no interference with monitoring activities unless directed by the PRS. Monitoring activities shall be conducted as follows:

1. Any change of monitoring from the accepted schedule in the PRMMP shall be proposed in a letter or email from the PRS and the project owner to the CPM prior to the change in monitoring and will be included in the monthly compliance report. The letter or email shall include the justification for the change in monitoring and be submitted to the CPM for review and approval.

2. The project owner shall ensure that the PRM(s) keep a daily monitoring log of paleontological resource activities. The PRS may informally discuss paleontological resource monitoring and mitigation activities with the CPM at any time.

3. The project owner shall ensure that the PRS notifies the CPM within 24 hours of the occurrence of any incidents of non-compliance with any paleontological resources conditions of certification. The PRS shall recommend corrective action to resolve the issues or achieve compliance with the conditions of certification.

4. For any significant paleontological resources encountered, either the project owner or the PRS shall notify the CPM within 24 hours, or Monday morning in the case of a weekend event, where construction has been halted because of a paleontological find.

The project owner shall ensure that the PRS prepares a summary of monitoring and other paleontological activities placed in the monthly compliance reports. The summary will include the name(s) of PRS or PRM(s) active during the month, general descriptions of training and monitored construction activities, and general locations of excavations, grading, and other activities. A section of the report shall include the geologic units or subunits encountered, descriptions of samplings within each unit, and a list of identified fossils. A final section of the report will address any issues or concerns about the project relating to paleontologic monitoring, including any incidents of non-compliance or any changes to the monitoring plan that have been approved by the CPM. If no monitoring took place during the month, the report shall include an explanation in the summary as to why monitoring was not conducted.

Verification: The project owner shall ensure that the PRS submits the summary of monitoring and paleontological activities in the MCR. When feasible, the CPM shall be notified 10 days in advance of any proposed changes in monitoring different from the plan identified in the PRMMP. If there is any unforeseen change in monitoring, the notice shall be given as soon as possible prior to implementation of the change.

PAL-6 The project owner, through the designated PRS, shall ensure that all components of the PRMMP are adequately performed including collection of fossil materials, preparation of fossil materials for analysis, analysis of fossils,

identification and inventory of fossils, the preparation of fossils for curation, and the delivery for curation of all significant paleontological resource materials encountered and collected during project construction.

Verification: The project owner shall maintain in his/her compliance file copies of signed contracts or agreements with the designated PRS and other qualified research specialists. The project owner shall maintain these files for a period of three years after project completion and approval of the CPM-approved paleontological resource report (see **PAL-7**). The project owner shall be responsible for paying any curation fees charged by the museum for fossils collected and curated as a result of paleontological mitigation. A copy of the letter of transmittal submitting the fossils to the curating institution shall be provided to the CPM.

PAL-7 The project owner shall ensure preparation of a Paleontological Resources Report (PRR) by the designated PRS. The PRR shall be prepared following completion of the ground-disturbing activities. The PRR shall include an analysis of the collected fossil materials and related information, and submit it to the CPM for review and approval.

The report shall include, but is not limited to, a description and inventory of recovered fossil materials; a map showing the location of paleontological resources encountered; determinations of sensitivity and significance; and a statement by the PRS that project impacts to paleontological resources have been mitigated below the level of significance.

Verification: Within 90 days after completion of ground-disturbing activities, including landscaping, the project owner shall submit the PRR under confidential cover to the CPM.

Certification of Completion
Worker Environmental Awareness Program
HIDDEN HILLS SOLAR ELECTRIC GENERATING SYSTEM
(11-AFC-02)

This is to certify these individuals have completed a mandatory California Energy Commission-approved Worker Environmental Awareness Program (WEAP). The WEAP includes pertinent information on cultural, paleontological, and biological resources for all personnel (that is, construction supervisors, crews, and plant operators) working on site or at related facilities. By signing below, the participant indicates that he/she understands and shall abide by the guidelines set forth in the program materials. Include this completed form in the Monthly Compliance Report.

No.	Employee Name	Title/Company	Signature
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Cultural Trainer: _____ Signature: _____ Date: ___/___/____

PaleoTrainer: _____ Signature: _____ Date: ___/___/____

Biological Trainer: _____Signature:_____ Date: ___/___/__

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GEOLOGY and PALEONTOLOGY

List of Comment Letters

		Geo / Paleo Comments?
1	Inyo County	
2	Bureau of Land Management	
3	National Park Service	
4	The Nature Conservancy	
5	Amargosa Conservancy	
6	Basin & Range Watch	
7	Pahrump Paiute Tribe	
8	Richard Arnold, Pahrump Piahute Tribe	
9	Big Pine Tribe of Owens Valley	
10	Intervenor Cindy MacDonald	
11	Intervenor Center for Biological Diversity	
12	Intervenor, Old Spanish Trail Association	
13	Applicant, BrightSource Energy, Inc.	X

Comment #	DATE	COMMENT TOPIC	RESPONSE
13	**July 23, 2012**	**Applicant, BrightSource Energy**	
13.1	**p. 194**	Addition of BLM in LORS table	BLM reference incorporated into LORS table
13.2	**p. 194**	Italicize Latin epithets	Unnecessary and not incorporated
13.3	**p. 194**	Clarification of effects relatible to their significance.	Comments accepted and incorporated
13.4	**p. 194**	Change "or" to "and"	Comment not accepted. Would change meaning of sentence and be incorrect English.
13.5	**p. 195**	Emphasize significance to cumulative impacts	Comments accepted and incorporated
13.6	**p. 195**	Emphasize significance to impacts	Comments accepted and incorporated
13.7	**p. 195**	Different description of Antiquities Act	Comments accepted and incorporated

13.8	**p. 195**	Delete duplication of reference to NEPA	Comments accepted and incorporated
13.9	**p. 195**	Different description of Omnibus Public Land Management Act	Comments accepted and incorporated
13.10	**p. 196**	Different description of CEQA, Appendix G	Comments accepted and incorporated
13.11	**p. 196**	Requested addition of BLM reference to LORS table	Comments accepted and incorporated
13.12	**p. 196**	Requested revision to project description	Comments accepted and incorporated
13.13	**p. 196**	Requested rewording description of regional geology to replace "metamorphism" to "diagenisis"	Comment not accepted. The description of the occurance of metamorphic rocks is clearly described in the preceeding paragraph. Text is accurate as presented.
13.14	**p. 196**	Requested rewording description of regional geology to replace "metamorphosed rocks" to "crust"	Comment not accepted. The description of the occurance of metamorphic rocks is clearly described in the preceeding paragraph. Text is accurate as presented.
13.15	**p. 196**	Emphasized development of rainshadow caused desertification of "Great Basin"	Comments accepted and incorporated
13.16	**p. 196**	Requested removal of the word "abandoned" referring to nonfunctioning onsite groundwater wells	Replaced "abandoned" with the word "nonfunctioning"
13.17	**p. 197**	Applicant states case law notes that imapcts analysis under CEQA is limited to potential effects of the project on the environment and not effects or risks to the project or people from the environment and requests removal of bullet under Method and Threshold for Determining Sinificance that states such.	Comment not accepted. Case cited is not relevant to this section
13.18	**p. 197**	Requested inclusion of BLM 2008 in text reference	Comments accepted and incorporated
13.19	**p. 197**	rearrangement of words to emphasize significance of adverse impacts	Comments accepted and incorporated
13.20	**p. 197**	Requested inclusion of BLM 2008 in text reference	Comments accepted and incorporated
13.21	**p. 197**	Requested change from the word "reconnaissance"to "survey".	Even though the Applicant's documents used the word "reconnaissance" through out its documents, the requested revisons have been accepted and incorporated.

13.22	**p. 197**	Requested the removal of reference to "dry lake" as a deposit where fossils would typically be found.	Comment partially accepted. Numerous articles in literature refer to dry lakes as yielding significant geological resources. Maybe none more notable than Fossil Lake in Oregon. It is interesting to note that the recent mission to Mars was focused on an ancient lake bed to search for evidence of life. For clarification, the words dry lake deposits have been replaced with "subsurface lacustrine deposits"
13.23	**p. 197**	Requested change to require monitoring of excavations unless and until sediments with high paleontological sensitivity are identified in the project area.	Comment not accepted. The absence of evidence is not evidence of absence. Monitoring must occur until and unless the Paleontological Resources Specialist (PRS) recommends to the CPM that monitoring is not necessary and that the CPM agrees with the PRS recommendation.
13.24	**p. 198**	Requested clarification that eathwork would be halted specifically in the immediate area of a paleontological find.	Comments accepted and incorporated
13.25	**p. 198**	Requests revision to allow PRS to determine changes in monitoring protocol without CEC approval of that change.	Comment not accepted. The CPM can authorize changes in monitoring protocol based on the PRS recommendation. The PRS does not have independent unilateral authority to make changes in CEC approved monitoring protocol.
13.26	**p. 198**	Requests specification that impacts would be mitigated to insignificant levels.	Comments accepted and incorporated
13.27	**p. 198**	Requests rewording cumulative impacts section by minimizing the potential of encountering paleontological resources during construction. Also requests adding clarification that adherence to Conditions of Certification would mitigate any potential cumulative impacts to insignificant levels.	Comment partially accepted. The absence of evidence is not evidence of absence. The discussion of the difference in geology between the site and Stump Springs is superfluous and is not accepted. In the comments, the applicant did state that paleontologically sensitive sediments have been found along limited sections of the project's linears. That statement has been accepted and incorporatated into the document. The inclusion of the phrase adherence to Conditions of Certification would mitigate any potential cumulative impacts to insignificant levels is accepted and incorporated.

GEOLOGICAL RESOURCES - FIGURE 3

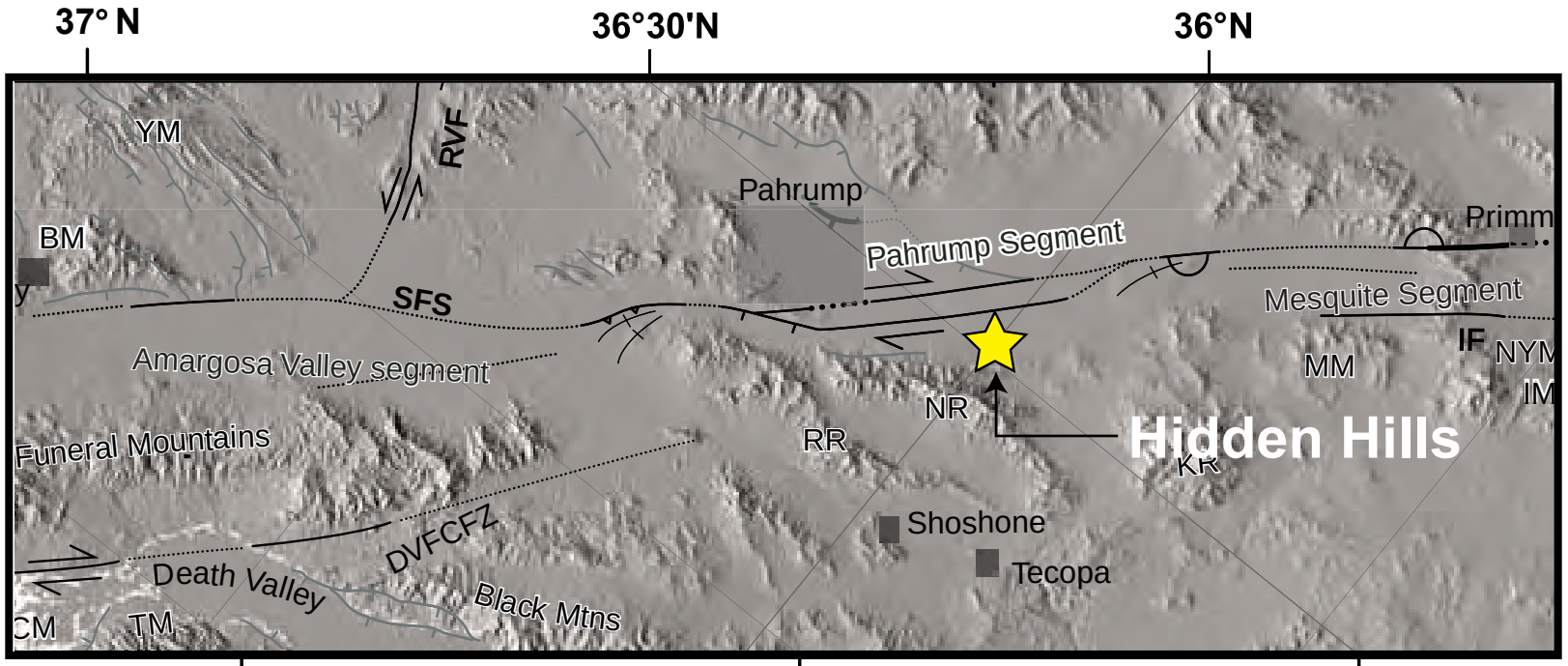
Hidden Hills Solar Electric Generating System (HHSEGS) - Geomorphic Provinces

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: California Department of Conservation, California Geological Survey, 2002.

GEOLOGICAL RESOURCES - FIGURE 1

Hidden Hills Solar Electric Generating System (HHSEGS) - Fault Map



RVF - Rock Valley Fault
DVFCFRZ - Death Velley Furnace Creek fault zone
SFS - Stateline fault system
YM - Yucca Mountain
BM - Bare Mountain
CM - Cottonwood Mountain
TM - Tucki Mountain
RR - Resting Spring Range
NR - Nopah Range
MM - Mesquite Mountain
IM - Ivanpah Mountain
NYM - New York Mountains

N

Inferred fault location

Mapped fault location with arrows showing relative direction of fault movement

Fold

Thrust fault—Sawteeth on upper plate

Location of offset geologic unit

Scale
1" = 13.636 Miles

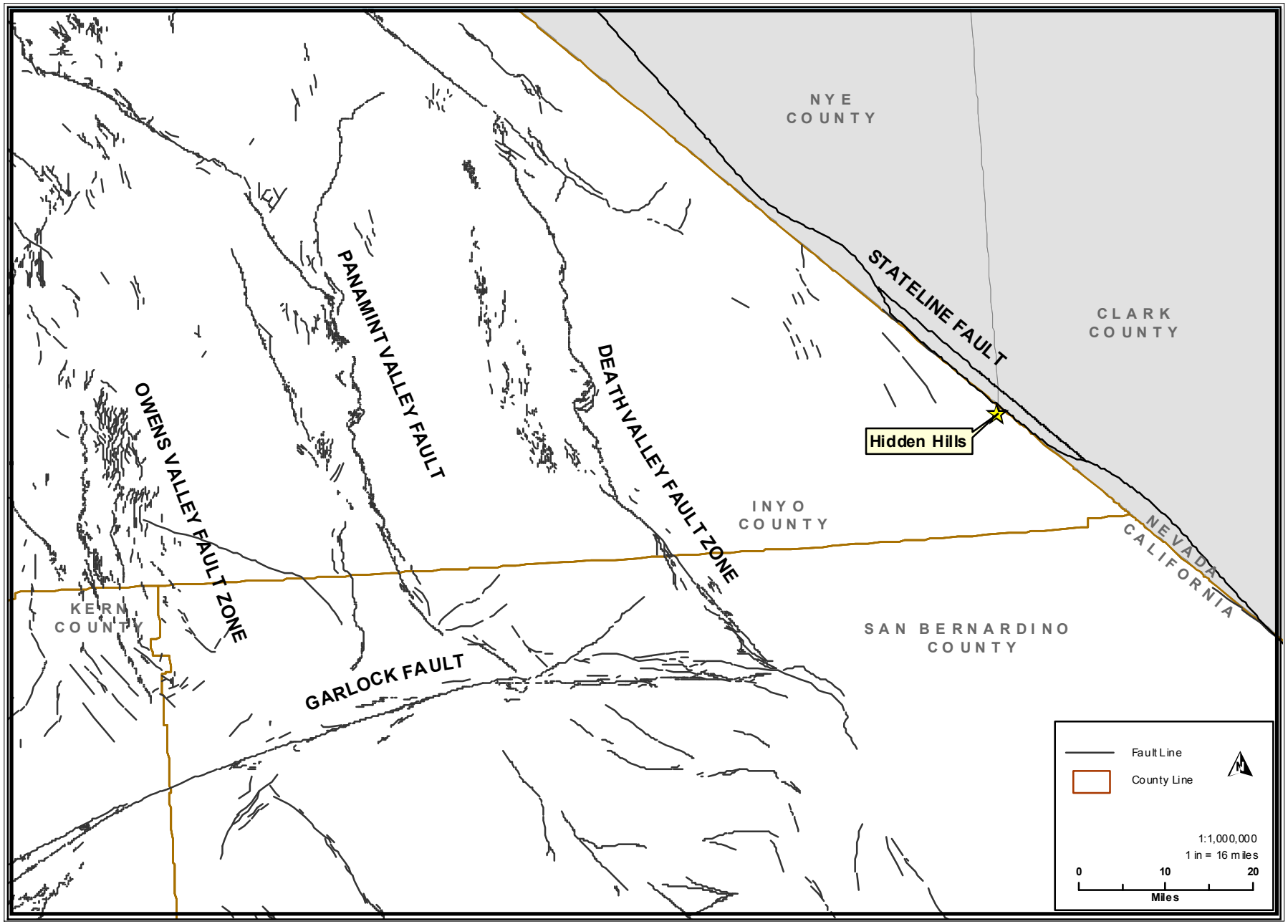
GEOLOGICAL RESOURCES

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Ground Water Atlas of the US_HA 730-B_Figure 36_ Pahrump Valley geology_http://pubs.usgs.gov/ha/ha730/ch_b/basin_range4.html
Geological Society of America Bulletin, Nov/Dec 2007

GEOLOGICAL RESOURCES - FIGURE 2

Hidden Hills Solar Electric Generating System (HHSEGS) Regional - Fault Map



GEOLOGICAL RESOURCES

CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Dept of Conservation - California Geological Survey - 2010 Fault Activity Map of California
Geological Society of America Bulletin, Nov/Dec 2007

GEOLOGICAL RESOURCES - FIGURE 4

Hidden Hills Solar Electric Generating System (HHSEGS) - General Geologic Map

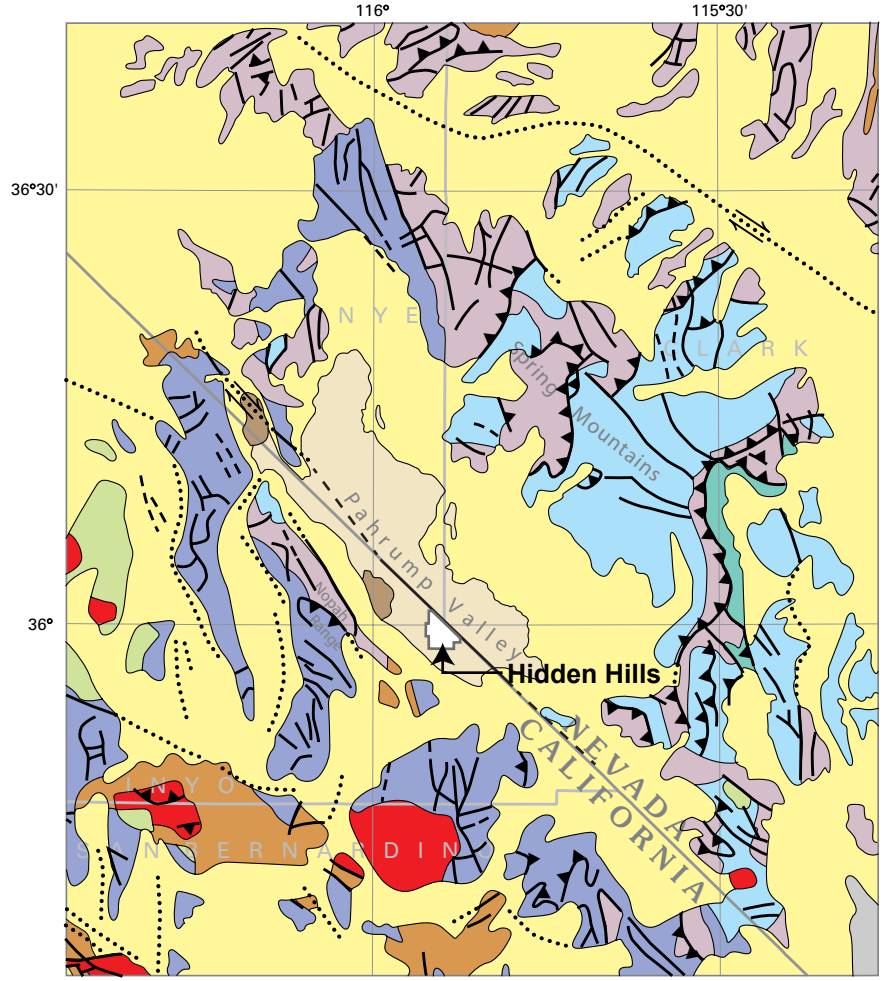
EXPLANATION

Basin-fill deposits

- Quaternary playa deposits
- Quaternary and Tertiary unconsolidated coarse-grained deposits
- Quaternary and Tertiary lacustrine and associated fine-grained deposits

Consolidated Rocks

- Tertiary consolidated deposits
- Tertiary to Triassic marine and continental rocks
- Triassic to Mississippian carbonate rocks
- Devonian to Cambrian carbonate and clastic rocks
- Cambrian and Precambrian clastic rocks
- Quaternary and Tertiary volcanic rocks
- Miocene to Triassic intrusive rocks
- Precambrian basement rocks
- Fault—Dashed where approximately located. Dotted where concealed Arrows show relative movement
- Thrust fault—Sawteeth on upper plate
- Inferred fault location



Base modified from U.S. Bureau of the Census TIGER/Line files, 1:100,000, 1990

Modified from Plume and Carlton, 1988 and Harrill, 1986

N

SCALE 1:1,000,000

0 5 10 15 MILES

0 5 10 15 KILOMETERS

Plume, R.W., and Carlton, S.M., 1988, Hydrogeology of the Great Basin region of Nevada, Utah, and adjacent States: U.S. Geological Survey Hydrologic Investigations Atlas HA–694–A.

Harrill, J.R., 1986, Ground-water storage depletion in Pahrump Valley, Nevada–California, 1962–75: U.S. Geological Survey Water-Supply Paper 2279, 53 p.

SOURCE: Ground Water Atlas of the US_HA 730-B_Figure 36_ Pahrump Valley geology_http://pubs.usgs.gov/ha/ha730/ch_b/basin_range4.html

POWER PLANT EFFICIENCY

Testimony of Shahab Khoshmashrab

SUMMARY OF CONCLUSIONS

The project would decrease reliance on fossil fuel, and would increase reliance on renewable energy resources. It would not create significant adverse effects on fossil fuel energy supplies or resources, would not require additional sources of energy supply, and would not consume fossil fuel energy in a wasteful of inefficient manner. No efficiency standards apply to this project. Staff therefore concludes that this project would present no significant adverse impacts on fossil fuel energy resources.

HHSEGS would occupy approximately 6.2 acres per MW of power output, a figure higher than that of some other solar power technologies.

INTRODUCTION

HHSEGS would generate 500 megawatts (MW) (nominal net output) of electricity. HHSEGS would be a solar thermal power plant in Inyo County, California. It would use solar energy to generate most of its electrical capacity. The project would use proprietary solar thermal power tower technology[1] to produce electrical power using steam turbine generators fed from solar steam generators.

The land that would be occupied by this project for power generation and power plant operation would be approximately 3,097 acres. Fossil fuel, in the form of natural gas, would be used to reduce startup time, to maintain system temperatures overnight, and for limited power augmentation when solar energy diminishes or during transient cloudy conditions.

METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

Fossil fuel use efficiency

One of the responsibilities of the California Energy Commission (Energy Commission) is to make findings on whether the energy use by a power plant, including the proposed HHSEGS project, would result in significant adverse impacts on the environment, as defined in the California Environmental Quality Act (CEQA). If the Energy Commission finds that HHSEGS's energy consumption creates a significant adverse impact, it must further determine if feasible mitigation measures could eliminate or minimize that impact. In this analysis, staff addresses the inefficient and unnecessary consumption of energy.

[1] http://www.brightsourceenergy.com/technology

In order to develop the Energy Commission's findings and conclusions, this analysis examines:

- whether the facility would likely present any adverse impacts upon energy resources; and if so,
- whether these adverse impacts are significant; and if so,
- whether feasible mitigation measures or alternatives could eliminate those adverse impacts or reduce them to a level of insignificance.

Solar land use efficiency

Solar thermal power plants typically consume much less fossil fuel (usually in the form of natural gas) than other types of nonrenewable thermal power plants. Therefore, common measures of power plant efficiency such as those described above are less meaningful. Solar power plants do occupy vast tracts of land, so, the focus for these types of facilities shifts from fuel efficiency to land use efficiency. To analyze the land use efficiency of a solar facility staff utilizes the following approach.

Solar thermal power plants convert the sun's energy into electricity in three basic steps:

- Mirrors and/or collectors capture the sun's rays.
- This solar energy is converted into heat.
- This heat is converted into electricity, typically in a heat engine such as a steam turbine generator or a Stirling Engine-powered generator.

The effectiveness of each of these steps depends on the specific technology employed; the product of these three steps determines the power plant's overall solar efficiency. The greater the project's solar efficiency, the less land the plant must occupy to produce a given power output.

The most significant environmental impacts caused by solar power plants result from occupying large expanses of land. The extent of these impacts is likely in direct proportion to the number of acres affected. For this reason, staff evaluates the land use efficiency of proposed solar power plant projects. This efficiency is expressed in terms of power produced, or MW per acre, and in terms of energy produced, or MW-hours (MWh) per acre-year. Specifically:

- Power-based solar land use efficiency is calculated by dividing the maximum net power output in MW by the total number of acres impacted by the power plant, not including offsite facilities (i.e.; offsite pipelines, roads, transmission lines and substations).
- Energy-based solar land use efficiency is calculated by dividing the annual net electrical energy production in MWh per year by the total number of acres impacted by the power plant. Since different solar technologies consume differing quantities of natural gas for morning warm-up, cloudy weather output leveling, and maintaining system temperatures overnight (and some consume no gas at all), the effect of the quantities of natural gas consumed by each power plant is accounted for in this calculation. Specifically, gas consumption is backed out by reducing the plant's net

energy output by the amount of energy that could have been produced by consuming the project's annual gas consumption in a modern combined cycle power plant. (See **Efficiency Appendix A**). This reduced energy output is then divided by acres impacted.

PROPOSED PROJECT

SETTING AND EXISTING CONDITIONS

The applicant proposes to build and operate HHSEGS, a solar thermal power plant producing a total of 500 MW (nominal net output). The project would consist of two solar fields (Solar Plant 1 and Solar Plant 2) using concentrating solar thermal tower technology, and would be located in Inyo County, California. Each solar field would consist of a large circular field of mirrors (called "heliostats") that reflect the sun's energy onto a central receiver tower to produce electrical power using a steam turbine generator fed from solar steam generators. The land that would be occupied by this project would be approximately 3,097 acres. Each solar field would consist of arrays of approximately 85,000 heliostats, one solar receiver steam generator (SRSG), one steam turbine generator, one auxiliary boiler, one nighttime preservation boiler and an air-cooled condenser (HHSG 2011a, AFC §§ 1.1, 2.1, 2.2.5; CH2 2012p, Boiler Optimization Plan, p. 101).

The project's power cycle would be based on a steam cycle (also known as the Rankine cycle) (HHSG 2011a, AFC §§ 2.1, 2.2.1). Solar energy is reflected by the heliostats onto the SRSG where the energy heats water into superheated steam. The steam is then routed via the main steam pipe to the steam turbine generator where the steam's energy is converted to electrical energy by the expansion of steam through the turbine.

Each solar plant would utilize two natural gas-fired boilers; one for overnight preservation (to maintain system temperatures overnight); and one to reduce startup time and to augment power production when solar energy diminishes or during transient cloudy conditions. On an annual basis, heat from natural gas would be limited by fuel use and other conditions to roughly 5 percent of the heat from the sun (HHSG 2011a, AFC Appendix Table 5.1B-13R, Amended April 2012).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

CEQA Guidelines state that the environmental analysis "…shall describe feasible measures which could minimize significant adverse impacts, including where relevant, inefficient and unnecessary consumption of energy" (Cal. Code Regs., tit. 14, § 15126.4(a)(1)). Appendix F of the Guidelines further suggests consideration of such factors as the project's energy requirements and energy use efficiency; its effects on local and regional energy supplies and energy resources; its requirements for additional energy supply capacity; its compliance with existing energy standards; and any alternatives that could reduce wasteful, inefficient and unnecessary consumption of energy (Cal. Code Regs., tit. 14, § 15000 et seq., Appendix F).

The inefficient and unnecessary consumption of energy, in the form of non-renewable fuels such as natural gas and oil, constitutes an adverse environmental impact. An adverse impact can be considered significant if it results in:

- adverse effects on local and regional energy supplies and energy resources;
- a requirement for additional energy supply capacity;
- noncompliance with existing energy standards; or
- the wasteful, inefficient and unnecessary consumption of fuel or energy.

Project Energy Requirements and Energy Use Efficiency

HHSEGS would consume some fossil fuel for power generation. It would consume fossil fuel to reduce startup time, for overnight preservation, and to augment power production when solar energy diminishes or during transient cloudy conditions.

The annual natural gas consumption would be limited to approximately 746,400 million British thermal units (MMBtu) (AFC § 5.1, Amended April 2012, Table 5.1-13R); equal to roughly 5 percent of the heat input from the sun. Thus, most of the project's produced electricity would come from the sun (a renewable source of energy). Compared to a typical fossil fuel-fired power plant of equal capacity (500 MW net), and compared to the relatively considerable resources of fossil fuel in California (see below in **Adverse Effects on Energy Supplies and Resources**), this rate of natural gas consumption is not significant. Natural gas is a relatively efficient form of fossil fuel.

The project's steam cycle efficiency, based on the solar heat input alone which would be the bulk of the project's energy input on an annual basis, is expected to be approximately 44 percent (HHSG 2011a, AFC Figure 2.2-3, enthalpy across the heat exchanger versus net electrical output). This efficiency figure compares favorably with a conventional boiler.

Therefore, staff considers the impact of the project's fuel consumption on energy supplies and energy efficiency to be less than significant.

Adverse Effects on Energy Supplies and Resources

The applicant has described its source of natural gas for the project. A 12-inch-diamter natural gas supply pipeline for HHSEGS would connect to an existing Kern River Gas Transmission (KRGT) pipeline approximately 32.4 miles southeast of the project site. A tap station on the main KRGT transmission pipeline would be installed at that interconnection point just north of Goodsprings in Clark County, Nevada. (CH2 2012ee) A gas metering station would be required at the interconnection point to measure and record gas volumes from the KRGT metering station (HHSG 2011a, AFC §§ 2.1, 2.2.3). KRGT's natural gas supply system draws from extensive supplies originating in the Rocky Mountains. It draws from the oil and gas producing fields of southwestern Wyoming through Utah and Nevada to the San Joaquin Valley near Bakersfield, California, and is capable of delivering the required amount of natural gas for this

project. Staff believes that there would be adequate natural gas supply and pipeline capacity to meet the project's needs (2012 California Gas Report[2]).

Additional Energy Supply Requirements

Because KRGT's natural gas supply system is extensive and readily available as explained above (in **Adverse Effects on Energy Supplies and Resources**), staff believes there would be no likelihood that HHSEGS would require the development of additional energy supply capacity (see above in **Adverse Effects on Energy Supplies and Resources**).

Compliance with Energy Standards

No standards apply to the efficiency of HHSEGS or other non-cogeneration projects.

Alternatives to Reduce Wasteful, Inefficient, and Unnecessary Energy Consumption

Staff typically evaluates project alternatives to determine if alternatives exist that could reduce the project's fuel use. The evaluation of alternatives to the project (that could reduce wasteful, inefficient, or unnecessary energy consumption) requires the examination of the project's energy consumption.

Efficiency of Alternatives to the Project

Please see the project alternatives discussed below and the alternative technologies discussions in the **Alternatives** section of this FSA for further information.

Alternative Generating Technologies

Alternative generating technologies for HHSEGS are considered in the AFC (HHSG 2011a, AFC § 6.7). For purposes of this analysis, natural gas, oil, coal, nuclear, geothermal, biomass, hydroelectric, wind, solar photovoltaic (PV), and parabolic trough solar thermal technologies were all considered. Because HHSEGS's consumption of fossil fuel for power production and other uses would be limited to roughly 5 percent of the total energy input from the sun, staff believes that the HHSEGS project would not constitute a significant adverse impact on fossil fuel energy resources compared to feasible alternatives.

The solar insolation falling on the earth's surface can be regarded as an energy resource. Since this energy is inexhaustible, its consumption does not present the concerns inherent in fossil fuel consumption. What is of concern, however, is the extent of land area required to capture this solar energy and convert it to electricity. Setting aside many acres of land for solar power generation removes it from alternative power generation uses. Specifically, from a power plant efficiency viewpoint, the concern is related to the quantities of land that would be unavailable, at least for the life of a project, to be utilized for alternative generating technologies. Thus, in comparing a solar plant's technology to alternative technologies, staff considers the land area that would

[2] http://www.socalgas.com/regulatory/documents/cgr/2012%20CGR_Final.pdf

be unavailable, and not only the land that would be graded and leveled. For example, for a solar power plant, whether or not the space between two rows of mirrors/panels would be leveled and/or graded, that area of land would not be available (at least for the operating life of the project) for the utilization of alternative power generation technologies.

For the purpose of comparing a project to alternative generating technologies, staff focuses more on land use efficiency rather than energy-based efficiency because land use efficiency is less subject to variations, and thus, more suitable for comparison. Energy-based efficiency can vary, sometimes significantly, throughout the life of the project depending on factors such as the need for dispatchability.

Thus, staff's comparison of the power plant efficiency of HHSEGS to other technologies focuses on land use efficiency rather than some other metric.

To assess HHSEGS's land use efficiency staff compares the land use efficiency of the solar projects licensed by, or currently before, the Energy Commission, to HHSEGS. This comparison helps determine a range of viable land-use efficiencies and where HHSEGS falls within that range.

At the time of this FSA's publication, there are 11 solar power plant projects that are either going through the Energy Commission siting process, or have been previously licensed by the Energy Commission for construction and operation[3]. These projects' power and energy output, and the extent of the land occupied by each, are summarized in **Efficiency Table 1**, below. The solar land use efficiency for a typical natural gas-fired combined cycle power plant is shown only for comparison.

HHSEGS would produce power at the rate of 500 MW net, and would generate energy at the rate of 1,432,000 MWh per year, while occupying 3,097 acres (HHSG 2011a, AFC §§ 1.1, 1.2.1, Appendix Table 5.1B-13R). Accordingly, staff calculates power-based and energy-based land use efficiencies thus:

Power-based efficiency: 500 MW ÷ 3,097 acres = **0.16 MW/acre** or **6.2 acres/MW**

Energy-based efficiency: 1,432,000 MWh/year ÷ 3,097 acres = **463 MWh/acre-year**

As seen in **Efficiency Table 1**, HHSEGS, employing the power tower technology would be less efficient in the use of land than the Beacon Solar Energy Project, which as licensed would have used the linear parabolic trough technology. HHSEGS would be slightly more efficient than Genesis Solar Energy Project, which also uses the linear parabolic trough technology. Also, HHSEGS would be more efficient in the use of land than the Ivanpah SEGS project -- which employs the same proprietary technology as HHSEGS -- and the Calico Solar and Imperial Valley Solar projects, which as licensed would have employed the Stirling Engine technology. Based on information regarding several solar PV (photovoltaic) projects, the expected average occupied land per MW of

[3] http://www.energy.ca.gov/siting/solar/index.html

output is approximately 7.0 acres/MW (see the **Alternatives** section of this FSA for the source of this figure). Compared to 6.2 acres/MW for HHSEGS, PV is less land-use efficient.

On an energy-based efficiency basis, HHSEGS would generate 463 MWh/acre-year; this compares favorably to all other solar projects listed in **Efficiency Table 1** (2nd column from the left).

Alternatives to Reduce Solar Land Use Impacts

Building and operating a natural gas-fired combined cycle power plant would yield much greater land use efficiency than any solar power plant; see **Efficiency Table 1**. However, this would not achieve the basic project objective, to generate electricity from the renewable energy of the sun and would not further the state's renewable energy development goals

Efficiency Table 1 — Solar Land Use Efficiency

Project	Generating Capacity (MW net)	Footprint (Acres)	Annual Energy Production (MWh net)	Annual Fuel Consumption (MMBtu LHV)	Land Use Efficiency (Power-Based) (MW/acre)	Land Use Efficiency (Energy – Based) (MWh/acre-year)	
						Total	Solar Only[1]
HHSEGS (11-AFC-2)	**500**	**3,096**	**1,432,000**	**746,400**	**0.16**	**463**	**424**
Rio Mesa (11-AFC-4)	500	3,805	1,424,600	746,355	0.13	**374**	**343**
Genesis Solar (09-AFC-8)	250	1,800	600,000	60,000	0.14	333	329
Ridgecrest Solar (09-AFC-8)	250	1,440	500,000	44,818	0.17	347	343
Beacon Solar (08-AFC-2)	250	1,321	600,000	36,000	0.19	454	450
Ivanpah SEGS (07-AFC-5)	400	3,744	960,000	432,432	0.11	256	238
Calico Solar (08-AFC-13)	850	8,200	1,840,000	0	0.11	224	224
Imperial Valley Solar (08-AFC-5)	750	6,500	1,620,000	0	0.12	249	249
Solar Millenium (Blythe) (09-AFC-6)	1000	5,950	2,100,000	172,272	0.17	353	349
Solar Millenium (Palen) (09-AFC-7)	500	2970	1,000,000	89,636	0.17	337	332

Abengoa Solar (09-AFC-5C)	250	1684	630,000	94,280	0.15	374	366
Rice Solar (09-AFC-10)	150	1,410	450,000	0	0.11	319	319
Avenal Energy (08-AFC-1)[2]	600	25	3,023,388	24,792,786	24.0	120,936	N/A

[1] Net energy output is reduced by natural gas-fired combined cycle proxy energy output; see **Efficiency Appendix A**.

[2] Example natural gas-fired combined cycle plan

In summary, building a solar thermal power plant employing a different technology than the power tower technology would not considerably improve land use efficiency. Thus, staff believes the technology selected for HHSEGS is reasonable.

Alternative Heat Rejection System

The applicant proposes to employ a dry cooling system (air-cooled condensers) as the means for rejecting power cycle heat from the steam turbines (HHSG 2011a, AFC §§ 2.5.1, 2.5.5.2). An alternative heat rejection system would utilize evaporative cooling towers.

The local climate in the project area is characterized by high temperatures and low relative humidity (low wet-bulb temperature). In low temperatures and high relative humidity (low dry-bulb temperature), the air-cooled condenser performs relatively efficiently compared to the evaporative tower. However, at the project area (low wet-bulb temperature and high dry-bulb temperature) the air-cooled condenser performance is relatively poor compared to that of an evaporative cooling tower. Furthermore, the performance of the heat rejection system affects the performance of the steam turbine, impacting turbine efficiency. However, to conserve water in the project site's desert environment, the applicant proposes to employ dry cooling. Even though evaporative cooling could offer greater efficiency, staff believes the applicant's selection of dry cooling is a reasonable tradeoff, as it would prevent potentially greater significant environmental impacts that could result from the consumption of larger quantities of water that would be required for wet cooling.

CUMULATIVE IMPACT ANALYSIS

There are no nearby power plant projects or other projects consuming large amounts of fossil fuel that hold the potential for cumulative energy consumption impacts when aggregated with the project, because the amount of fuel to be consumed by HHSEGS would be insignificant compared to the considerable resources of fossil fuel, including natural gas, in California.

Staff believes that the construction and operation of the project would not create indirect impacts (in the form of additional fuel consumption) that would not have otherwise occurred without this project. Because HHSEGS would consume significantly less fossil fuel than a typical fossil fuel-fired power plant, it should compete favorably in the California power market and replace older fossil fuel burning power plants. The project would therefore cause a positive impact on the cumulative amount of fossil fuel consumed for power generation.

COMPLIANCE WITH LORS

No federal, state, or local/county laws, ordinances, regulations, and standards (LORS) apply to the efficiency of this project.

NOTEWORTHY PUBLIC BENEFITS

HHSEGS would employ an advanced solar thermal technology. Solar energy is renewable and unlimited. The project would have a less than significant adverse impact on nonrenewable energy resources. Consequently, the project would help in reducing California's dependence on fossil fuel-fired power plants.

PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

No conditions of certification are proposed.

FINDINGS

1. HHSEGS would provide approximately 500 MW (net output) of electrical power, using solar energy to generate most of its capacity and using natural gas auxiliary boilers to maintain steam seals and other system temperatures, reduce startup time, and provide limited power augmentation.

2. HHSEGS is likely to experience an average steam cycle efficiency of 44 percent, which is favorable when compared to the 35 to 40 percent steam efficiency for modern steam turbines.

3. The project would burn natural gas at a nominal rate of approximately 746,400 MMBtus per year. Compared to the project's expected overall production rate and compared to a typical fossil fuel-fired power plant of equal capacity, the amount of fossil fuel consumption is less than significant.

4. The impact of the project's fuel consumption on energy supplies and energy efficiency is less than significant.

5. HHSEGS would not require the development of new fuel supply resources.

6. None of the alternative generating technologies is superior to the proposed project at meeting the project objective of using a renewable source of energy in an efficient and reliable manner.

7. The project would decrease reliance on fossil fuel and would increase reliance on renewable energy resources. Consequently, the project would help in reducing California's dependence on fossil fuel-fired power plants.

8. The project would occupy approximately 6.2 acres per MW of power output, a figure higher than some other solar power technologies. On an energy-based efficiency basis, HHSEGS would generate 463 MWh/acre-year; this compares favorably to all other solar projects listed in **Efficiency Table 1** (2nd column from the left).

9. No nearby power plant projects or other projects consuming large amounts of fossil fuel hold the potential for cumulative energy consumption impacts when aggregated with the project.

10. No Federal, State, or local laws, ordinances, regulations, or standards apply to the efficiency of this project.

CONCLUSIONS

Compared to the project's expected overall production rate of approximately 1,432,000 MWh net on an average annual basis, and compared to a typical fossil fuel-fired power plant of equal capacity, the amount of the annual power production from fossil fuel is not significant; HHSEGS would use solar energy to generate most of its electricity.

The project would decrease reliance on fossil fuel, and would increase reliance on renewable energy resources. It would not create significant adverse effects on energy supplies or resources, would not require additional sources of energy supply, and would not consume energy in a wasteful or inefficient manner. No energy standards apply to this project.

No cumulative impacts on energy resources are likely.

HHSEGS would occupy approximately 6.2 acres per MW of power output, a figure less than that of some other solar power technologies. Building a solar power plant employing the power tower technology is reasonable in order to meet the project objective of generating electricity using a renewable source of energy.

Staff therefore concludes that this project would present no significant adverse impacts on energy resources.

REFERENCES

CH2 2012p – CH2MHill/J. Carrier (tn: 64558) Supplemental Data Response, Set 2, Boiler Optimization Plan and Design Change. 04/02/2012

CH2 2012ee– CH2MHill/J. Carrier (tn: 66319) Applicant's PSA Comments, Set 2. 7/23/2012

HHSG 2011a – BrightSource Energy/J. Woolard (tn: 61756) Application for Certification, Volume 1 & 2. 08/5/2011

Efficiency Appendix A
Solar Power Plant Efficiency Calculation
Gas-Fired Proxy

In calculating the efficiency of a solar power plant, it is desired to subtract the effect of natural gas burned for morning startup, cloudy weather augmentation and nighttime preservation. As a proxy, staff has used an average efficiency based on several baseload combined cycle power plant projects that have gone through the Energy Commission's siting process. Baseload combined cycles were chosen because their intended dispatch most nearly mirrors the intended dispatch of solar plants, that is, operate at full load in a position high on the dispatch authority's loading order.

The most recent such projects are:

Colusa Generating Station (06-AFC-9)
- Nominal 660 MW 2-on-1 Combined Cycle with GE Frame 7FA CGTs
- Air cooled condenser, evaporative inlet air cooling
- Efficiency with duct burners on: 666.3 MW @ 52.5% LHV
- Efficiency with duct burners off: 519.4 MW @ 55.3% LHV
- Efficiency (average of these two): **53.9% LHV**

San Gabriel Generating Station (07-AFC-2)
- Nominal 696 MW 2-on-1 Combined Cycle with Siemens 5000F CGTs
- Air cooled condenser, evaporative inlet air cooling
- Efficiency with duct burners on: 695.8 MW @ 52.1% LHV
- Efficiency with duct burners off: 556.9 MW @ 55.1% LHV
- Efficiency (average of these two): **53.6% LHV**

KRCD Community Power Plant (07-AFC-7)
- Nominal 565 MW 2-on-1 Combined Cycle with GE or Siemens F-class CGTs
- Evaporative cooling, evaporative or fogging inlet air cooling
- Efficiency with GE CGTs: 497 MW @ 54.6% LHV
- Efficiency with Siemens CGTs: 565 MW @ 56.1% LHV
- Efficiency (average of these two): **55.4% LHV**

Avenal Energy (08-AFC-1)
- Nominal 600 MW 2-on-1 Combined Cycle with GE Frame 7FA CGTs
- Air cooled condenser, inlet air chillers
- Efficiency with duct burners on: 600.0 MW @ 50.5% LHV
- Efficiency with duct burners off: 506.5 MW @ 53.4% LHV
- Efficiency (average of these two): **52.0% LHV**

Average of these four power plants: **53.7% LHV**

The annual fuel consumption in MMBtu/year, converted to MWh/year at 53.7% energy conversion efficiency, and then, subtracted from the total MWh/year (solar + fuel), results

in the total MWh/year from only the solar energy input. This number is then divided by the number of acres, which results in the energy-based efficiency (last column in **Efficiency Table 1**).

EFFICIENCY

List of Comment Letters

		Efficiency Comments?
1	Inyo County	
2	Bureau of Land Management	
3	National Park Service	
4	The Nature Conservancy	
5	Amargosa Conservancy	
6	Basin & Range Watch	
7	Pahrump Paiute Tribe	
8	Richard Arnold, Pahrump Piahute Tribe	
9	Big Pine Tribe of Owens Valley	
10	Intervenor Cindy MacDonald	
11	Intervener Center for Biological Diversity	
12	Intervener, Old Spanish Trail Association	
13	Applicant, BrightSource Energy, Inc.	**X**

Comment #	DATE	COMMENT TOPIC	RESPONSE
13	**July 23, 2012**	**Applicant, BrightSource Energy**	
13.2		References to HHSEGS occupying 6.5 acres/MW.	Staff has revised this figure to account for subtraction of 180 acres of temporary laydown area from the total project footprint; the new figure for HHSEGS is 6.2 acres/MW. Also please see responses to Applicant Comments 13.50 and 13.62.
13.3		Additional explanation to further describe "the effect" in subsection entitled "Solar Land Use Efficiency", 2nd set of bullets, 2nd bullet.	This phrase is described in the PSA in the sentence immediately following the sentence containing this phrase. However, to further describe this, staff has revised this paragraph in the **FSA**. Also see the text at the end of **Efficiency Appendix A**.

13.4		Add, to the last sentence under "Adverse Effects on Energy Supplies and Resources", a citation to CEC Natural Gas Assessment.	Staff has included the correct citation in the **FSA**.
13.5		Add to the statement in "Additional Energy Supply Requirements", a citation to CEC Natural Gas Assessment.	Staff does not believe it is necessary to repeat the citation. The current sentence refers the reader to the sub-section under "Adverse Effects on Energy Supplies and Resources", where the citation is included.
13.6		in subsection "Alternative Generating Technologies" additional metrics need to be taken into account. PV may destroy all habitant, while concentrating solar power may preserve some habitat value.	Please see the response to Comment 13.7. This paragraph has been updated to further explain the reasoning behind the staff's method of analysis for alternative technologies as related to power plant efficiency. From a power plant efficiency viewpoint, the concern is related to the quantities of land that would be unavailable for the life of the project. Such a land area, whether disturbed or not, would not be available, at least for the life of the project, for the utilization of alternative generation technologies.

13.7		Why is land use efficiency the only metric being focused on? What about other metrics like energy-based efficiency, water use, or graded and leveled land area?	From a power plant efficiency viewpoint, the concern is related to the quantities of land that would be unavailable, at least for the life of a project, to be utilized for alternative generating technologies, because setting aside the land area for solar power generation removes it from alternative power generation uses. Thus, in comparing a project's technology to alternative technologies, staff considers the land area that would be unavailable for the life of the project, and not only the land that would be graded and/or leveled. For example, for a solar power plant, whether or not the space between two rows of mirrors/panels would be leveled and/or graded, that area of land would not be available (at least for the operating life of the project) for alternative power generation technologies. Staff has compared this project with other projects using the energy-based efficiency (in terms of MWh/year) (see **Efficiency Table 1** and the text). However the focus remains on land use efficiency, because it's less subject to variations and thus more suitable for comparison. Energy-based efficiency can vary, sometimes significantly, throughout the life of the project depending on factors such the need for dispatchability. Staff has recognized the benefits of this project in regards to water use in subsection "Alternative Heat Rejection System", but does not believe water use should be the focus of the power plant efficiency analysis.
13.8		Add a column to Efficiency Table 1 for acres/MW to coincide with comparison described in text.	Staff does not believe this is necessary, as the column showing the efficiency figures in terms of numerical ratios is self-explanatory in displaying the degree of the efficiency of HHSEGS as compared to the other projects.
13.9		revise values in Efficiency Table 1 to reflect the project being downsized to 500 MW.	Staff has done this.

13.10		In "Alternative Heat Rejection System", the comparison of tradeoff would be more meaningful if it were quantified.	Staff's goal from writing this sentence is simply to acknowledge that there is a tradeoff; staff does not believe the tradeoff needs to be quantified in this section. Furthermore, in order to precisely quantify the loss in efficiency, an engineering evaluation for this project would need to be undertaken, which staff believes is unnecessary. Also, the values for efficiency losses and reduction in water consumption are two different metrics and quantifying them for the purpose of making comparison is not very meaningful.
13.11		Conclusions, 4th paragraph, 1st sentence: correct "incude" to include".	There is no such a typo.

POWER PLANT RELIABILITY

Testimony of Shahab Khoshmashrab

SUMMARY OF CONCLUSIONS

The applicant predicts an equivalent availability factor of 92- 98%[1]. Staff believes this is achievable. Based on a review of the Application for Certification (AFC), staff concludes that the Hidden Hills Solar Electric Generating System (HHSEGS) would be built and operated in a manner consistent with industry norms for reliable operation. This should provide an adequate level of reliability. No conditions of certification are proposed.

INTRODUCTION

In this analysis, California Energy Commission (Energy Commission) staff addresses the reliability issues of the project to determine if the power plant is likely to be built in accordance with typical industry norms for reliability of power generation. Staff uses this level of reliability as a benchmark because it ensures that the resulting project would likely not degrade the overall reliability of the electric system it serves (see "Setting" below).

The scope of this power plant reliability analysis covers:

- equipment availability;
- plant maintainability;
- fuel and water availability; and
- power plant reliability in relation to natural hazards.

Staff examined the project design criteria to determine if the project is likely to be built in accordance with typical industry norms for reliability of power generation. While the applicant has predicted an equivalent availability factor of 92-98% for HHSEGS (see below), staff uses typical industry norms as a benchmark, rather than the applicant's projection, to evaluate the project's reliability.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

No federal, state, or local/county laws, ordinances, regulations, and standards (LORS) apply to the reliability of this project.

SETTING

In the restructured competitive electric power industry, the responsibility for maintaining system reliability falls largely to the state's control area operators, such as the California

[1] The plant would be available 92-98% of the time when the source of energy (the sunlight) is available, which is when the plant is expected to be available to come online. This availability factor mainly reflects maintenance and unplanned outages, and is a reflection of the maturity and capability of the technology.

Independent System Operator (California ISO), that purchase, dispatch, and sell electric power throughout the state. Determining how the California ISO and other control area operators would ensure system reliability has been an ongoing effort. Protocols that allow sufficient reliability to be maintained under the competitive market system have been developed and put in place. “Must-run” power purchase agreements and “participating generator” agreements are two mechanisms that have been employed to ensure an adequate supply of reliable power.

In September 2005, California AB 380 (Núñez, Chapter 367, Statutes of 2005) became law. This modification to the Public Utilities Code requires the California Public Utilities Commission to consult with the California ISO to establish resource adequacy requirements for all load-serving entities (basically, publicly and privately owned utility companies). These requirements include maintaining a minimum reserve margin (extra generating capacity to serve in times of equipment failure or unexpected demand) and maintaining sufficient local generating resources to satisfy the load-serving entity’s peak demand and operating reserve requirements.

In order to fulfill this mandate, the California ISO has begun to establish specific criteria for each load-serving entity under its jurisdiction. These criteria guide each load-serving entity in deciding how much generating capacity and ancillary services to build or purchase, after which the load-serving entity issues power purchase agreements to satisfy these needs. According to the applicant, the HHSEGS has signed a power purchase agreement with Pacific Gas & Electric Company.

The California ISO’s mechanisms to ensure adequate power plant reliability apparently were devised under the assumption that the individual power plants that compete to sell power into the system will each exhibit a level of reliability similar to that of power plants of past decades. However, there has been valid cause to believe that, under free market competition, financial pressures on power plant owners to minimize capital outlays and maintenance expenditures may act to reduce the reliability of many power plants, both existing and newly constructed (McGraw-Hill 1994). It is possible that, if significant numbers of power plants were to exhibit individual reliability sufficiently lower than this historical level, the assumptions used by California ISO to ensure system reliability would prove invalid, with potentially disappointing results. Accordingly, staff has recommended that power plant owners continue to build and operate their projects to the level of reliability to which all in the industry are accustomed.

As part of its plan to provide needed reliability, the applicant proposes to operate the 500-megawatt (MW) (net power output) HHSEGS, a solar thermal power plant facility employing an advanced solar power technology. This project, using mostly renewable solar energy[2], would provide dependable power to support the grid. This project would help serve the need for renewable energy in California, as most of its generated electricity would be produced by a reliable source of energy that is available during the hot summer afternoons, when power is needed most.

[2] Auxiliary boilers will supplement power generation when solar insolation drops below the level required to keep the turbines online.

ASSESSMENT OF IMPACTS

METHOD FOR DETERMINING RELIABILITY

The Energy Commission must make findings as to the manner in which the project is to be designed, sited, and operated to ensure safe and reliable operation (Title 20, CCR §1752[c]). Staff takes the approach that a project is acceptable if it does not degrade the reliability of the utility system to which it is connected. This is likely the case if the project exhibits reliability at least equal to that of other power plants on that system.

The availability factor for a power plant is the percentage of the time that it is available to generate power; both planned and unplanned outages subtract from its availability. Measures of power plant reliability are based on the plant's actual ability to generate power when it is considered available and are based on starting failures and unplanned, or forced, outages. For practical purposes, reliability can be considered a combination of these two industry measures, making a reliable power plant one that is available when called upon to operate.

Power plant systems must be able to operate for extended periods without shutting down for maintenance or repairs. Achieving this reliability is accomplished by ensuring adequate levels of equipment availability, plant maintainability with scheduled maintenance outages, fuel and water availability, and resistance to natural hazards. Staff examines these factors for the project and compares them to industry norms. If they compare favorably, staff can conclude that HHSEGS would be as reliable as other power plants on the electric system and will therefore not degrade system reliability (see below for analysis).

EQUIPMENT AVAILABILITY

Equipment availability would be ensured by use of appropriate quality assurance/quality control (QA/QC) programs during design, procurement, construction and operation of the plant and by providing for adequate maintenance and repair of the equipment and systems (discussed below).

Quality Control Program

The applicant describes a QA/QC program (HHSG 2011a, AFC § 2.3.2.5) typical of the power industry. Equipment would be purchased from qualified suppliers based on technical and commercial evaluations. The project owner would perform receipt inspections, test components, and administer independent testing contracts. Staff expects implementation of this program to yield typical reliability of design and construction. To ensure such implementation, staff has proposed appropriate conditions of certification under the portion of this document entitled **Facility Design**.

PLANT MAINTAINABILITY

Equipment Redundancy

A generating facility called on to operate in base-load service for long periods of time must be capable of being maintained while operating. A typical approach for achieving

this is to provide redundant examples of those pieces of equipment most likely to require service or repair.

The applicant plans to provide appropriate redundancy of function for the project (HHSG 2011a, AFC § 2.3.2.2). The project, as proposed in the AFC, would be able to operate when the sun is shining. Maintenance or repairs could be done when the plant is shut down at night. This would help to enhance the project's reliability. The nature of solar thermal generating technology also provides inherent redundancy; the series arrangement of solar collector assemblies would allow for reduced output generation if one (or possible several) rows of solar collectors were to require service or repair. This redundancy would allow service or repair to be done during sunny days when the plant is in operation, if required.

Furthermore, all plant ancillary systems are designed with adequate redundancy to ensure continued operation in the face of equipment failure. Balance of plant equipment would be provided with redundancy; examples include spare circulating pumps, feed water pumps and condensate pumps (HHSG 2011a, AFC § 2.3.2.2).
Staff believes that equipment redundancy would be sufficient for a project such as this.

Maintenance Program

The applicant proposes to establish a preventive plant maintenance program typical of the industry (HHSG 2011a, AFC § 2.3.2.5). Equipment manufacturers provide maintenance recommendations with their products; the applicant would base its maintenance program on these recommendations. The program will encompass preventive and predictive maintenance techniques. Maintenance outages would be planned for periods of low electricity demand. In light of these plans, staff expects that the project would be adequately maintained to ensure acceptable reliability.

FUEL AND WATER AVAILABILITY

For any power plant, the long-term availability of fuel and of water for cooling or process use is necessary to ensure reliability. The need for reliable sources of fuel and water is obvious; lacking long-term availability of either source, the service life of the plant may be curtailed, threatening the supply of power as well as the economic viability of the plant.

Fuel Availability

Natural gas would be used in natural gas boilers for startup, overnight freeze protection, and supplementary power production[3]. A 12-inch diameter natural gas supply pipeline for HHSEGS would connect to a Kern River Gas Transmission (KRGT) pipeline approximately 32.4 miles southeast of the project site. A tap station on the main KRGT transmission pipeline would be installed at that interconnection point just north of Goodsprings in Clark County, Nevada. A gas metering station would be required at the interconnection point to measure and record gas volumes from the KRGT metering station (HHSG 2011a, AFC §§ 2.1, 2.2.3, CH2 2012ee, p.1). KRGT's natural gas supply

[3] On an annual basis, heat input from natural gas would be limited by fuel use and other conditions to less than 10% of the heat input from the sun.

system draws from extensive supplies originating in the Rocky Mountains. It draws from the oil and gas producing fields of southwestern Wyoming through Utah and Nevada to the San Joaquin Valley near Bakersfield, California, and is capable of delivering the required amount of gas for this project. Staff agrees with the applicant's prediction that there would be adequate natural gas supply and pipeline capacity to meet the project's needs.

Water Supply Reliability

The project would use groundwater for plant service needs, steam boiler makeup, heliostat washing, and fire protection. Groundwater would be drawn daily from six onsite groundwater supply wells; two new wells per power block (primary and backup) and two wells at the administration complex. The entire 500-MW net project would require up to 84.5 gallons per minute (gpm) (average) raw water make-up, with 30 to 50 gpm required by each plant, and 3.5 gpm (average) required for potable water use. Turbine cooling would be provided by air-cooled condensers, supplemented by a partial dry-cooling system for auxiliary equipment cooling (HHSG 2011a, AFC §§ 2.3.2.4, 5.15, 2.2.5). The applicant intends to drill a temporary well to be used during construction only, primarily for the onsite concrete batch plant used to serve project construction needs. Staff believes these sources yield sufficient likelihood of a reliable supply of water. (For further discussion of water supply, see the **Water Supply** section of this document.)

POWER PLANT RELIABILITY IN RELATION TO NATURAL HAZARDS

Natural forces can threaten the reliable operation of a power plant. High winds, tsunamis (tidal waves), seiches (waves in inland bodies of water), and flooding would not likely represent a hazard for this project, but seismic shaking (earthquake) may present a credible threat to reliable operation.

Seismic Shaking

The project site lies within Inyo County in the eastern part of California. These areas are considered to exhibit low seismic activity (HHSG 2011a, AFC § 5.4.3.3); see the "Faulting and Seismicity" portion of the **Geology and Paleontology** section of this document. The project would be designed and constructed to the latest applicable LORS (HHSG 2011a, AFC Appendices 2A and 2B). Compliance with current seismic design LORS represents an upgrading of performance during seismic shaking compared to older facilities since these LORS have been continually upgraded. Because it would be built to the latest seismic design LORS, this project would likely perform at least as well as, and perhaps better than, existing plants in the electric power system. Staff has proposed conditions of certification to ensure this; see the section of this document entitled **Facility Design**. In light of the general historical performance of California power plants and the electrical system in seismic events, staff has no special concerns with the power plant's functional reliability during earthquakes.

FLOODING

The site's elevation ranges from approximately 2,590 feet above mean sea level (amsl) to approximately 2,680 feet amsl (HHSG 2011a, AFC § 5.4.3). The project site is

located in an area affected by two Federal Emergency Management Agency established Special Flood Hazard Zones. Both zones are classified as Zone A, which is defined as an area subject to a 1% annual chance of flooding with no base flood elevation determined (HHSG 2011a, AFC § 5.15.3.1.4). With proper plant design (ensured by adherence to the proposed **Facility Design** conditions of certification), and appropriate mitigation measures to reduce potential flooding impacts caused by large storm events proposed in **Soils and Surface Water** conditions of certification, including **SOILS-5**), staff believes there are no concerns with power plant functional reliability due to flooding. For further discussion, see **Soils and Surface Water**, **Water Supply** and the **Geology and Paleontology** sections of this **FSA**.

COMPARISON WITH EXISTING FACILITIES

The North American Electric Reliability Corporation (NERC) maintains industry statistics for availability factors (as well as other related reliability data). The NERC regularly polls North American utility companies on their project reliability through its Generating Availability Data System and periodically summarizes and publishes those statistics on the Internet <http://www.nerc.com>. Because solar technology is relatively new, no statistics are available for solar power plants. The project's power cycle is based on steam cycle. Because natural gas is the primary type of fossil fuel used in California, staff finds it reasonable to compare the project's availability factor to the average availability factor of natural gas-fired fossil fuel units. Also, because the project's total net power output would be 500 MW, staff uses the NERC statistics for 400–599 MW units. The NERC reported an availability factor of 85.15% as the generating unit average for the years 2005 through 2009 for natural gas units of 400–599 MW (NERC 2010).

The project would use triple-pressure, condensing steam turbine technology. Steam turbines incorporating this technology have been on the market for many years now and are expected to exhibit typically high availability. Also, because solar-generated steam is cleaner than burnt fossil fuel (i.e., natural gas), the HHSEGS steam cycle units would likely require less frequent maintenance than units that burn fossil fuel. Therefore, the applicant's expectation of an annual availability factor of 92 to 98% (HHSG 2011a, AFC § 2-2.1) appears reasonable when compared with the NERC figures throughout North America (see above). In fact, these machines can well be expected to outperform the fleet of various turbines (mostly older and smaller) that make up NERC statistics.

Additionally, because the plant would consist of two independent steam turbine generators and many rows of heliostats, maintenance could be scheduled during the times of the year when the full power output is not required to meet market demand, which is typical of industry standard maintenance procedures. Also, because the plant would operate when the sun is shining, maintenance can also be performed during the nighttime hours. The applicant's estimate of plant availability, therefore, appears to be realistic. Stated procedures for assuring the design, procurement, and construction of a reliable power plant appear to be consistent with industry norms, and staff believes they are likely to ultimately produce an adequately reliable plant.

NOTEWORTHY PROJECT BENEFITS

This project would help serve the need for renewable energy in California, as most of the electricity generated would be produced by a reliable source of energy that is available during the hot summer afternoons, when power is needed most.

CONCLUSION

The applicant predicts an equivalent availability factor of 92-98%, which staff believes is achievable. Based on a review of the AFC, staff concludes that the plant would be built and operated in a manner consistent with industry norms for reliable operation. This should provide an adequate level of reliability. No conditions of certification are proposed.

PROPOSED CONDITIONS OF CERTIFICATION

No conditions of certification are proposed.

REFERENCES

CH2 2012p – CH2MHill/J. Carrier (tn: 64558) Supplemental Data Response, Set 2, Boiler Optimization Plan and Design Change. 4/2/2012

CH2 2012ee– CH2MHill/J. Carrier (tn: 66319) Applicant's PSA Comments, Set 2. 7/23/2012

GTW (Gas Turbine World) 2006 – Gas Turbine World, July-August 2006, p. 9.

HHSG 2011a – BrightSource Energy/J. Woolard (tn: 61756) Application for Certification, Volume 1 & 2. 08/05/2011

McGraw-Hill (McGraw-Hill Energy Information Services Group). 1994. Operational Experience in Competitive Electric Generation. Executive Report.

NERC (North American Electric Reliability Council). 2010. 2005–2009 Generating Availability Report.

TRANSMISSION SYSTEM ENGINEERING

Testimony of Sudath Edirisuriya and Mark Hesters

SUMMARY OF CONCLUSIONS

The proposed Hidden Hills Solar Electric Generating Station System (HHSEGS) outlet lines and termination are acceptable and would comply with all applicable laws, ordinances, regulations, and standards (LORS). The analysis of environmental impacts for project transmission lines and equipment, both from the power plant up to the point of interconnection with the existing transmission network as well as upgrades beyond the interconnection that are attributable to the project and located in California have been evaluated by staff and are included in the environmental sections of this staff assessment.

- HHSEGS project should design and construct with adequate reactive power resources to compensate the consumption of Var by the generator step-up transformers, distribution feeders and generator tie-lines.
- The identified new Special Protection Systems (SPS) should be implemented to curtail the generation of the Queue Cluster Alpha Phase One (QCA) projects to mitigate the overload criteria violations caused by the projects on the Valley Electric Association (VEA) system.
- The identified conceptual interconnection facilities, Reliability network upgrades and Delivery network upgrades are necessary to safely and reliably interconnect the QCA projects.

STAFF ANALYSIS

This transmission system engineering (TSE) analysis examines whether this project's proposed interconnection conforms to all LORS required for safe and reliable electric power transmission. Additionally, under CEQA, the Energy Commission must conduct an environmental review of the "whole of the action," which may include facilities not licensed by the Energy Commission (Title 14, California Code of Regulations §15378). The Energy Commission must therefore identify the system impacts and necessary new or modified transmission facilities downstream of the proposed interconnection that are required for interconnection and that represent the whole of the action.

Commission staff relies upon the responsible interconnecting authority for analysis of impacts on the transmission grid, as well as for the identification and approval of new or modified facilities required downstream from the proposed interconnection for mitigation purposes. The proposed project would connect to the VEA's 230-kV transmission network and requires both analysis by VEA and the approval of the California ISO.

VEA'S ROLE

VEA is responsible for ensuring electric system reliability in its service territory for the proposed transmission modifications. For the HHSEGS project and at the request of the applicant, Navigant Consulting Inc. performed the QCA interconnection study to determine whether or not the proposed transmission modifications conform to reliability

standards. Because the project would be connected to the California ISO controlled transmission grid, the California ISO's role is to review and approve the QCA study and its conclusions.

CALIFORNIA ISO'S ROLE

The California ISO is responsible for ensuring electric system reliability for all participating transmission owners and is also responsible for developing the standards necessary to achieve system reliability. The project power will be dispatched to the California ISO grid via VEA's Crazy Eyes Tap 230kV substation. Therefore, California ISO reviews the studies of the VEA system to ensure adequacy of the proposed transmission interconnection. The California ISO determines the reliability impacts of the proposed transmission modifications on the VEA transmission system in accordance with all applicable reliability criteria. According to the California ISO tariffs, the California ISO will determine the "need" for transmission additions or upgrades downstream from the interconnection point to insure reliability of the transmission grid. On completion of the VEA's QCA study, the California ISO will review the study results, provide its conclusions and recommendations, and issue a final approval/disapproval letter for the interconnection of the proposed HHSEGP project. The California ISO may provide written and verbal testimony on its findings at the Energy Commission hearings.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

- California Public Utilities Commission (CPUC) General Order 95 (GO-95), *Rules for* Overhead *Electric Line Construction*, sets forth uniform requirements for the construction of overhead lines. Compliance with this order ensures both adequate service and the safety of both the public and the people who build, maintain, and operate overhead electric lines.
- CPUC General Order 128 (GO-128), *Rules for Construction of Underground* Electric Supply *and Communications Systems*, sets forth uniform requirements and minimum standards for underground supply systems to ensure adequate service and the safety of both the public and the people who build, maintain, and operate underground electric lines.
- The National Electric Safety Code, 1999, provides electrical, mechanical, civil, and structural requirements for overhead electric line construction and operation.
- The combined NERC/WECC (North American Electric Reliability Corporation/Western Electricity Coordinating Council) planning standards provide system performance standards for assessing the reliability of the interconnected transmission system. These standards require continuity of service as their first priority and the preservation of interconnected operation as their second. Some aspects of NERC/WECC standards are either more stringent or more specific than the either agency's standards alone. These standards are designed to ensure that transmission systems can withstand both forced and maintenance outage system contingencies while operating reliably within equipment and electric system thermal, voltage, and stability limits. These standards include reliability criteria for system adequacy and security, system modeling data requirements, system protection and control, and system restoration. Analysis of the WECC system is based to a large

degree on Section I.A of WECC standards, *NERC and WECC Planning Standards with Table I and WECC Disturbance-Performance Table,* and on Section I.D, *NERC and WECC Standards for Voltage Support and Reactive Power.* These standards require that power flows and stability simulations verify defined performance levels. Performance levels are defined by specifying allowable variations in thermal loading, voltage and frequency, and loss of load that may occur during various disturbances. Performance levels range from no significant adverse effects inside and outside a system area during a minor disturbance (such as the loss of load from a single transmission element) to a catastrophic loss level designed to prevent system cascading and the subsequent blackout of islanded areas and millions of consumers during a major transmission disturbance (such as the loss of multiple 500-kV lines along a common right-of- way, and/or of multiple large generators). While the controlled loss of generation or system separation is permitted under certain specific circumstances, this sort of major uncontrolled loss is not permitted (WECC, 2002).

- NERC's reliability standards for North America's electric transmission system spell out the national policies, standards, principles, and guidelines that ensure the adequacy and security of the nation's transmission system. These reliability standards provide for system performance levels under both normal and contingency conditions. While these standards are similar to the combined NERC/WECC standards, certain aspects of the combined standards are either more stringent or more specific than the NERC performance standards alone. NERC's reliability standards apply to both interconnected system operations and to individual service areas (NERC, 2006).
- California ISO planning standards also provide the standards and guidelines that ensure the adequacy, security, and reliability of the state's member grid facilities. These standards also incorporate the combined NERC/WECC and NERC standards. These standards are also similar to the NERC/WECC or NERC standards for transmission system contingency performance. However, the California ISO standards also provide additional requirements that are not found in either the WECC/NERC or NERC standards. The California ISO standards apply to all participating transmission owners interconnecting to the California ISO- controlled grid. They also apply to non-member facilities that impact the California ISO grid through their interconnections with adjacent control grids (California ISO, 2002a).
- California ISO/FERC (Federal Energy Regulatory Commission) electricity tariffs contain guidelines for building all transmission additions/upgrades within the California ISO-controlled grid. (California ISO, 2003a).

PROJECT DESCRIPTION

The HHSEGS would utilize heliostat solar thermal technology which consists of elevated mirrors guided by tracking system mounted on a pylon. The heliostats will focus the sun's rays on solar receiver steam generator (SRSG) mounted on a solar power tower near the center of each solar field.

The two 270 MW SRSGs will generate maximum plant net output of 500 MW. The auxiliary load for each SRSG would be 20 MW, resulting in a maximum net output of

250 MW at a 90 percent power factor. Each SRSG unit would be connected to the low side of its dedicated 18/230kV and 210/280/350 megavolt ampere (MVA) generator step-up (GSU) transformer through 18kV, 12,000 ampere gas-insulated (SF6) breakers. The high side of each generator step-up transformer would be connected to the HHSEGS switchyard through an underground segment of 230kV, 1000 kcmil, copper per phase cable and overhead segment of 230kV, 795 kcmil ACSR per phase conductors. Power would be transmitted from plant one to the onsite switchyard via an approximately 3,800 foot underground cable and a 10,275 foot overhead transmission line. Plant Two would be connected to the switchyard via a 7,300 foot underground cable and a 3,270 foot overhead transmission line. The project's HHSEGS switchyard would use a breaker and-a-half configuration with six 230-kV circuit breakers, disconnect switches, and other switching gear that will allow delivery of the project's output to the proposed Crazy Eyes Tap 230kV substation. The proposed commercial operation date of the project is June 30, 2015. (HHSEGS, 2011a section 3.0 pages 3-1 to 3-10 and Figure 3.2-1, 3.2-2R, TSE-1 and TSE-2)

INTERCONNECTION FACILITIES

The applicant proposes to build a 230kV single circuit, with 795 kcmil, "Drake" ACSR conductor (generator-tie line) to interconnect the power plant switchyard to the grid. The proposed generator tie-line is rated to carry the full output of the project. The generator tie-line leaves the State of California boarder 900 feet from the HHSEGS switchyard when it crosses over the eastern border of the project site. The interconnection would require an approximately 10 mile long generation tie line from the HHSEGS to the proposed Crazy Eyes Tap substation where the project would interconnect to the VEA electric grid. The generator tie line would originate at the HHSEGS's onsite switchyard, cross the state line into Nevada, and continue east for approximately 1.5 miles until reaching Tecopa Road (also known at Old Spanish Trail Highway). At Tecopa Road, the route would head northeast paralleling Tecopa Road until it reaches the Crazy Eyes Tap Substation, which would be located immediately east of the Tecopa Road/SR 160 intersection. The Crazy Eyes Tap substation would interconnect to the existing VEA's Pahrump Bob Tap 230kV line.

Assessment of Impacts and discussion of mitigation

For the interconnection of this proposed project to the grid, the interconnecting utility VEA and the control area operator (California ISO) are responsible for ensuring grid reliability. These two entities determine the transmission system impacts of the proposed project and any mitigation measures needed to ensure system conformance with utility reliability criteria, NERC planning standards, WECC reliability criteria, and California ISO reliability criteria. System impact and facilities studies are used to determine the impacts of the proposed project on the transmission grid. Staff relies on these studies and any review conducted by the California ISO to determine the effect of the project on the transmission grid and to identify any necessary downstream facilities or indirect project impacts required to bring the transmission network into compliance with applicable reliability standards. System impact and facilities studies analyze the grid both with and without the proposed project, under conditions specified in the planning standards and reliability criteria. The standards and criteria define the assumptions used in the study and establish the thresholds through which grid reliability is determined.

The studies analyze the impact of the project for the proposed first year of operation, and are based on a forecast of loads, generation, and transmission. Load forecasts are developed by the interconnected utility. Generation and transmission forecasts are established by an interconnection queue. The studies focus on thermal overloads, voltage deviations, system stability (excessive oscillations in generators and transmission system, voltage collapse, loss of loads, or cascading outages), and short circuit duties. If the studies show that the interconnection of the project causes the grid to be out of compliance with reliability standards, then the study will identify mitigation alternatives or ways in which the grid could be brought into compliance with reliability standards. When a project connects to the California ISO-controlled grid, both the studies and mitigation alternatives must be reviewed and approved by the California ISO. If either the California ISO or interconnecting utility determines that the only feasible mitigation includes transmission modifications or additions requiring CEQA review, the Energy Commission must analyze those modifications or additions according to CEQA requirements.

SCOPE OF INTERCONNECTION STUDY

The individual study QCA was performed by Navigant Consulting Inc. for VEA due to on-going effort to merge VEA generation queue and the transmission facilities with California ISO. The study identified operational constraints of transmission facilities of VEA, SCE and NV energy systems. The study is based upon the power flow data files used in the California ISO's Queue Cluster Four (QC4) Phase One study for the East-of-Pisgah area undertaken in 2011. The study included two new solar thermal projects in the capacity of 540MW and 270 MW to be interconnected to the proposed VEA's 230kV Crazy Eyes Tap substation.

Power Flow Study Assumptions:

The QCA study base cases were developed from the on-peak and off-peak base cases used by Southern California Edison (SCE) and the California ISO in the QC4 studies for the East-of –Pisgah (EOP) area and reflected the generation dispatch assumptions applied in and the new transmission projects identified as part of the QC4 studies. The QC4 base cases were modified, as necessary, to create reference cases in which VEA system and its existing and planned interconnection points with the California ISO controlled grid were model at Eldorado, the Western Area Power Administration (WAPA) system at Mead and Amargosa, and the NV Energy system at Northwest and Jackass Flats. Additionally, pertinent levels of on-peak and off-peak loads within the VEA system were modeled. The project power flow studies were conducted with and without HHSEGS connected to VEA's grid at the Crazy Eyes Tap 230kV substation, using peak and off-peak conditions. The power flow study assessed the project's impact on thermal loading of the transmission lines and equipment. Transient and post-transient studies were conducted using the heavy summer base case to determine whether the project would create instability in the system following certain selected outages. Short circuit studies were conducted to determine if HHSEGS would overstress existing substation facilities. The detailed study assumptions are described in the study.

Power Flow Study results:

Base case with no upgrades of the VEA system:

The initial step in identifying the system upgrades and additions required to facilitate the delivery of the proposed projects from the VEA system to the balance of the California ISO controlled grid consisted of developing on-peak and off-peak power flow cases with no upgrades or additions to the VEA system and assessing the resultant Category A loadings on the VEA system.

Following facilities are identified as Category "A" normal overloads in the existing VEA system without any system upgrades.

Over Load facilities:

- Crazy Eyes Tap-Bob Tap 230kV line was overloaded by 130% under on-peak conditions and 156% overloaded under off-peak condition.
- Crazy Eyes Tap-Pahrump 230kV line was overloaded by 147% under on-peak condition and 118% under overloaded off-peak condition.
- Pahrump #1 230/ 138 kV transformer was overloaded by 116% under on-peak condition and less than 90% loaded under off-peak condition.
- Pahrump #2 230/ 138 kV transformer was overloaded by 110% under on-peak condition and less than 90% loaded under off-peak condition.

Study has identified two mitigation measures for the above overload criteria violations

Mitigations:

- Re-conductoring of the impacted 230kV lines or
- Developing a new 230kV line between the Crazy Eyes Tap and Eldorado.

The reconductoring option has been selected due to cost effectiveness and ability to meet the project in-service date. As a result, the post-QCA on-peak and off-peak base cases were modified to reflect reconductoring of the Pahrump-Crazy Eyes tap, the Crazy Eyes Tap-Bob Tap, and the Bob Tap-Mead 230kV line sections with 3M "Drake" ACCR conductor. Reconductoring above facilities would increase the conductor normal rating by 700 MW and emergency rating by 750 MW.

Power Flow Studies with Pahrump-Mead 230kV line sections reconductored:

VEA system overloads for category A, B and C contingencies for the modified base cases are summarized below;

- Pahrump #1 230/138kV transformer was overloaded under on-peak category A, B and C and off-peak category B conditions.
- Pahrump #2 230/138kV transformer was overloaded under on-peak category A, B and C and off-peak category B conditions.

- Crazy Eyes Tap-Pahrump 230kV line was overloaded under on-peak category B and C and off-peak category B and C conditions.
- Pahrump-Desert View 230kV line was overloaded under on-peak category B and C and off-peak category B and C conditions.
- Amargosa 230/138kV transformer was overloaded under on-peak category B and C and off-peak category A, B and C conditions.
- Pahrump-Gamebird 138kV line was overloaded under on-peak category B and C and off-peak category A, B and C conditions.
- Pahrump-Vista 138kV line was overloaded under on-peak category B and C conditions.
- Crazy Eyes Tap-Bob Tap 230kV line was overloaded under on-peak category B and C and off-peak category B and C conditions
- Valley Tap-Johnnie 138kV line was overloaded on-peak category C and off-peak category C conditions.
- Pahrump-Gamebird 138kV line was overloaded on-peak category C conditions.
- Gamebird-Sandy 138kV line was overloaded off-peak category B conditions.
- Gamebird-Amargosa 138kV line was overloaded off-peak category B conditions.

Proposed Mitigation:

With respect to the post-contingency overloads noted on the reconductored Crazy Eyes Tap-Bob Tap and Crazy Eyes Tap-Pahrump lines, VEA has determined that the application of Special Protection Schemes (SPS) which would drop one of the three QCA 270MW units is the most cost effective way of mitigation.

The following SPS would be applied for the Category B and C outages.

Category B:

Crazy Eyes Tap-Bob Tap 230kV line.

Crazy Eyes Tap-Pahrump 230kV line.

Category C:

Crazy Eyes Tap-Bob Tap 230kV line and Gamebird-Sandy 138 kV line.

Crazy Eyes Tap-Pahrump 230kV line and Pahrump-Gamebird 138kV line.

Crazy Eyes Tap-Pahrump 230kV line and Pahrump 230kV transformer #1

The application of such SPS would also mitigate any other overloads resulting from these five outages. Additionally, the following upgrades are required to

mitigate the overloads resulting from outages other than the five contingencies listed above.

- Pahrump #1 230/138kV transformer overload could be mitigated by replacing transformer with unit rated at 176 MVA normal and 220MVA emergency.
- Pahrump #2 230/138kV transformer overload could be mitigated by replacing transformer with unit rated at 176 MVA normal and 220MVA emergency.
- Amargosa 230/138kV transformer overload could be mitigated by installing 138kV Pase Shifting Transformer (PST) 75MVA at Gamebird on line to Sandy/Amargosa to limit post-contingency flows through transformer.
- Pahrump-Vista 138kV line overload could be mitigated by installing 138kV PST (75MVA) at Gamebird on line to Sandy/Amargosa to limit post-contingency flows through transformer.
- Pahrump-Gamebird 138kV line overload could be mitigated by reconductoring using ACCR conductor.

Impacts on the SCE system:
Categorey B and C contingencies were simulated on the SCE 500kV and 230kV facilities located in the East-of-Pisgah (EOP) area on the on-peak and off-peak cases with the VEA 230kV line reconductoring model. These studies indicated that the QCA projects interconnection with the VEA system had no impacts on the SCE system in the EOP area.

Impacts on other systems:
New overloads were found on certain Nevada Energy 138kV lines between VEA's Lathrop Wells Substation and Nevada Energy's Northwest Substation for the Category B and C outages involving the Crazy Eyes Tap-Bob Tap 230kV line. These overloads could be mitigated by the proposed application of SPS for these outages. The simulation of Category B and C outages on the NVE and WAPA systems did not indicate that the interconnection of the QCA generation with the VEA system had any negative impacts on the NVE and WAPA system.

Dynamic Stability Study results:

Dynamic stability analyses were conducted on both the QCA peak and off-peak base cases with the above noted upgrades modeled to ensure that the transmission system remains stable with the addition of QCA projects. These analyses assessed the impacts of the outages of VEA system, SCE system and other systems. The disturbance simulations were performed for a study period of 10 seconds and monitored bus voltages and frequencies at several buses of the VEA, SCE and NV energy systems. The study monitored the generator angles of the QCA and the adjacent generator units of the Southern Nevada. These simulations indicated that, with the addition of QCA projects and the identified upgrades in place there are no Dynamic instability problems for the selected outages of VEA, SCE or NV energy systems.

Transient and Post Transient Stability Analysis:

NERC/WECC planning standards require that the system maintain post-transient voltage stability when either critical path transfers or area loads increase by 5 percent

for category ”B” contingencies, and 2.5 percent for category ”C” contingencies. Transient stability analysis was conducted using both the peak and off-peak full loop base cases to ensure that the transmission system remains stable with the addition of QCA generation projects. Transient stability simulations also indicated that there are some stability issues such as low bus voltages and frequencies or excessive angular changes at the QCA projects on the VEA system without the application of the SPS. These stability problems could be mitigated by the proposed SPS.

Reactive Power Deficiency Analysis:

The power flow base cases are built assuming that dynamic reactive power support will be available for all the cluster 4 projects. With this assumption, there were no reactive power deficiencies identified with the addition of the QCA projects in the EOP area.

Short Circuit Study results:

Short circuit studies were performed on VEA system to determine the fault duty impact of adding the QCA projects to the transmission system and to ensure system coordination. The fault duties were calculated with and without the projects to identify any equipment overstress conditions. Once overstressed circuit breakers are identified, the fault current contribution from each individual project in QCA is determined. All bus locations where the QCA projects increase the short circuit duty by 0.1kA or more and where duty is in excess of 60% of the minimum breaker nameplate rating are listed in Table 7. The information summarized in Table 7 regarding the estimated fault currents at the VEA busses indicates that the only significant differences between the pre-QCA and post-QCA fault levels are at the proposed Bob Tap and Crazy Eyes Tap substations and the equipments at these substations can be sized to accommodate the estimated fault currents.

With respect to the information for the three SCE busses summarized in Table 7 pre- and post-studies indicates that the interconnection of the QCA projects with the VEA system would result in a 5% increase in the fault currents at existing Eldorado 220kV bus. Therefore breaker ratings and other relevant protection equipments should be further evaluated in the existing Eldorado 220kV substation.

COMPLIANCE WITH LORS

The QCA study indicates that the project interconnection would comply with NERC/WECC planning standards and California ISO reliability criteria. The applicant will design and build the proposed 230-kV overhead transmission lines.

Staff concludes that assuming the proposed conditions of certification are met; the project would likely meet the requirements and standards of all applicable LORS.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Please see **Appendix 1** for Preliminary Staff Assessment (PSA) Response to Comments – TSE.

CONCLUSIONS AND RECOMMENDATIONS

- HHSEGS project should design and construct with adequate reactive power resources to compensate the consumption of Var by the generator step-up transformers, distribution feeders and generator tie-lines.
- The identified new SPS should be implemented to curtail the generation of the QCA projects to mitigate the overload criteria violations caused by the projects on Valley Electric Association system.
- The identified conceptual interconnection facilities, Reliability network upgrades and Delivery network upgrades are necessary to safely and reliably interconnect the QCA projects.

CONDITIONS OF CERTIFICATION FOR TSE

TSE-1 The project owner shall furnish to the Compliance Project Manager (CPM) and to the Chief Building Official (CBO) a schedule of transmission facility design submittals, a Master Drawing List, a Master Specifications List, and a Major Equipment and Structure List. The schedule shall contain a description and list of proposed submittal packages for design, calculations, and specifications for major structures and equipment. To facilitate audits by Energy Commission staff, the project owner shall provide designated packages to the CPM when requested.

Verification: At least 60 days prior to the start of construction (or a lesser number of days mutually agreed to by the project owner and the CBO), the project owner shall submit the schedule, a Master Drawing List, and a Master Specifications List to the CBO and to the CPM. The schedule shall contain a description and list of proposed submittal packages for design, calculations, and specifications for major structures and equipment (see a list of major equipment in **Table 1: Major Equipment List** below). Additions and deletions shall be made to the table only with CPM and CBO approval. The project owner shall provide schedule updates in the Monthly Compliance Report.

TRANSMISSION SYSTEM ENGINEERING Table 1
Major Equipment List

Breakers
Step-Up Transformer
Switchyard
Busses
Surge Arrestors
Disconnects
Take Off Facilities
Electrical Control Building
Switchyard Control Building
Transmission Pole/Tower
Grounding System

TSE-2 Prior to the start of construction, the project owner shall assign an electrical engineer and at least one of each of the following to the project: A) a civil engineer; B) a geotechnical engineer or a civil engineer experienced and knowledgeable in the practice of soils engineering; C) a design engineer who is either a structural engineer or a civil engineer fully competent and proficient in the design of power plant structures and equipment supports; or D) a mechanical engineer. (Business and Professions Code Sections 6704 et seq. require state registration to practice as a civil engineer or structural engineer in California.

Protocol: The tasks performed by the civil, mechanical, electrical, or design engineers may be divided between two or more engineers, as long as each engineer is responsible for a particular segment of the project (e.g., proposed earthwork, civil structures, power plant structures, equipment support). No segment of the project shall have more than one responsible engineer. The transmission line may be the responsibility of a separate California-registered electrical engineer. The civil, geotechnical or civil, and design engineer assigned in conformance with Facility Design condition **GEN-5**, may be responsible for design and review of the TSE facilities.

Protocol: The project owner shall submit to the CBO for review and approval, the names, qualifications, and registration numbers of all engineers assigned to the project. If any one of the designated engineers is subsequently reassigned or replaced, the project owner shall submit the name, qualifications, and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer. This engineer shall be authorized to halt earthwork and to require changes if site conditions are unsafe or do not conform with predicted conditions used as a basis for design of earthwork or foundations.

Protocol: The electrical engineer shall:

1. Be responsible for the electrical design of the power plant switchyard, outlet and termination facilities; and

2. Sign and stamp electrical design drawings, plans, specifications, and calculations.

Verification: At least 30 days prior to the start of rough grading (or a lesser number of days mutually agreed to by the project owner and the CBO), the project owner shall submit to the CBO for review and approval, the names, qualifications, and registration numbers of all the responsible engineers assigned to the project. The project owner shall notify the CPM of the CBO's approvals of the engineers within five days of the approval.

If the designated responsible engineer is subsequently reassigned or replaced, the project owner has five days in which to submit the name, qualifications, and registration number of the newly assigned engineer to the CBO for review and approval. The project

owner shall notify the CPM of the CBO's approval of the new engineer within five days of the approval.

TSE-3 If any discrepancy in design and/or construction is discovered in any engineering work that has undergone CBO design review and approval, the project owner shall document the discrepancy and recommend corrective action (California Building Code, 2010, Chapter 1, Section 108.4, Approval Required; Chapter 17, Section 1701.3, Duties and Responsibilities of the Special Inspector; Appendix Chapter 33, Section 3317.7, Notification of Noncompliance). The discrepancy documentation shall become a controlled document and shall be submitted to the CBO for review and approval and shall reference this condition of certification.

Verification: The project owner shall submit a copy of the CBO's approval or disapproval of any corrective action taken to resolve a discrepancy to the CPM within 15 days of receipt. If disapproved, the project owner shall advise the CPM, within five days, the reason for disapproval, and the revised corrective action required obtaining the CBO's approval.

TSE-4 For the power plant switchyard, outlet line, and termination, the project owner shall not begin any increment of construction until plans for that increment have been approved by the CBO. These plans, together with design changes and design change notices, shall remain on the site for one year after completion of construction. The project owner shall request that the CBO inspect the installation to ensure compliance with the requirements of applicable LORS. The following activities shall be reported in the Monthly Compliance Report:

1. Receipt or delay of major electrical equipment;

2. Testing or energization of major electrical equipment; and

3. The number of electrical drawings approved, submitted for approval, and still to be submitted.

Verification: At least 30 days prior to the start of each increment of construction (or a lesser number of days mutually agreed to by the project owner and the CBO), the project owner shall submit to the CBO for review and approval the final design plans, specifications, and calculations for equipment and systems of the power plant switchyard, outlet line, and termination, including a copy of the signed and stamped statement from the responsible electrical engineer attesting to compliance with the applicable LORS, and send the CPM a copy of the transmittal letter in the next Monthly Compliance Report.

TSE-5 The project owner shall ensure that the design, construction, and operation of the proposed transmission facilities will conform to all applicable LORS, including the requirements listed below. The project owner shall submit the required number of copies of the design drawings and calculations as determined by the CBO.

1. The HHSEGS project will be interconnected to the VEA grid via a 220-kV, 795 kcmil per phase, and approximately 10 miles long single circuit (generator- tie line). The proposed HHSEGS switching station would construct with six 230kV breakers, breaker- and- a- half configuration with 3- bays and 4 positions. The power plant outlet line shall meet or exceed the electrical, mechanical, civil, and structural requirements of CPUC General Order 95 and General Order 98 or National Electric Safety Code (NESC), Title 8 of the California Code and Regulations (Title 8), Articles 35, 36, and 37 of the "High Voltage Electric Safety Orders", California ISO standards, National Electric Code (NEC), and related industry standards.

2. Breakers and busses in the power plant switchyard and other switchyards, where applicable, shall be sized to comply with a short-circuit analysis.

3. Outlet line crossings and line parallels with transmission and distribution facilities shall be coordinated with the transmission line owner and comply with the owner's standards.

4. The project conductors shall be sized to accommodate the full output from the project.

5. Termination facilities shall comply with applicable SCE interconnection standards.

6. The project owner shall provide to the CPM:
   a. The final Detailed Facility Study (DFS) including a description of facility upgrades, operational mitigation measures, and/or Special Protection System (SPS) sequencing and timing if applicable,
   b. Executed project owner and California ISO Facility Interconnection Agreement.

Verification: At least 60 days prior to the start of construction of transmission facilities (or a lessor number of days mutually agree to by the project owner and CBO), the project owner shall submit to the CBO for approval:

1. Design drawings, specifications, and calculations conforming with CPUC General Order 95 and General Order 98 or NESC; Title 8, California Code of Regulations, Articles 35, 36, and 37 of the "High Voltage Electric Safety Orders"; NEC; applicable interconnection standards, and related industry standards for the poles/towers, foundations, anchor bolts, conductors, grounding systems, and major switchyard equipment.

2. For each element of the transmission facilities identified above, the submittal package to the CBO shall contain the design criteria, a discussion of the calculation method(s), a sample calculation based on "worst-case conditions,"[1] and a statement signed and sealed by the registered engineer in responsible charge, or other acceptable alternative verification, that the transmission element(s) will conform with CPUC General Order 95 or NESC; Title 8, California Code of Regulations, Articles

[1] Worst-case conditions for the foundations would include for instance, a dead-end or angle pole.

35, 36 and 37 of the “High Voltage Electric Safety Orders”; NEC; applicable interconnection standards, and related industry standards.

3. Electrical one-line diagrams signed and sealed by the registered professional electrical engineer in responsible charge, a route map, and an engineering description of equipment and the configurations covered by requirements **TSE-5** 1) through 5) above.

4. The final Detailed Facility Study, including a description of facility upgrades, operational mitigation measures, and/or SPS sequencing and timing if applicable, shall be provided concurrently to the CPM.

TSE-6 The project owner shall provide the following Notice to the California Independent System Operator (California ISO) prior to synchronizing the facility with the California transmission system:

1. At least one week prior to synchronizing the facility with the grid for testing, provide the California ISO a letter stating the proposed date of synchronization; and

2. At least one business day prior to synchronizing the facility with the grid for testing, provide telephone notification to the California ISO Outage Coordination Department.

Verification: The project owner shall provide copies of the California ISO letter to the CPM when it is sent to the California ISO one week prior to initial synchronization with the grid. A report of the conversation with the California ISO shall be provided electronically to the CPM one day before synchronizing the facility with the California transmission system for the first time.

TSE-7 The project owner shall be responsible for the inspection of the transmission facilities during and after project construction, and any subsequent CPM and CBO approved changes thereto, to ensure conformance with CPUC GO-95 or NESC; Title 8, CCR, Articles 35, 36 and 37 of the “High Voltage Electric Safety Orders”; applicable interconnection standards; NEC; and related industry standards. In case of non-conformance, the project owner shall inform the CPM and CBO in writing, within 10 days of discovering such non-conformance and describe the corrective actions to be taken.

Verification: Within 60 days after first synchronization of the project, the project owner shall transmit to the CPM and CBO:

1. “As built” engineering description(s) and one-line drawings of the electrical portion of the facilities signed and sealed by the registered electrical engineer in responsible charge. A statement attesting to conformance with CPUC GO-95 or NESC; Title 8, California Code of Regulations, Articles 35, 36 and 37 of the “High Voltage Electric Safety Orders”; applicable interconnection standards; NEC; and related industry standards, and these conditions shall be provided concurrently.

2. An “as built” engineering description of the mechanical, structural, and civil portion of the transmission facilities signed and sealed by the registered engineer in

responsible charge or acceptable alternative verification. “As built” drawings of the electrical, mechanical, structural, and civil portion of the transmission facilities shall be maintained at the power plant and made available, if requested, for CPM audit as set forth in the “Compliance Monitoring Plan.”

3. A summary of inspections of the completed transmission facilities, and identification of any nonconforming work and corrective actions taken, signed and sealed by the registered engineer in charge

REFERENCES

California ISO (California Independent System Operator). 1998a. Cal-ISO Tariff Scheduling Protocol. Posted April 1998, Amendments 1,4,5,6, and 7 incorporated.

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HHSEGS (Hidden Hills Solar Electric Generating Station System). 2012b. Brightsource Energy, Inc., Hidden Hills Ranch (Queue Cluster 4 phase One Draft Report) submitted to the California Energy Commission.

HHSEGS (Hidden Hills Solar Electric Generating Station System). 2012b. Brightsource Energy, Inc., Hidden Hills Ranch (Queue Cluster Alpha phase One Interconnection Study Report) submitted to the California Energy Commission.

HHSEGS (Hidden Hills Solar Electric Generating Station System). 2012c. Brightsource Energy,Inc., Hidden Hills Ranch Application for Certification. Submitted to the California Energy Commission.

NERC/WECC (North American Reliability Council/Western Electricity Coordinating Council). 2002. NERC/WECC Planning Standards. August 2002.

DEFINITION OF TERMS

AAC - All aluminum conductor

ACSR - Aluminum conductor steel-reinforced

ACSS - Aluminum conductor steel-supported

Ampacity - Current-carrying capacity, expressed in amperes, of a conductor at specified ambient conditions, at which damage to the conductor is nonexistent or deemed acceptable based on economic, safety, and reliability considerations.

Ampere - The unit of current flowing in a conductor.

Bundled - Two wires, 18 inches apart.

Bus - Conductors that serve as a common connection for two or more circuits.

Conductor - The part of the transmission line (the wire) that carries the current.

Congestion management – A scheduling protocol, which provides that dispatched generation and transmission loading (imports) will not violate criteria.

Emergency overload – See “Single Contingency.” This is also called an L-1.

Kcmil or KCM – Thousand circular mil. A unit of the conductor’s cross sectional area When divided by 1,273, the area in square inches is obtained.

Kilovolt (kV) - A unit of potential difference, or voltage, between two conductors of a circuit, or between a conductor and the ground.

Loop - An electrical cul de sac. A transmission configuration that interrupts an existing circuit, diverts it to another connection, and returns it back to the interrupted circuit, thus forming a loop or cul de sac.

Megavar - One megavolt ampere reactive.

Megavars - Mega-volt-Ampere-Reactive. One million Volt-Ampere-Reactive. Reactive power is generally associated with the reactive nature of motor loads that must be fed by generation units in the system.

Megavolt ampere (MVA) – A unit of apparent power. It equals the product of the line voltage in kilovolts, current in amperes, and the square root of 3, divided by 1,000.

Megawatt (MW) – A unit of power equivalent to 1,341 horsepower.

Normal operation/normal overload – The condition arrived at when all customers receive the power they are entitled to, without interruption and at steady voltage, and with no element of the transmission system loaded beyond its continuous rating.

N-1 condition – See “single contingency.”

Outlet - Transmission facilities (circuit, transformer, circuit breaker, etc.) linking generation facilities to the main grid.

Power flow analysis – A forward-looking computer simulation of essentially all generation and transmission system facilities that identifies overloaded circuits, transformers, and other equipment and system voltage levels.

Reactive power – Generally associated with the reactive nature of motor loads that must be fed by generation units in the system. An adequate supply of reactive power is required to maintain voltage levels in the system.

Remedial action scheme (RAS) – An automatic control provision, which, for instance, will trip a selected generating unit upon a circuit overload.

SF6 (sulfur hexafluoride) – An insulating medium.

Single contingency – Also known as “emergency” or “N-1 condition,” the occurrence when one major transmission element (circuit, transformer, circuit breaker, etc.) or one generator is out of service.

Solid dielectric cable – Copper or aluminum conductors that are insulated by solid polyethylene type insulation and covered by a metallic shield and outer polyethylene jacket.

Switchyard - An integral part of a power plant and used as an outlet for one or more electric generators.

Thermal rating – See “ampacity.”

TSE - Transmission system engineering.

Tap - A transmission configuration creating an interconnection through a sort single circuit to a small or medium sized load or a generator. The new single circuit line is inserted into an existing circuit by utilizing breakers at existing terminals of the circuit, rather than installing breakers at the interconnection in a new switchyard.

Undercrossing – A transmission configuration where a transmission line crosses below the conductors of another transmission line, generally at 90 degrees.

Underbuild - A transmission or distribution configuration where a transmission or distribution circuit is attached to a transmission tower or pole below (under) the principle transmission line conductors.

TRANSMISSION SYSTEM ENGINEERING

List of Comment Letters

		TSE Comments?
1	Inyo County	
2	Bureau of Land Management	
3	National Park Service	
4	The Nature Conservancy	
5	Amargosa Conservancy	
6	Basin & Range Watch	
7	Pahrump Paiute Tribe	
8	Richard Arnold, Pahrump Piahute Tribe	
9	Big Pine Tribe of Owens Valley	
10	Intervenor Cindy MacDonald	**X**
11	Intervenor Center for Biological Diversity	
12	Intervenor, Old Spanish Trail Association	
13	Applicant, BrightSource Energy, Inc.	**X**

Comment #	DATE	COMMENT TOPIC	RESPONSE
10	**July 21, 2012**	**Intervenor Cindy MacDonald**	
10.1	**p. 16-2 #1**	Determine the project switchyard location on-site or off-site	On-site
10.2	**p. 16-2 #2**	Not applicable	
10.3	**p. 16-2 #1**	feasibility of a construction traffic route to be utilized as transmission route after the construction work completed.	TSE staff does not determine the transmission route of the project. It can be utilized as a transmission route, if proper Right Way (R/W), G.O. 95 and 128 standards are satisfied.
10.4	**p. 16-2 #2**	Would utilizing the alternative route reduce or prevent adverse impacts to the vegitable, wildlife and critical habitat resources.	TSE staff does not evaluate the environmental impacts.

Comment #	DATE	COMMENT TOPIC	RESPONSE
13	July 23, 2012	Applicant, BrightSource Energy	
13.1	p. 259 #1	State the correct name of the project.	Agree to use the project name as "Hidden Hills Solar Electric Generating System (HHSEGS)"
13.2	p. 259 #2	Find the attached Valley Electric Associated Queue Cluster Alpha Phase One Study.	The applicant submitted Phase One Interconnection Study Report on July 23, 2012
13.3	p. 259 #3	Modify the project description passage	Agree to modify the paragraph to a certain extent.
13.4	p. 260 #4	Correct the conductor size of the Generator tie line.	Agree to use the correct conductor size as 795 kcmil "Drake" ACSR ,conductor per phase.
13.5	p. 260 #5	Include the modified Generator tie line route.	The new proposed generator tie line route which interconnect the Crazy Eyes tap 230kV substation will be included into the **Final Staff Assessmen**t.

ALTERNATIVES

Testimony of Jeanine Hinde[1]

INTRODUCTION

This analysis evaluates a reasonable range of potentially feasible alternatives to the proposed Hidden Hills Solar Electric Generating System (HHSEGS) project. Staff reviewed the alternatives analysis provided by the project applicant in the application for certification (AFC) for the HHSEGS project, using that as a starting point for the alternatives analysis in this staff assessment.

Staff reviewed many potentially feasible off-site alternatives and alternative renewable technologies during the initial work to determine the scope and content of this analysis, including those that were also reviewed in the AFC for the proposed project. That review led to selection by staff of the following six project alternatives for full analysis and comparison to the proposed HHSEGS project:

- No-Project Alternative
- Sandy Valley Off-site Alternative (same technology as the proposed project)
- Solar Power Tower with Energy Storage Alternative (at the proposed HHSEGS site)
- Solar Photovoltaic Alternative (at the proposed HHSEGS site)
- Parabolic Trough Alternative (at the proposed HHSEGS site)
- Reduced Acreage Alternative

Staff concludes that the primary environmental benefits of the Solar Photovoltaic (PV) Alternative compared to the proposed project are greatly reduced impacts on Visual Resources, Biological Resources, and Cultural Resources. The Solar PV Alternative reduces the magnitude of potential impacts on Water Supply. The Solar PV Alternative would eliminate the potential for mortality and morbidity of avian species from exposure to concentrated solar flux over the solar collector arrays. Because the Solar PV Alternative would not involve installation of solar power towers or other extremely tall structures, the potential for avian species to collide with the types of equipment and permanent facilities that would be part of the proposed project would be reduced under the Solar PV Alternative. If substantially reducing the extent and severity of direct environmental effects is the priority, then the Solar PV Alternative would be environmentally superior to the proposed project. An analysis of the environmentally superior alternative comparing the effects of each of the project alternatives to the proposed HHSEGS project is at the end of this alternatives analysis.

Preparation of this alternatives analysis included reviews of many other renewable energy technologies that are at various stages of development, research, and implementation in California. Discussions of other renewable energy technologies that

[1] **Alternatives Appendix-1** lists other staff contributors to this analysis of project alternatives.

are not considered potentially feasible alternatives to the proposed project are presented in **Alternatives Appendix-2** of this staff assessment, **Other Renewable Energy Technologies**.

CEQA REQUIREMENTS

As lead agency for the proposed Hidden Hills Solar Electric Generating System project (HHSEGS or proposed project), the California Energy Commission (Energy Commission) is required to consider and discuss alternatives to the proposed project. The guiding principles for the selection of alternatives for analysis in an environmental impact report (EIR) are provided by the California Environmental Quality Act Guidelines (State CEQA Guidelines) (Cal. Code Regs., tit. 14, § 15000 et seq.). Section 15126.6 of the State CEQA Guidelines indicates that the alternatives analysis must:

- describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project;
- consider alternatives that would avoid or substantially lessen any significant environmental impacts of the proposed project, including alternatives that would be more costly or would otherwise impede the project's objectives; and
- evaluate the comparative merits of the alternatives.

These regulations also apply to the document used as a substitute for an EIR in a certified program (Cal. Code Regs., tit. 14, §§ 15251 and 15252).

The lead agency is responsible for selecting a range of project alternatives for examination and must publicly disclose its reasoning for selecting those alternatives (Cal. Code Regs., tit. 14, § 15126.6[a]). CEQA does not require an EIR to "consider every conceivable alternative to a project. Rather it must consider a reasonable range of potentially feasible alternatives…." The range of reasonable alternatives must be selected and discussed in a manner that fosters meaningful public participation and informed decision making (Cal. Code Regs., tit. 14, § 15126.6[f]). That is, the range of alternatives presented in this analysis is limited to ones that will inform a reasoned choice by Energy Commission decision makers. Under the "rule of reason," an EIR "need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative" (Cal. Code Regs., tit. 14, § 15126.6[f][3]).

The lead agency is also required to (1) evaluate a "no-project alternative," (2) identify alternatives that were initially considered but then rejected from further evaluation, and (3) identify the "environmentally superior alternative" among the other alternatives (Cal. Code Regs., tit. 14, § 15126.6).

Alternatives may be eliminated from detailed consideration by the lead agency if they fail to meet most of the basic project objectives, are infeasible, or could not avoid any significant environmental effects (Cal. Code Regs., tit. 14, § 15126.6[c]).

ALTERNATIVES SCREENING

The ideal process to select alternatives to include in the alternatives analysis begins with the establishment of project objectives. Section 15124 of the State CEQA Guidelines addresses the requirement for a statement of objectives (Cal. Code Regs., tit. 14, § 15124[b]):

> *A clearly written statement of objectives will help the lead agency develop a reasonable range of alternatives to evaluate in the EIR and will aid the decision makers in preparing findings or a statement of overriding considerations, if necessary. The statement of objectives should include the underlying purpose of the project.*

A goal of state policy is to implement California's Renewables Portfolio Standard (RPS) program, which was established in 2002 under Senate Bill (SB) 1078, accelerated in 2006 under SB 107, and expanded in 2011 under SB X 1-2. Other related legislation has altered specific parts of the RPS program. The RPS program requires a retail seller of electricity to increase procurement from eligible renewable energy resources to 33 percent of total procurement by 2020. The California Public Utilities Commission (CPUC) and the Energy Commission are jointly responsible for implementing the program.

The importance of achieving these renewable energy goals was emphasized with the enactment of Assembly Bill (AB) 32, the California Global Warming Solutions Act of 2006, which sets aggressive greenhouse gas reduction goals for the state.

The Renewable Energy Resources Program (SB 107) states that the Energy Commission's program objective is "to increase, in the near term, the quantity of California's electricity generated by in-state renewable electrical generation facilities, while protecting system reliability, fostering resource diversity, and obtaining the greatest environmental benefits for California residents" (Pub. Resources Code, § 25740.5[c]).

Staff has identified the project objectives, as follows:

- Safely and economically construct and operate a nominal 500-megawatt renewable electrical generation facility resulting in sales of competitively priced renewable energy consistent with the needs of California utility companies.
- Develop a renewable energy facility that will supply electricity for use by retail sellers and publicly owned electric utilities to help satisfy their required California Renewables Portfolio Standard (RPS) program goals.
- Develop a renewable energy facility capable of providing grid support by offering power generation that is flexible.
- Ensure construction and operation of a renewable electrical generation facility that will meet permitting requirements and comply with applicable laws, ordinances, regulations, and standards (LORS).

- Develop a renewable energy facility in a timely manner that will avoid or minimize significant environmental impacts to the greatest extent feasible.
- Obtain site control and use within a reasonable time frame.
- Develop a renewable energy facility in an area with high solar value and minimal slope.

These project objectives are generally based on the project objectives set forth by the project applicant; however, they have been altered by staff to facilitate this analysis of a reasonable range of potentially feasible alternatives, in accordance with requirements of the State CEQA Guidelines for an alternatives analysis. The project applicant's project objectives are listed in the "Executive Summary" of the AFC for the HHSEGS project (Hidden Hills Solar I and II, LLCs 2011a).

ALTERNATIVES CONSIDERED IN THE APPLICATION FOR CERTIFICATION

Review of Off-site Alternatives

Section 6.0, "Alternatives," of the AFC evaluated eight off-site alternatives and the No-Project Alternative (Hidden Hills Solar I and II, LLCs 2011a).

Subsection 6.2 of the AFC discusses alternative sites that were part of the screening analysis for off-site alternatives to the HHSEGS project site. Alternative sites that were considered include the following (see **Alternatives Figure 1**):

- Centennial Flat
- Panamint Valley
- Chicago Valley
- Tecopa
- Sandy Valley
- Death Valley Junction
- Calvada South
- Trona

Of these eight off-site alternatives, the project applicant carried forward the Calvada South and Trona sites for further analysis (Hidden Hills Solar I and II, LLCs 2011a). The remaining six were not retained by the project applicant for further analysis based on a limited review of the sites' characteristics compared to the applicant's screening criteria. Subsection 6.2.1.1, "Alternative Sites That Are Not Feasible," of the AFC briefly discusses the reasons for eliminating the six alternatives. Some of the stated reasons are excessively long linears (i.e., long transmission lines and natural gas pipelines), biological sensitivity (e.g., in known ranges of desert tortoise [*Gopherus agassizii*] or Mohave ground squirrel [*Spermophilus mohavensis*]), possible shortfalls of contiguous

private land acreage, location relative to the China Lake Naval Air Weapons Station (NAWS), and high visual sensitivity. Water supply for the six rejected alternatives is described either as "uncertain," "medium," or "poor." Subsection 6.2.1.3, "Alternative Sites Would Fail to Satisfy Some of the Project Objectives," states that the Panamint Valley, Tecopa, Chicago Valley, and Death Valley Junction alternative sites have constrained transmission capacity requiring system upgrades "that would make it more difficult, if not impossible, for those areas to be available by 2015." Chicago Valley is identified as the only location that has sufficient contiguous private land to meet the development schedule. Tecopa and Sandy Valley are identified as being too small to allow for the project as proposed.

Based partially on information provided in the AFC, Energy Commission staff (staff) concurs with the project applicant's rejection of the Centennial Flat, Panamint Valley, Chicago Valley, Tecopa, and Death Valley Junction alternative sites. Staff reviewed the screening level information provided by the project applicant on the Sandy Valley site and determined that more information was needed to adequately evaluate the site. **Alternatives Table 1** summarizes information from the AFC on the Sandy Valley off-site alternative.

Alternatives Table 1
Information from the Application for Certification on the Sandy Valley Off-site Alternative

Criteria	Sandy Valley Off-site Alternative
Area and slope	Uncertain whether contiguous land of adequate size is available. No information on slope is provided.
Ability to obtain site control	Sufficient private land may be available, but many parcels are in agricultural use.
General plan and zoning	No information provided.
Transmission lines	Approximately 50 miles of new transmission line required.
Natural gas pipeline	The Kern River Gas Transmission pipeline is about 25 miles away.
Water supply	Individual wells supply water.
Desert tortoise	The site is among the alternatives with the highest ratings for tortoise habitat suitability; however, much of the land has already been disturbed by agricultural use.[1]
Visual quality	No information provided.
Economic viability	"Medium" because the linears are long, but not as long as for other alternative sites.

Alternatives Table 1 Information from the Application for Certification on the Sandy Valley Off-site Alternative	
Criteria	**Sandy Valley Off-site Alternative**

Source: Hidden Hills Solar I and II, LLCs 2011
Notes:
[1] The U.S. Geological Survey habitat rating is 0.6, and the site is adjacent to areas with ratings of 0.5 and 0.6. These are mid-range index values on a scale that ranges from 0.0 (lowest value) to 1.0 (highest value) (Nussear et al. 2009).

In data requests submitted to the applicant in November 2011 and January 2012, staff requested additional information on the Sandy Valley site. Responses to those data requests were received in February 2012. Staff's analysis of the Sandy Valley off-site alternative incorporates information from those data responses. (Please refer to the discussion and analysis below under, "Alternatives Evaluated in Detail.")

Subsections 6.2.2 and 6.2.3 of the AFC provide discussions of the Calvada South and Trona sites and compare the potential environmental impacts of those alternatives to the HHSEGS project (Hidden Hills Solar I and II, LLCs 2011a). The Calvada South and Trona sites have been carefully evaluated by staff and eliminated from detailed consideration in this staff assessment because neither of them could have avoided or lessened the environmental impacts of the proposed project, and in some cases, could have resulted in much greater impacts compared to the proposed project. Staff reviewed the information in the AFC and used other maps and resource data to characterize the two sites.

The project applicant identifies greater impacts on biological resources at the Calvada South and Trona sites compared to the proposed project. Greater impacts on visual resources are identified at the Trona site because of the Trona Pinnacles, an unusual geological feature in the Searles Dry Lake basin. However, staff observes that the Trona Pinnacles are south of Searles Valley and approximately 16 miles south of the Trona site identified in the AFC. At this distance, it is likely that views of the Trona Pinnacles would be unaffected by a project at the Trona site.

Based on a review of regional maps, staff observes that the Trona site is located along Trona-Wildrose Road, which is a county highway that connects with a segment of State Route (SR) 178 near Ridgecrest and turns north near the turnoff to the Trona Pinnacles before continuing through remote areas, including the Panamint Valley. The highway continues north and meets SR 190 east of Panamint Springs within Death Valley National Park (see **Alternatives Figure 1**). Given the location of the Trona site along a remote highway providing access to Death Valley National Park and other scenic areas, it is presumed that the visual impacts from a project at the Trona site would be high.

The AFC identifies a greater impact on water resources at the Trona site compared to the proposed project, describing water for that alternative as "troublesome" and a water supply that is "very high in salinity and minerals."

Subsection 6.2.2.1 of the AFC, “HHSEGS Project Site,” describes the proposed project site as having “low density populations of desert tortoise and low-quality tortoise habitat.” Pedestrian transect surveys conducted by biologists for the project applicant on April 13 and May 18, 2011, resulted in observations of two live tortoises at the site and 13 additional tortoises within the *zone of influence* transects surrounding the project site (Hidden Hills Solar I and II, LLCs 2011a). Refer to the **Biological Resources** section of this staff assessment for a discussion and analysis of sensitive plant and animal species at the HHSEGS project site, including desert tortoise.

Subsection 6.2.3.2 of the AFC, “Biological Resources,” states that “desert tortoise density surveys performed at HHSEGS and the Calvada South sites indicated a higher density of desert tortoise at Calvada South.” However, no information is provided in the AFC documenting the conclusion on desert tortoise density at the Calvada South site. The United States Geological Survey (USGS) desert tortoise habitat index value for the Calvada South site is 0.9 (Nussear et al. 2001). The discussion in the AFC also states that the Calvada South site has a higher density of native vegetation and less surface disturbance compared to the HHSEGS site. The AFC identifies a “higher biological concern” at the Trona site due to its location in the Mohave Ground Squirrel Conservation Area and potential to impact critical habitat for the Inyo California towhee (*Pipilo crissalis eremophilus*). The USGS desert tortoise habitat index value for the Trona site is 0.8 (Nussear et al. 2009).

Subsection 6.2.2 of the AFC briefly discusses transmission lines for the Calvada South and Trona alternative sites. The Calvada South site is approximately 2 miles southeast of the HHSEGS site, and the new transmission lines for this alternative would be similar in length to those required for the proposed project. According to information in the AFC, approximately 40 miles of new transmission line would be required to connect a project at the Trona site to the Inyokern Substation near U.S. Route 395. The feasibility of interconnecting at the Inyokern Substation is unknown.

An approximately 35-mile-long natural gas pipeline would be constructed to connect the proposed project to the existing interstate natural gas pipeline that is owned and operated by the Kern River Gas Transmission Company (KRGT). A natural gas supply for the Calvada South alternative site would require construction of a slightly longer pipeline to connect to the KRGT pipeline. Subsection 6.2.2.3 of the AFC states that a Pacific Gas & Electric Company (PG&E) natural gas pipeline up to 12 inches in diameter is located approximately 12 miles south of the Trona site. Staff observes that this PG&E pipeline has a 10-inch diameter, which is insufficient to serve the project. Based on data mapped by staff on natural gas pipelines in the project region, staff observes that the closest high-capacity natural gas pipeline is more than 50 miles south of the Trona site.

The Trona site is approximately 15 miles east of the China Lake Naval Air Weapons Station (NAWS). Based on a review of regional maps, staff observes that the Trona site is approximately 20 miles northeast of Armitage Airfield, which is in the southern portion of the China Lake NAWS. The Department of the Navy promotes mutually compatible land uses near the military installation to reduce potential conflicts with the U.S.

Department of Defense (DOD) military mission and protect public health and safety in the region. Although work has not been done to assess potential conflicts of a large renewable energy project at the Trona site with the China Lake NAWS mission, it is presumed that extensive coordination with DOD would be required, and resolution of potential land use conflict issues is unknown.

Staff has not retained the Calvada South site for further analysis based partially on the predicted high habitat values at the site. In addition, the screening level review of the site's characteristics has not resulted in identification of any potential environmental impacts that would be avoided or reduced at the Calvada South site compared to the proposed project.

Staff has identified several issues and potentially severe environmental impacts at the Trona site indicating its probable infeasibility as an alternative to the proposed project:

- *Visual Resources* – probable high visual impacts due to the site's remote character and location relative to Death Valley National Park.
- *Water Supply* – uncertain water supply for the project given that potable water is piped from either Indian Wells Valley (as stated in the AFC) or Ridgecrest (as indicated by staff).
- *Biological Resources* – potential high biological resource values due to its location in the Mohave Ground Squirrel (*Spermophilus mohavensis*) Conservation Area, a high USGS desert tortoise (*Gopherus agassizii*) habitat index value, and the potential to impact critical habitat for the Inyo California towhee (*Pipilo crissalis eremophilus*).
- *Transmission Line Interconnection* – unknown feasibility of interconnecting at the Inyokern Substation near U.S. Route 395.
- *Location Relative to Military Lands* – predicted need for extensive coordination with DOD because of the site's location near the China Lake NAWS.

Review of Alternative Project Configurations

The AFC briefly evaluates changing the proposed project configuration by eliminating the auxiliary natural-gas fired boilers. The analysis states that "elimination of these boilers was considered due to the reduction in air emissions and cost…." The analysis concludes that the boilers "have been included to enhance the operation and economics of the project" (Hidden Hills Solar I and II, LLCs 2011a). The applicant has since conducted boiler optimization studies, and as a result, has removed plans for some of the auxiliary boilers from the proposed project.

The applicant considered developing a smaller plant with a net generating electrical capacity of 100 or 200 megawatts (MWs). The discussion of a project with reduced capacity briefly and generally addresses the proportionately lower impacts on resources such as air quality, biological resources, cultural resources, paleontological resources, soil erosion, waste management, and visual resources. The applicant concludes that a smaller plant "would not feasibly accomplish most of the basic objectives of the project and would not avoid or substantially lessen one or more of the significant effects.

Furthermore, a smaller plant may result in an inefficient use of the land by failing to fully realize the solar potential of the area."

The Reduced Acreage Alternative is analyzed as a potentially feasible alternative in this staff assessment. Refer to the subsection below, "Alternatives Evaluated in Detail," for an analysis of this project alternative.

Review of Alternative Renewable Technologies

Other renewable solar technologies discussed in the AFC include central tower with integral thermal storage, parabolic trough, and solar photovoltaic. These three alternative technologies are analyzed as potentially feasible alternatives in this staff assessment. Refer to the subsection below, "Alternatives Evaluated in Detail," for a full analysis of these alternative technologies.

PUBLIC AND AGENCY PARTICIPATION

Preparation of the HHSEGS alternatives analysis included staff's participation in two publicly-noticed issues resolution workshops in Tecopa, California, and several status conferences that were held before the Energy Commission in Sacramento. Comments from the public and intervenors on the alternatives analysis were considered by staff in determining the scope and content of the analysis. Included here is a summary list of topics pertaining to the alternatives analysis that were presented by commenters and addressed by staff:

- *Request to include an analysis of the bloom box technology (i.e., Bloom's Energy Server™ or solid oxide fuel cells) in the analysis of project alternatives* – A discussion of solid oxide fuel cells is included in **Alternatives Appendix-2**, **Other Renewable Energy Technologies**.
- *Request to include a photovoltaic alternative* – A utility-scale photovoltaic alternative is included in this alternatives analysis. Refer to the section below, "Alternatives Evaluated in Detail," for a full analysis of this alternative.
- *Request to include an analysis of distributed generation* – A discussion and analysis of distributed generation is provided below.

Staff also coordinated with Inyo County staff on the content and scope of the alternatives analysis, including an analysis of the potential land use effects of the off-site alternative that is evaluated by staff. Refer to the section below, "Sandy Valley Off-site Alternative," for a full analysis of this alternative.

Comments submitted on the preliminary staff assessment (PSA) that was published by Energy Commission staff in May 2012 (Energy Commission 2012a) addressed the need for an alternative with a reduced site footprint. In response to those comments, staff has included an additional alternative at the proposed project site that would reduce the total acreage by approximately one-half. See the subsection below, "Reduced Acreage Alternative," for a full analysis of this alternative.

ALTERNATIVES ELIMINATED FROM DETAILED CONSIDERATION

Section 15126.6(c) of the State CEQA Guidelines addresses the requirement to identify any alternatives that were considered by the lead agency but were rejected as infeasible and briefly explain the reasons underlying the lead agency's determination. Staff evaluated the potential for a 500-megawatt (MW) renewable energy facility to be constructed and operated in the Barstow preliminary renewable energy study area (RESA) and determined that it would not reduce or avoid any of the significant impacts of the proposed project. Staff researched and analyzed the potential for the *distributed generation* category of renewable energy production to be a potentially feasible alternative to the proposed project; the analysis and related conclusions are provided below. *Energy efficiency* strategies are critical to reducing energy consumption in the state. A full discussion of energy efficiency is provided below to acknowledge the importance of achieving all cost-effective energy efficiency for the state.

Barstow Preliminary Renewable Energy Study Area

Staff's work to identify potentially feasible alternatives included a review of the October 2011 Draft Preliminary Conservation Strategy (Draft PCS), which is a key part of the Desert Renewable Energy Conservation Plan (DRECP) under development by the Renewable Energy Action Team (REAT) (Energy Commission 2011a). The purpose of the DRECP is to ensure protection and conservation of California desert ecosystems while facilitating the review and approval of appropriate renewable energy development projects.

Development of the Draft PCS included identification of RESAs based on the presence of available renewable energy resources and a lower potential for conflicts with conservation goals. The Draft PCS map synthesizes physical, biological, and land use data and is based on key biological elements identified by REAT agencies.

The first preliminary draft of the RESAs includes an area of approximately 249,400 acres near the city of Barstow. Acreages depicted in the Barstow RESA are summarized in **Alternatives Table 2**.

Alternatives Table 2
Acreages in the Barstow Renewable Energy Study Area by Preliminary Conservation Strategy (PCS) Map Category

PCS Map Categories	Barstow RESA (acres)
Agriculture	5,563
Developed Lands	18,550
Legally and Legislatively Protected Areas[1]	2,046
Lower Biological Value Areas	44,312
Military Lands	3,565
Moderate to High Biological Value Areas	141,968
Off-Highway Vehicle Lands	—

Alternatives Table 2 Acreages in the Barstow Renewable Energy Study Area by Preliminary Conservation Strategy (PCS) Map Category	
PCS Map Categories	**Barstow RESA (acres)**
Other Managed and Designated Areas[2]	33,378
State Vehicle Recreation Area Lands	—
Total	249,382

Source: Energy Commission 2011a

Notes:

[1] These areas include lands that have legal or legislative mandates for natural resource protection and are predominantly federally and state-owned lands.

[2] These areas include public lands with specific designations for the management of biological resources.

In addition to the city of Barstow, smaller communities in the area include Hinkley, Lenwood, Daggett, Yermo, and Newberry Springs. The Barstow-Daggett Airport is a general aviation airport located in Daggett. The airfield includes two runways; aircraft operations averaged 100 per day for the 12-month period ending June 22, 2011 (AirNav 2011). **Alternatives Figure 2** shows the Barstow RESA and the surrounding area.

The Barstow RESA includes the junction of Interstates 15 and 40 (I-15 and I-40) and segments of these highways east of Barstow. SR 58 and SR 247 enter the western part of the Barstow RESA and end at I-15 near Barstow. The Burlington Northern Santa Fe Railway (BNSF Railway) and Union Pacific Railroad (UPRR) provide long-haul freight service across the western two-thirds of the country. BNSF Railway and UPRR each operate double-track railroad lines that cross the Barstow RESA. The railroads parallel I-15 and I-40 in the eastern portion of the study area. AMTRAK's Southwest Chief route provides passenger service on the BNSF Railway from Los Angeles to Chicago. The Southwest Chief passenger trains travel through the Barstow area twice each night.

The Barstow RESA is within the planning area of the West Mojave Plan, which was adopted in 2006 by the U.S. Bureau of Land Management (BLM) as an amendment to the California Desert Conservation Area (CDCA) Plan. The purpose of the West Mojave Plan is twofold: (1) present a comprehensive strategy to conserve and protect the desert tortoise, Mohave ground squirrel, and over 100 other sensitive plants and animals and the natural communities they inhabit; and (2) provide a streamlined program for complying with the requirements of the California and federal Endangered Species Acts (BLM 2006).

The amended CDCA plan established a 1 percent threshold for new ground disturbance in the Habitat Conservation Area covered by the CDCA plan. New *areas of critical environmental concern* (ACEC) were established, including the Mojave fringe-toed lizard ACEC shown on **Alternatives Figure-2**. New ACECs were established for management of desert tortoise conservation and recovery, including the Fremont-Kramer *desert wildlife management area* (DWMA), Superior-Cronese DWMA, and Ord-Rodman DWMA (BLM 2006) (**Alternatives Figure-2**). Other agencies did not adopt the habitat conservation plan proposed in the West Mojave Plan to cover their jurisdictions;

therefore, the adopted plan applies only to public lands (BLM 2012). Part of the Mojave River crosses the Barstow RESA. Most of its flow is underground while its surface channels remain dry most of the time.

East of Barstow Area

The eastern portion of the Barstow RESA east of Barstow includes rural residential uses and a military base. Preparation of the alternatives analysis for the Ivanpah Solar Electric Generating System (ISEGS) project included an analysis of a potential off-site alternative on approximately 4,000 acres of disturbed private land between the Mojave River and I-15 (**Alternatives Figure-2**). The California Department of Fish and Game (DFG) Camp Cady Wildlife Area is located immediately south of the former alternative site. The alternatives analysis for ISEGS concluded that the private land alternative should be eliminated from consideration due to its potential to cause significant impacts on many environmental resources (Energy Commission 2009a).

The Energy Commission's website documenting renewable energy projects that are undergoing review includes a list and maps of projects (Energy Commission 2012b). Projects mapped in the east side of the Barstow RESA include the 1,500-acre Riverbluff PV Solar Farm, which is identified as a point on the REAT 2011 project tracking map at the former site of the ISEGS private land alternative. If the Riverbluff project is constructed as planned, it would have a generating capacity of 230 MWs. A much smaller solar PV project called Solutions for Utilities Phase 1 and 2 is also mapped in the east side of the Barstow RESA. It is listed as a 3-MW project on 22 acres. The smaller sizes of the two PV projects relative to the proposed HHSEGS project indicate that the area may be best suited for renewable energy projects with smaller profiles overall compared to the proposed project.

The railroads that parallel I-15 and I-40 effectively hem in the east side of the Barstow RESA. Based on staff's review of the area using Google Maps images, the railroad crossings are grade crossings. Moving equipment, people, and construction materials to the area would likely be impossible without construction of at least one road bridge over the railroad. Staff observes the considerable challenges that would accompany coordination with BNSF or UPRR. Staff concludes that development of a large-scale renewable energy facility in this area is unlikely to provide a feasible alternative to the proposed project.

Harper Dry Lake Area

Harper Dry Lake is in the western portion of the Barstow RESA. The Abengoa Mojave Solar Project (AMSP) is under construction next to Harper Dry Lake (**Alternatives Figure-2**). The Solar Electric Generating Systems VIII and IX facilities are immediately northwest of the AMSP site. These renewable energy projects are surrounded by lands being managed by BLM for desert tortoise conservation. Other lands in this part of the Barstow RESA are crossed by one of the two major railroads in the region, SR 58, and the Mojave River. Development of additional utility-scale renewable energy facilities in this area is unlikely to provide a feasible alternative to the proposed project.

Distributed Generation

Overview

Governor Jerry Brown's Clean Energy Jobs Plan identifies a goal of installing 20,000 MWs of new renewable capacity by 2020, including 12,000 MWs of localized electricity generation (i.e., distributed generation [DG])[2] (Energy Commission 2011b). These targeted renewable capacity goals support California's RPS program goals.

There is no single accepted definition of renewable DG. The *2011 Integrated Energy Policy Report* published by the Energy Commission provides this definition: "For the purposes of the 12,000 MWs of renewable distributed generation by 2020 goal, distributed generation is defined as: (1) fuels and technologies accepted as renewable for purposes of the Renewables Portfolio Standard; (2) sized up to 20 MWs; and (3) located within the low-voltage distribution grid or supplying power directly to a consumer" (Energy Commission 2012c). As of 2011, a total of approximately 3,000 MWs of renewable DG capacity has been installed; another 6,200 MWs is pending or authorized under existing state programs that support DG.

Distributed solar facilities vary in size from kilowatts to tens of megawatts and do not require transmission to get to the areas where the electricity is used. Renewable DG technologies like small PV can be located in industrial areas on previously disturbed land or on existing residential, industrial, or commercial buildings. Standards, codes, and fees vary widely for DG projects, and land use requirements for identical systems can vary significantly from jurisdiction to jurisdiction. Efforts at the national, state, and local levels are underway to identify and provide solutions to barriers to permitting renewable DG facilities (Energy Commission 2011b).

CPUC oversees two incentive programs for customer-side of the meter DG (also called *on-site generation* or *self generation*) for customers in the territories of PG&E, San Diego Gas & Electric (SDG&E), and Southern California Edison Company (SCE) (CPUC 2012). The customer-side DG programs include several existing, new, and emerging distributed energy sources, including solar electric. The Energy Commission oversees related incentive programs.

The programs supporting on-site solar projects include CPUC's California Solar Initiative, the Energy Commission's New Solar Homes Partnership, and a variety of solar programs offered through publicly owned utilities. The overall goal of these programs is to encourage Californians to install 3,000 MWs of solar energy systems on homes and businesses by 2016 (CPUC 2012). Generation from these facilities may or may not be able to produce excess electricity exported to the distribution or transmission system, but all are connected to the electric grid (Energy Commission 2011b).

[2] The total 20,000 MWs from the Governor's Clean Energy Jobs Plan includes 8,000 MWs of utility-scale renewable capacity from wind, solar, and geothermal projects.

CPUC has implemented policies and programs related to procurement of utility-side DG (also called *wholesale* or *system-side generation*) (CPUC 2012). Under its investor-owned utility (IOU) solar PV programs, CPUC authorized PG&E, SDG&E, and SCE to own and operate PV facilities and to execute solar PV power purchase agreements with independent power producers through a competitive solicitation process. Based on decisions issued by CPUC in 2009 and 2010, these programs will yield up to 1,100 MWs of new solar PV capacity in the next few years. The energy produced under the solar PV programs will contribute to meeting the state's RPS program goals.

CPUC provides incentives for the development of DG through its Self-Generation Incentive Program (SGIP) (CPUC 2012). This program provides financial incentives for installing new, qualifying, self-generation equipment that meets all or a portion of the electric energy needs of a facility. SGIP administrators include PG&E, SCE, Southern California Gas Company, and the California Center for Sustainable Energy. Eligible fuels for eligible SGIP generating technologies include several renewable and non-renewable fuels. In 2009, SB 412 modified SGIP to require identification of distributed energy resources that will contribute to greenhouse gas (GHG) reduction goals. In 2011, SGIP facilities supplied enough electricity to power over 116,000 homes.

CPUC's Renewable Auction Mechanism (RAM) was created for the procurement of renewable DG projects generating from 3 MWs up to 20 MWs of electricity. CPUC adopted RAM in 2010 to encourage development of resources that can use existing transmission and distribution infrastructure and contribute to the state's RPS program in the near term. CPUC initially authorized the large IOUs to procure 1,000 MWs through RAM by holding four competitive auctions over 2 years. Total procurement was expanded in early 2012 to 1,299 MWs. Project eligibility and viability is determined by the IOUs based on the offerer's ability to demonstrate the following:

- *Site Control* – 100 percent site control obtained through direct ownership, lease, or an option to lease or purchase that may be exercised when the RAM contract is awarded.
- *Development Experience* – One member of the development team has completed at least one project of similar technology and capacity or has begun construction of at least one other similar project.
- *Commercialized Technology* – The project is based on a commercialized technology.
- *Interconnection Application* – An interconnection application has been filed.

Other programs in the state are designed to help offset the costs of installing rooftop PV systems on affordable and low-income housing. For example, the Los Angeles Department of Water and Power (LADWP) relaunched its solar incentive program. As part of the program, LADWP staff is investigating options for making solar affordable for lower income households (Energy Commission 2012c).

If existing state programs to support DG, including solar PV, are fully successful, the state could add approximately 6,000 MWs of additional capacity in the next several

years. Additional programs or incentives may be needed to attain the 2020 goal specified in the Governor's Clean Energy Jobs Plan (Energy Commission 2011b).

Decision to Eliminate this Category of Renewable Energy Generation from Detailed Consideration

Comments received during the proceedings for previous siting cases for utility-scale (greater than 20 MWs) renewable energy projects (e.g., ISEGS) have included requests that the review of project alternatives include a distributed generation photovoltaic (DGPV) project. Both *concentrated* and *distributed* types of systems result in production of electricity from renewable sources (i.e., both use solar technologies). However, the characteristics of the DG category of renewable energy generation make it an impracticable alternative in the context of a CEQA alternatives analysis.

As discussed above, CEQA does not require consideration of "every conceivable alternative to a project…" (Cal Code Regs., tit. 14, § 15126.6[a]). CEQA does not require consideration of "an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative" (Cal Code Regs., tit. 14, § 15126.6[f][3]). Staff concludes that a DGPV alternative is unlikely to provide a feasible alternative to the proposed project based on the following discussions and analysis:

- *Lack of Defined Projects with Sites* – Compared to a large project such as HHSEGS that is proposed for construction on a defined site, a *renewable DG alternative* is amorphous and impossible to analyze. Some renewable DG projects are carried out by proponents and agencies at defined sites; however, the existence of renewable DG projects does not mean that a DG alternative as a category of renewable energy generation could be a valid alternative to a larger generation project such as HHSEGS. The feasibility of a renewable DG alternative is extremely speculative. Given that the location and characteristics of such an alternative is unknown, no method is available to verify whether a collection of DGPV projects totaling several hundred MWs of electrical generation has ever been installed as an alternative to the proposed HHSEGS project.
- *No Oversight or Permitting Authority for a DGPV Alternative* –DG projects are generally initiated and installed or constructed under the jurisdiction of local governments by public utilities, private developers or residents and business owners, and others. Potential sites could be distributed across several local municipalities; and widely varying codes, standards, and fees among local governments with jurisdiction over DG projects is one of the challenges identified for developers (Energy Commission 2012c). The general plans and zoning ordinances of local jurisdictions may address environmental screening and review for large-scale renewable projects, but not for DG projects.
- *Voluntary Participation in On-site Generation Programs* – Participation in the state's on-site generation incentive programs (described above) is based on decisions made by individual residents and property and business owners. Participation in the incentive programs is elective; no laws or regulations mandate installation of on-site renewable energy systems; and utilities do not approve or deny DG systems on private property. Although the importance of the state's DG incentive programs

cannot be overstated, it is not possible to treat a conglomeration of DGPV (or other types of DG) projects as a potentially feasible alternative to a utility-scale renewable energy project such as the proposed project.

- *Failure to Meet Critical Project Objectives* – Critical project objectives for HHSEGS include those addressing development of a renewable energy facility that will contribute to meeting the state's RPS program goals. Based on electricity supply and demand forecast reports prepared by Energy Commission staff, as well as expert witness testimony in prior proceedings (e.g., the ISEGS siting case), renewable DG projects alone would not supply enough electricity to meet the state's mandated RPS program goals. Energy generation to meet the RPS program goals needs to come from a mix of renewable sources, and not merely one to the exclusion of others. Various agency publications identify the need to increase renewable generating capacity from DG and utility-scale sources; both are essential to successfully meeting RPS program goals. Therefore, rejection of the proposed HHSEGS project on the grounds that some renewable DG projects will be built would be inconsistent with the state's RPS program objectives. Such a decision would also be inconsistent with the HHSEGS' project goals of helping to meet such objectives.

Energy Efficiency

In 2003, the principal energy agencies in the state jointly created and adopted the *Energy Action Plan* (EAP), which identifies goals and actions to eliminate energy outages and excessive price spikes in electricity and natural gas (Energy Commission and CPUC 2003). The EAP states the importance of having reasonably priced and environmentally sensitive energy resources to support economic growth and attract new investments that will provide jobs and prosperity for California consumers and taxpayers. The EAP envisions a "loading order" of energy resources to guide agency decisions: (1) the agencies will optimize all strategies for increasing conservation and energy efficiency to minimize increases in electricity and natural gas demand, (2) recognizing that new generation is necessary and desirable, the agencies intend to meet the need first by renewable energy resources and distributed generation, and (3) because the preferred resources require both sufficient investment and adequate time to "get to scale," the agencies will support additional clean, fossil-fueled, central station generation (Energy Commission and CPUC 2003). Section 454.5(b) of the California Public Utilities Code addresses requirements for an electrical corporation's proposed procurement plan, including the requirement to "first meet its unmet resource needs through all available energy efficiency and demand reduction resources that are cost effective, reliable, and feasible."

In 2008, an update to the EAP was published that examines the state's ongoing actions in the context of global climate change following passage of AB 32. The updated EAP iterates how the EAP represents a collaborative process that is subject to change and updating over time. The EAP does not supersede or replace the extensive efforts of the Energy Commission's *Integrated Energy Policy Report* (IEPR), which remains the overall guiding document on energy policy. The IEPR addresses a wide range of issues pertaining to the state's electricity, natural gas, and transportation fuel sectors. The EAP

is intended to capture recent changes in the policy landscape and describe activities to accomplish those policies (Energy Commission and CPUC 2008).

In its discussion on energy efficiency, the 2008 EAP update refers to strategies identified in the 2006 *California Climate Action Team Report*, explaining that "nearly one-quarter of the emission reductions identified from existing or known strategies in 2020 would come from some form of energy efficiency investment, either through improved building codes or appliance standards, utility energy efficiency programs, or smart growth strategies" (Energy Commission and CPUC 2008). The 2008 EAP update and the 2011 IEPR discuss the significance of AB 2021, which was enacted in 2006 to further the goal of achieving all cost-effective energy efficiency. AB 2021 requires the Energy Commission, in consultation with CPUC, to develop statewide energy efficiency potential estimates and targets for California's investor-owned and publicly owned utilities. Progress toward meeting the targets is reported in the current biennial IEPR (Energy Commission 2012c). In December 2011, Energy Commission staff published the final report, *Achieving Cost-Effective Energy Efficiency for California 2011–2020*, which summarizes utility progress and recommends improvements for publicly owned utility efficiency efforts (Energy Commission 2012c).

The 2008 EAP update also discusses CPUC's strategic planning process to develop comprehensive, long-term strategies for making energy efficiency a way of life for Californians. CPUC adopted California's first *Long-Term Efficiency Strategic Plan* in 2008, which was developed through a collaborative process with CPUC's regulated utilities—PG&E, SCE, SDG&E, and Southern California Gas Company—and many other key stakeholders. The long-term plan provides a statewide roadmap to maximize achievement of cost-effective energy efficiency in California's electricity and natural gas sectors from 2009 through 2020 and beyond. CPUC's 2011 update to the *Energy Efficiency Strategic Plan* (CPUC 2011) is a comprehensive plan with goals and strategies covering all major economic sectors in the state.

As described in the 2011 IEPR, California's energy efficiency policies, programs, and energy standards for buildings and appliances in the last three decades have contributed to keeping the state's per capita electricity consumption relatively constant while energy use in the rest of the country has increased by approximately 40 percent (Energy Commission 2012c). In addition to achieving all cost-effective energy efficiency, California's energy efficiency policies include reducing energy use in existing buildings and achieving *zero net energy* building standards. Reducing building energy use to zero net energy is accomplished by combining greater energy efficiency and on-site clean energy production.

In its discussion on reducing energy use in existing buildings, the 2011 IEPR states that more than half of the state's 13 million residential units and more than 40 percent of commercial buildings were built before building and appliance efficiency standards were implemented (Energy Commission 2012c). AB 758 directed the Energy Commission to develop, adopt, and implement a comprehensive statewide program to reduce energy consumption in existing buildings and report on that effort in the IEPR. The Energy Commission shares responsibility with CPUC, local governments, and utilities to

coordinate residential and commercial building retrofit programs. Completion of needs assessments and development of action plans is continuing. Other joint efforts are planned and intended to achieve improved compliance with building and appliance standards and ensure that energy efficiency measures and equipment are properly installed and delivering savings.

The Energy Commission, CPUC, and the California Air Resources Board have adopted a goal of achieving zero net energy building standards by 2020 for residential buildings and 2030 for commercial buildings (Energy Commission 2012c). In September 2011, CPUC released its *2010–2012 Zero Net Energy Action Plan* for the commercial building sector. The Energy Commission regularly updates its building efficiency standards to reflect new technologies and strategies consistent with the goal of achieving 20 to 30 percent energy savings in each triennial update. Appliance standards are being updated to include electronics and other devices plugged into electrical outlets.

Decision to Eliminate Energy Efficiency Strategies from Detailed Consideration

The loading order specified in the EAP does not bind the Energy Commission to analyze particular project alternatives, and energy efficiency measures alone would not satisfy the project objectives and are not intended to replace all central station renewable energy facilities in the state. Staff's analysis of a range of potentially feasible alternatives, including the No-Project Alternative (evaluated below), does not reduce or eliminate opportunities for conservation and energy efficiency.

ALTERNATIVES EVALUATED IN DETAIL

CEQA requires consideration of "a reasonable range of potentially feasible alternatives that will foster informed decision making and public participation. An EIR is not required to consider alternatives which are infeasible" (Cal. Code Regs., tit. 14, § 15126.6[a]). Feasible is defined as "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors" (Cal. Code Regs., tit. 14, § 15364).

Project alternatives were selected based on their potential to satisfy most of the basic project objectives discussed above under, "Alternatives Screening," and their potential to reduce or avoid the significant impacts identified for the proposed project.

The analysis below evaluates six alternatives to the proposed project:

- No-Project Alternative
- Sandy Valley Off-site Alternative (same technology as the proposed project)
- Solar Power Tower (SPT) with Energy Storage Alternative (at the HHSEGS site)
- Solar Photovoltaic Alternative (at the HHSEGS site)
- Parabolic Trough Alternative (at the HHSEGS site)

- Reduced Acreage Alternative (at the HHSEGS site)

The proposed HHSEGS project would contribute to a net reduction in GHG emissions from power generation. Net GHG emissions for the state's integrated electric system will decline when new renewable power plants are added that: (1) meet eligibility requirements for renewable energy resources in the state; (2) improve the overall efficiency, or GHG emission rate, of the electric system; and (3) serve increasing load (i.e., energy use) or energy capacity needs more efficiently, and with fewer GHG emissions, compared to fossil-fueled generation. Each of the project alternatives would result in a net benefit in reducing GHG emissions. Because solar thermal power plants with energy storage may not require a natural gas supply for project operations, they may displace more fossil fuel use and are more effective at reducing GHG emissions compared to solar thermal power plants without energy storage.

Summary discussions are provided below comparing the environmental effects of the proposed HHSEGS project to the project alternatives and the No-Project Alternative. Environmental impacts that could potentially occur under a project alternative but that would not occur under the proposed project are also discussed. A summary table comparing the potential impacts of the proposed project to the potential impacts of the project alternatives and the No-Project Alternative is provided in **Alternatives Appendix-3**.

The Energy Commission has the exclusive authority to license thermal power plants in the state with a generating capacity of 50 MWs or greater; therefore, state and local land use plans, policies, and regulations that would be applicable to a project alternative discussed below would be covered under the Energy Commission's in lieu permitting authority.

NO-PROJECT ALTERNATIVE

The State CEQA Guidelines require that, among other alternatives, a no-project alternative shall be evaluated in relation to the proposed project. The no-project alternative analysis must "discuss the existing conditions at the time…environmental analysis is commenced, as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services" (Cal. Code Regs., tit. 14, § 15126.6[e][2]). As required by CEQA, a No-Project Alternative has been included to allow a comparison of the impacts of approving the proposed HHSEGS project with the impacts of not approving the proposed project.

An EIR was prepared in 1974 by the Inyo County Planning Department for a project to subdivide and develop several thousand acres in Pahrump Valley, an area that includes the present site for the proposed HHSEGS project north of the Old Spanish Trail Highway (referred to as Parcel 86 in the 1974 EIR) (Inyo County 1974). The owner-trustee of the land intended to convert the area that was subdivided and approved for development into 20-acre family farms, and evidence remains showing a dirt road grid system at the site. The proposed HHSEGS site includes approximately 170 lots. However, no significant development occurred, no improvements were implemented,

and no development-related or public services infrastructure was brought to the site or area near the site. It has been close to 40 years since the area was approved for development, and no residences or other occupied structures were ever constructed at the proposed HHSEGS site.

Inyo County officials states that the HHSEGS project site has "significant environmental assets that are just beginning to attract some specialty visitors, such as ecotourists and geologists….While the availability of such a large parcel of privately owned land is unique, the Charleston View area has yet to reach an economic takeoff point" (Inyo County 2012a). Although this statement indicates that Inyo County staff is evaluating ideas for future uses of the area that are consistent with existing zoning at the site, no plan is under consideration that "would be reasonably expected to occur in the foreseeable future if the project were not approved" (Cal. Code Regs., tit. 14, § 15126[e][2]). (Refer to the **Land Use** section of this staff assessment for a discussion of general plan designations and zoning districts for the HHSEGS project site.) The Inyo County letter acknowledges the "uncertainty concerning the availability of sufficient water to support major commercial, recreational or residential developments." Inyo County staff's ideas for future uses of the site may not be realized for many years, and the extent to which water supply could limit development potential is not presently known.

Staff states in the PSA for the proposed project that "[t]he proposed HHSEGS site is currently undeveloped, vacant private land" (Energy Commission 2012a). In comments on the PSA, the applicant disagrees that the site is undeveloped and states that "[t]he site is partially developed by graded roads, distribution lines, and existing wells" (Hidden Hills Solar I and II, LLCs 2012a). In August 2011, a Phase I Environmental Site Assessment (Phase I ESA) was prepared for the proposed HHSEGS project (Hidden Hills Solar I and II, LLCs 2011b). The Phase I ESA characterizes the site and vicinity and describes the HHSEGS site as "undeveloped, vacant land." Site improvements are described to include a fenced weather station on the west-central portion of the site and an abandoned orchard on the south-central margin of the site. It is stated that "[n]o other observable improvements were noted on the subject site." Land to the north, west, south, and east is described as "generally undeveloped" except for the Charleston View rural residential area south of the project site.

The Phase I ESA describes the six historic groundwater supply wells at the site, four of which are along the Old Spanish Trail Highway. An underground electrical line runs from the wood-pole electrical line along the Old Spanish Trail Highway to a groundwater well and pump box panel in the former orchard area. In the site information questionnaire completed by the major site owners and included in the Phase I ESA, all questions pertaining to structures or buildings at the site are answered as "N/A" or "none." In answering the question on site history, it states that "[t]here was some cattle grazing on the land years ago, and part of the land (the southern part of Section 28) was used to grow melons and peaches." Energy Commission staff participated in a site visit to the proposed HHSEGS site on October 27, 2011; based on direct observations during the site visit and other evidence, including site descriptions in the Phase I ESA, staff confirms that the HHSEGS site is undeveloped and vacant. As stated above, no

residential development has occurred in the area covered by the 1974 EIR, including the proposed HHSEGS site. In theory, under the No-Project Alternative, the potential exists for minor land use changes to occur at the site (e.g., construction of a few residences). In comments submitted to the Energy Commission on the No-Project Alternative from the Inyo County Counsel's Office, these facts on the 40-year-old subdivision are presented (Inyo County 2012b):

- Fewer than six residential building permits have been issued for the Charleston View area, including the proposed project site, during the past 10 years.
- No plans have been identified to construct any residential units on any of the lots should the proposed project not proceed.
- The site is located in an area with very limited services.
- The site sits within a short commute to areas with large housing stock, including Pahrump and Las Vegas.
- Current economic predictors suggest residential development of the proposed project site is unlikely in the near future.

Moreover, the overdraft status of the groundwater basin may create further barriers to full development of the lots located on the proposed project site (Inyo County 2012b). Based on available information, the No-Project Alternative is characterized by the continuation of existing conditions at the HHSEGS site. No action would be taken. No renewable energy project would be constructed and operated at the HHSEGS site. No other use is reasonably foreseeable; therefore, it is assumed that existing conditions would persist at the site absent the proposed project. The Phase I ESA for the proposed project describes the site as undeveloped, vacant land. The mere existence of subdivided property does not make development of this relatively isolated area reasonably foreseeable.

Continuation of existing conditions under the No-Project Alternative has the potential to affect certain resource areas to varying degrees. The subsections that follow summarize how minor changes in land use from relatively low intensity uses at the existing HHSEGS site could affect environmental resources at and near the site.

Biological Resources

Under the No-Project Alternative, minor land use changes are reasonably foreseeable. Shadscale scrub, Mojave creosote scrub, and desert washes compose on-site habitat, and these communities would remain primarily intact with minimal losses to development expected. Wildlife inhabit the project area, using it for food, shelter, and breeding; because the site is undeveloped, wildlife are able to move through the area without encountering barriers. Although the area has previously been disturbed by road grading work and agricultural use, extant wildlife abundance and diversity indicate the ongoing biological functionality of the site. This has been well documented by the project applicant, and is evidenced by the presence of rare plants and the *state listed as threatened* desert tortoise.

Even the minor land use changes that could potentially occur on the site would reduce available habitat and could introduce edge effects to the environment such as dust and proliferation of weeds. Continued anthropogenic uses (e.g., off-road vehicle use, camping, or other unauthorized recreational uses) would contribute to degradation of the site and could cause injury or even mortality of wildlife species. Any further site degradation would affect plant and wildlife assemblages by reducing their abundance, distribution, and health. These effects would be minor compared to the proposed HHSEGS project. Impacts on special-status plants, waters of the U.S., and waters of the state under the No-Project Alternative would be **much less compared to the proposed project**. Similarly, impacts on desert tortoise and other special-status wildlife would be **much less compared to the proposed project**. No impacts on avian species would occur from collisions with structures or exposure to concentrated solar flux.

The Pahrump Artesian Aquifer underlying the proposed project site has been in overdraft since the last century (Buqo 2004), with groundwater being pumped at a rate higher than the recharge rate of the aquifer. Groundwater levels are expected to continue to decline, causing adverse impacts on groundwater-dependent vegetation, and subsequently, wildlife that inhabit the area or forage on that vegetation. Without the proposed project, impacts on groundwater dependent plants and wildlife species under the No-Project Alternative would be **somewhat less than the proposed HHSEGS project**.

Cultural Resources

Reasonably foreseeable human activities under the No-Project Alternative would include intermittent use of the site for unauthorized recreational uses. Continued drawdown of local subsurface aquifers due to regional overuse of the resource would also occur. Natural erosion and burial of archaeological deposits would continue as would the degradation of built-environment resources. While the natural and human-induced changes would vary from baseline conditions, staff does not interpret the changes to meet the threshold for consideration as effects in the context of planning for the proposed project. The changes represent the anticipated evolution of the baseline for the project area as well as for many parcels in the vicinity. These effects under the No-Project Alternative would be **much less than HHSEGS**.

Soil and Surface Water

Under the No-Project Alternative, intermittent recreational uses could cause potential soil erosion from occasional vehicle use, and the possibility of litter could cause contamination of storm water runoff. The proposed project would include grading of roughly 440 acres during construction and would add 851 acres of impervious area (equal to about 27 percent of the site) and another 189 acres of graded dirt roads. While the proposed project would require implementation of Best Management Practices and conditions of certification to protect soil and water resources, the No-Project Alternative comparison to the proposed project assumes continuation of existing conditions, which also accounts for the possibility of minor land use changes occurring at the site. Although the site would continue to gradually degrade under the No-Project Alternative,

impacts on soil and surface water would be **much less than the proposed HHSEGS project**.

Water Supply

Under the No-Project Alternative, continued anthropogenic uses, including minor development and use of the site for unauthorized recreational uses, could contribute to overdraft in the Pahrump groundwater basin, if groundwater pumping occurred.

Under the No-Project Alternative, groundwater levels would be expected to continue to decline. The aquifer underlying the project has been in overdraft since the last century, and this trend would likely continue (Buqo 2004). Without the proposed project, impacts from potential drawdown of local wells and impacts on groundwater basin balance would be **somewhat less than HHSEGS**.

SANDY VALLEY OFF-SITE ALTERNATIVE

Overview

This alternative would consist of constructing and operating an approximately 500-MW solar power tower (SPT) project at the Sandy Valley alternative site. The project elements and major facility components of this alternative would be similar to those of the proposed project. The Sandy Valley Off-site Alternative borders the state boundary with Nevada approximately 20 miles southeast (as the crow flies) of the proposed HHSEGS project site. The unincorporated town of Sandy Valley, Nevada, borders the state line. According to 2010 U.S. Census data, a total of 2,051 people were living in Sandy Valley. The community included 811 housing units at an average density of 14.5 units per square mile. USGS topographic maps for the area show a sedimentary basin, Mesquite Valley, straddling the border between Nevada and California in the region encompassing the study area for the Sandy Valley Off-site Alternative.

The project applicant responded to staff's data requests for additional information on a potential off-site alternative in the Sandy Valley area (Hidden Hills Solar I and II, LLCs 2012b). The project applicant provided a map showing a potential 3,119-acre alternative site at the southeast corner of Inyo County. Portions of two parcels included in the project applicant's alternative site overlap with lands managed by BLM in the Pahrump Valley Wilderness to the west. To avoid these particular BLM properties, Energy Commission staff changed the boundary for the Sandy Valley study area. **Alternatives Figure 3** shows the study area for the Sandy Valley Off-site Alternative that has been evaluated by staff.

The altered Sandy Valley study area encompasses approximately 3,354 acres in Inyo and San Bernardino counties. A total of approximately 657 acres in the Sandy Valley study area are federally-owned vacant land; based on available land ownership data, two parcels identified as "government land" are likely managed by BLM. The remaining approximately 2,697 acres are in private ownership. Based on parcel data maintained by Inyo and San Bernardino counties, staff estimates that the properties are owned by 24 individual owners.

The lengths of the linear corridors for the transmission line and the natural gas pipeline for the Sandy Valley Off-site Alternative may be shorter than the linear corridors for the proposed project. The project applicant identified a possible alignment for a generation tie (gen-tie) line to the proposed Valley Electric Association 500-kilovolt (kV) transmission line. The natural gas pipeline to connect the proposed HHSEGS project to the Kern River Gas Transmission (KRGT) pipeline would be approximately 35 miles long. The natural gas pipeline to connect to the KRGT pipeline for the Sandy Valley Off-site Alternative would be either 14½ or 15½ miles long depending on the route. **Alternatives Figures 4** and **5** shows possible alignments for the linear corridors. Like the proposed project, the transmission line and natural gas pipeline would be constructed in Nevada.

Potential to Attain Project Objectives

CEQA requires an alternatives analysis to "describe a range of reasonable alternatives to the project…which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project..." (Cal. Code Regs., tit. 14, § 15126.6[a]).

Development of an approximately 500-MW SPT project at the Sandy Valley alternative site could potentially meet the project objectives related to construction and operation of a utility-scale renewable electrical generation facility, which would lead to the sale of renewable energy and contribute to achieving California's renewable energy goals; approval of amendments to the PPAs by CPUC could be required. This alternative could potentially satisfy the project objectives addressing the requirement to comply with applicable LORS and avoid or minimize significant impacts to the greatest extent feasible. This alternative would satisfy the project objective to develop a renewable energy facility in an area with high solar value and minimal slope. See the discussions below under, "Environmental Analysis," for general analyses of the potential environmental effects of this alternative compared to the proposed project.

The project objectives include an objective to develop a renewable energy facility capable of providing grid support by offering power generation that is flexible. In general, a resource's flexible capacity is based on its operational flexibility, which is the resource's ability to respond to dispatch instructions from the California Independent System Operator (CAISO). Flexibility is characterized, in part, by a resource's ability to be dispatched, and ramped up and down to produce or curtail energy production. A resource's degree of flexibility is largely qualitative, and a resource's flexibility at any particular time can vary depending on the status of that resource (e.g., whether it's online or off-line) or other operating parameters (e.g., already at full load, or the operating range of the resource) (CAISO 2012). CAISO is developing detailed policies on flexible capacity procurement to reliably operate the electrical grid as additional variable resources come online to meet the state's 33 percent renewable energy target. The retirement of aging natural gas-fired resources, including the once-through-cooled resources in the next 10 years is contributing to the need for additional flexible capacity (CAISO 2012).

Integrating variable energy resources such as wind and solar "requires increased operational flexibility, notably the ability to provide services to match real-time upward and downward movements and at *ramp rates* faster than what is generally provided today" (Energy Commission 2011b)[3]. Ramping capability balances the less predictable energy production patterns of renewable resources such as wind and solar. For natural gas facilities, the degree of flexibility generally relates to engine design. A simple-cycle natural gas-fired power plant is highly flexible based on its ability to start or stop quickly and ramp up and down rapidly. A combined-cycle natural gas-fired power plant has the ability to create additional energy from steam, thereby increasing its efficiency compared to a simple-cycle gas-fired plant. Although a combined-cycle gas-fired plant can provide more efficient capacity and energy, it generally has longer start-up times; therefore, it is less flexible than a simple-cycle gas-fired plant. Newer designs for simple-cycle gas-fired plants have resulted in increased operating efficiencies, and some newer combined cycle plants have shortened start-up times.

Solar PV and wind power are intermittent resources that have no inherent upward ramp capability; these two fuel sources (sunshine and wind) are ineligible to provide flexible ramping capacity (CAISO 2012). Because these energy sources are variable, solar PV and wind power are incapable of responding to dispatch instructions and needs. Solar PV and wind increase the need for other flexible resources to assist in the integration of these variable resources.

Solar thermal technologies that do not include energy storage (e.g., the proposed project) generally have lower ramping capabilities compared to solar thermal with energy storage and are not specifically considered by CAISO to provide flexible capacity. Solar thermal technologies without integral thermal storage (e.g., the Ivanpah Solar Electric Generating System) rely on natural gas-fired steam boilers to provide thermal input in the morning and during periods of cloud cover. The solar thermal characteristics of the proposed project enhance its ability to maintain some stability and consistency in the MWs of electricity produced during periods of cloud cover. The proposed HHSEGS project has some operational flexibility during daylight hours that slightly increase its value to the electrical grid system compared to a solar PV project. For example, the proposed project could be operated to respond to a request from CAISO to curtail energy production, but conversely, the proposed project could not ramp up unless it was operating at less than full load, and the solar fuel was available (i.e., the sun was shining).

Solar thermal technologies with energy storage can store excess energy when on-line generation exceeds load (Energy Commission 2011b). Adding thermal storage to a concentrating solar power plant can result in generation of dispatchable electricity depending on daily resource constraints.

[3] Balancing electricity generation to load, while maintaining the voltage and frequency within operational tolerances, is achieved through resource commitment and dispatch. Fitting any particular generating unit into that process, whether conventional or renewable, is called integration. Integration is generally invisible to the consumer and allows generation and load (i.e., use) to be in harmony (Energy Commission 2011b). Ramping capability is typically expressed as MW per minute.

The project objectives also address obtaining site control and use within a reasonable time frame. Defining what is meant by a reasonable amount of time in the context of the time line for the proposed HHSEGS project is debatable. It is possible that the end of a reasonable time period defines the point at which schedule delays could cause the proposed project to become infeasible, but that point is not currently known. Given the number of property owners at the Sandy Valley Off-site Alternative, staff assumes that obtaining site control and use within a reasonable time period would be difficult and achieving this project objective might not be possible.

The Sandy Valley Off-site Alternative could potentially satisfy five of the seven project objectives. Like the proposed project, this alternative would have a limited ability to satisfy the project objective addressing operational flexibility. The objective to obtain site control and use within a reasonable period of time is also relevant to the discussion of potential feasibility of this project alternative (see below), and it is key to the success of the project. It is not known whether this project objective could be attained.

Potential Feasibility Issues

Staff submitted data requests for information on the potential feasibility and viability of constructing and operating a utility-scale renewable energy facility at the Sandy Valley alternative site. The applicant's data responses identify 16 property owners for the smaller site footprint in the Inyo County portion of the Sandy Valley area. In the data responses, the applicant states that "the feasibility of securing site control from this many property owners renders this alternative site infeasible from a transactional, financial, and project development scheduling perspective" (Hidden Hills Solar I and II, LLCs 2012b). In other responses to staff's data requests, the applicant states the following (Hidden Hills Solar I and II, LLCs 2011b):

> *Sandy Valley may have a sufficient amount of private land to accommodate the HHSEGS project, but many of the private parcels located in Sandy Valley are currently being used for agricultural purposes. Even assuming that the agricultural lands might be available for sale, land consolidation and landowner cooperation is expected to be too time consuming and costly to obtain site control within a reasonable time period and certainly not in time for planned commercial operations, targeted for the first/second quarter of 2015 .*

The statement by the applicant regarding the plan to achieve commercial operation of the project by the first or second quarter of 2015 refers to the applicant's project objectives, which are listed in the "Executive Summary" of the application for certification for the HHSEGS project (Hidden Hills Solar I and II, LLCs 2011a).

The issue of land ownership fragmentation is a topic that was generally addressed as part of the Renewable Energy Transmission Initiative (RETI), which is a California stakeholder process involving development of a conceptual plan to expand the state's electric transmission grid (Energy Commission 2009b). Work on the RETI process included identifying, characterizing, and ranking Competitive Renewable Energy Zones (CREZ) in California and neighboring regions. Areas potentially suitable for solar thermal development (referred to as *proxy* solar projects) were represented on RETI

maps as square areas containing 1,280 acres (2 square miles). Some of the extensively parcelized private lands are near existing infrastructure or are disturbed. Although these lands otherwise appear to be suitable for renewable energy development, proxy projects on properties with 20 or more different landowners were removed from the RETI maps or reshaped to conform to the threshold of 20 landowners per 2-square-mile area.

This 20-landowner criterion was chosen by the CREZ Revision Working Group based on the experience of solar and wind project developers. As a practical matter, increased development costs associated with negotiating land lease or purchase agreements with many landowners (e.g., 40 landowners at a theoretical 4-square-mile project site) could cause such projects to become uneconomical (or infeasible). Staff's study area for the Sandy Valley Off-site Alternative includes 3,354 acres; approximately 24 landowners are identified as owning property in the 5.24-square-mile area. This ratio is well under the threshold discussed in the 2009 RETI report. Nevertheless, securing site control at the Sandy Valley site would be challenging. Gaining site control of federally-owned properties could further complicate the work to secure site control.

The applicant responded to staff's data request for information on any private lands potentially for sale in the Sandy Valley area and described a site visit to the Sandy Valley area on February 3, 2011 (Hidden Hills Solar I and II, LLCs 2012b). No signs advertising property for sale were observed during the site visit. Online research conducted by the applicant indicated that, on average, privately owned properties in the Sandy Valley area of the state had not changed ownership for over 10 years. Most had changed ownership no more than once after the original land purchase or construction date, which was generally reported to be the late 1970s to early 1980s. The applicant states that no properties were listed for sale. Of the privately owned properties at the 3,119-acre alternative site delineated by the applicant, one property had been sold since 2008. It is possible that no property owners are considering selling property at the Sandy Valley alternative site; it is also possible that property owners would consider selling to an interested buyer.

In responses to staff's data request on the viability of the Sandy Valley Off-site Alternative, the applicant explains that bilateral negotiations with each landowner would be the only way to secure site control. The applicant describes how the "high number of parcels involved increases the risk that a landowner could choose not to sell, lease or option the parcel to Applicant, and increases the risk that other landowners may 'hold out' from agreeing to terms to obtain a better deal" (Hidden Hills Solar I and II, LLCs 2012b). The potential feasibility of gaining site control cannot be determined without additional research on the potential to secure site control of properties at the alternative site.

A February 2012 article in the Los Angeles Times reported on some of the successes of land brokers who have been purchasing thousands of acres in the Mojave Desert for possible utility-scale solar energy development (Los Angeles Times 2012). Some land brokers work for solar developers to negotiate land purchases from multiple property owners. Strata Equity Group is a real estate investment company that purchased

approximately 11,500 acres in the West Mojave for solar development. The purchase involved 66 land parcels that were owned by 40 landowners. Of the total acreage, approximately 6,000 acres were owned by one landowner. The total land purchase was completed in 4 years (Flodine, pers. comm., 2012). Purchases of properties are sometimes complicated by title exceptions on specific properties (e.g., mineral rights, various easements, road rights). It could take over 2 years to assemble the necessary acreage for a project at the Sandy Valley alternative site (Flodine, pers. comm., 2012). Whether or not site control and use could be obtained within a reasonable period of time would depend substantially on when negotiations were started relative to the overall project schedule.

The feasibility of obtaining site control and use at the Sandy Valley Off-site Alternative is not clear; however, gaining site control and use is essential to the success of the project. Given the greater number of property owners at the alternative site, it is assumed that gaining site control would delay the project schedule. It is not known at what point a project schedule delay would affect the feasibility of the project altogether.

Environmental Analysis

Alternatives Table 3 presents a summary comparison of impacts of the proposed HHSEGS project to the same or similar potential impacts of the Sandy Valley Off-site Alternative. The comparison of impacts to the proposed project is conveyed using these terms in a graded scale:

- Much less than HHSEGS
- Less than HHSEGS
- Somewhat less than HHSEGS
- Similar to HHSEGS
- Same as HHSEGS
- Somewhat greater than HHSEGS
- Greater than HHSEGS
- Much greater than HHSEGS

Impact conclusions for the proposed project and the comparative impacts for the alternatives are shown using these abbreviations:

— = no impact

B = beneficial impact

LS = less-than-significant impact, no mitigation required

SM or PSM = significant or potentially significant impact that can be mitigated to less than significant

SU or PSU = significant and unavoidable or potentially significant and unavoidable impact that cannot be mitigated to less than significant

Comparative discussions for each environmental topic area follow the table. As stated above, **Alternatives Appendix-3** contains a complete summary table comparing the potential impacts of the proposed project to the potential impacts of the project alternatives and the No-Project Alternative.

Alternatives Table 3
Summary Comparison of the Proposed Project's Impacts to the Sandy Valley Off-site Alternative

Environmental Effect	Proposed Project	Sandy Valley Off-site Alternative
Air Quality		
Construction-related emissions	SM	Similar to HHSEGS (SM)
Project operations emissions	SM	Similar to HHSEGS (SM)
Biological Resources		
Impacts on special-status plant species	SM	Much less than HHSEGS (SM)
Impacts on waters of the U.S. and waters of the state	SM	Much less than HHSEGS (SM)
Impacts on desert tortoise	SM	Much less than HHSEGS (SM)
Impacts on special-status terrestrial wildlife species (other than desert tortoise)	SM	Much less than HHSEGS (SM)
Impacts on avian species from collisions with project features (see biological resources note)	PSU	Similar to or somewhat greater than HHSEGS (PSU)
Impacts on avian species from exposure to concentrated solar flux	PSU	Similar to or somewhat greater than HHSEGS (PSU)
Potential impacts on groundwater dependent ecosystems	PSM	Somewhat less than HHSEGS (PSM)
Biological resources note: Collisions could be secondary to exposure to concentrated solar flux.		
Cultural Resources		
Potential to disturb, destroy, or visually degrade significant prehistoric and historical archaeological sites *on* the site (see cultural resources note)	LS	Somewhat greater than HHSEGS (PSM)
Potential to disturb, destroy, or visually degrade significant prehistoric and historical archaeological sites *beyond* the site	SU	Similar to HHSEGS (PSU)

Alternatives Table 3 Summary Comparison of the Proposed Project's Impacts to the Sandy Valley Off-site Alternative		
Environmental Effect	**Proposed Project**	**Sandy Valley Off-site Alternative**
Potential impacts on significant built-environment cultural resources *on* the site	SM	Similar to HHSEGS (PSM)
Potential impacts on significant built-environment cultural resources *beyond* the site	SU	Similar to HHSEGS (PSU)
Potential to disturb, destroy, or visually degrade significant ethnographic resources *on* the site	SU	Similar to HHSEGS (SU)
Potential to disturb, destroy, or visually degrade significant ethnographic resources *beyond* the site	SU	Similar to HHSEGS (SU)
Cultural resources note: "Site" means the facility site proper and does not include linear or ancillary infrastructure away from the facility site.		
Fire Protection		
Potential impacts on local fire protection resources	PSM	Similar to HHSEGS (PSM)
Potential impacts on emergency response services	PSM	Similar to HHSEGS (PSM)
Geology and Paleontology		
Potential impacts from strong seismic shaking	SM	Similar to HHSEGS (PSM)
Potential impacts from soil failure caused by liquefaction, hydrocollapse, formation of soil fissures, and/or dynamic compaction	SM	Similar to HHSEGS (PSM)
Potential impacts on paleontological resources	SM	Similar to HHSEGS (PSM)
Potential impacts on geological or mineralogical resources	LS	Similar to HHSEGS (LS)
Hazardous Materials		
Potential for release of hazardous materials to occur on-site	SM	Similar to HHSEGS (PSM)
Potential for release of hazardous materials to occur off-site	SM	Similar to HHSEGS (PSM)
Land Use		
Conflicts or inconsistencies with general plan land use designations and zoning	SU	Similar to HHSEGS (SU)
Conversion of agricultural land	—	Much greater than HHSEGS (SM)
Noise and Vibration		
Potential for noise to impact noise-sensitive receptors	PSM	Somewhat greater than HHSEGS (PSM)

Alternatives Table 3 Summary Comparison of the Proposed Project's Impacts to the Sandy Valley Off-site Alternative		
Environmental Effect	**Proposed Project**	**Sandy Valley Off-site Alternative**
Public Health		
Potential for project construction to cause air toxics-related impacts that could affect public health	LS	Similar to HHSEGS (LS)
Potential for project operations to cause air toxics-related impacts that could affect public health	LS	Similar to HHSEGS (LS)
Socioeconomic Resources		
Construction employment and increased taxes and fees	B	Similar to HHSEGS (B)
Displacement of existing rural residences	—	Greater than HHSEGS (LS)
Potential impacts on emergency medical and law enforcement services	PSM	Similar to HHSEGS (PSM)
Traffic and Transportation		
Potential impacts on roadway infrastructure	SM	Similar to HHSEGS (SM)
Potential for glint and glare to cause safety hazards or a distinct visual distraction effect from an operator control perspective (i.e., vehicle drivers and aircraft pilots)	PSM	Similar to HHSEGS (PSM)
Potential for construction equipment and/or permanent structures to exceed 200 feet in height above ground level	SM	Similar to HHSEGS (SM)
Transmission Line Safety and Nuisance		
Potential for impacts related to aviation safety, hazardous shocks, nuisance shocks, and electric and magnetic field exposure	SM	Similar to HHSEGS (SM)
Visual Resources		
Construction-Related Impacts		
Potential to substantially degrade the existing visual character or quality of the site and its surroundings	SU	Similar to HHSEGS (SU)
Potential to create a new source of substantial light or glare which would adversely affect day or nighttime views in the area	SU	Similar to HHSEGS (SU)
Project Operations Impacts		
Potential to substantially degrade the existing visual character or quality of the site and its surroundings	SU	Similar to HHSEGS (SU)
Potential to create a new source of substantial light or glare which would adversely affect day or nighttime views in the area	SU	Similar to HHSEGS (SU)
Waste Management		

Alternatives Table 3 Summary Comparison of the Proposed Project's Impacts to the Sandy Valley Off-site Alternative		
Environmental Effect	**Proposed Project**	**Sandy Valley Off-site Alternative**
Potential for disposal or diversion of project materials to cause impacts on existing waste disposal or diversion facilities	SM	Similar to HHSEGS (PSM)
Potential for impacts on human health and the environment related to past or present soil or water contamination	PSM	Somewhat greater than HHSEGS (PSM)
Soil and Surface Water		
Soil erosion by wind and water during project construction	SM	Similar to HHSEGS (SM)
Soil erosion by wind and water during project operations	PSM	Similar to HHSEGS (PSM)
Water quality impacts from contaminated storm water runoff	SM	Same as HHSEGS (SM)
Water quality impacts from storm damage	PSM	Similar to HHSEGS (PSM)
Water quality impacts from power plant operations	SM	Same as HHSEGS (SM)
Water quality impacts from sanitary waste	SM	Same as HHSEGS (SM)
Potential impacts from on-site and off-site flooding	SM	Similar to HHSEGS (SM)
Potential to impede or redirect 100-year flood flows, as shown on Federal Emergency Management Agency maps	LS	Similar to HHSEGS (LS)
Water Supply		
Potential impacts on local wells	PSM	Similar to HHSEGS (PSM)
Potential impacts on groundwater basin balance	PSM	Similar to HHSEGS (PSM)

Air Quality

Environmental Setting

The study area for the Sandy Valley Off-site Alternative is located in two of the state's air pollution control districts (APCDs). The jurisdictional boundary for the two APCDs in the Sandy Valley study area coincides with the boundary between Inyo and San Bernardino counties. Like the proposed project, the northern half of the study area for this alternative is in the Great Basin Unified Air Pollution Control District (GBUAPCD), which covers the state's Great Basin Valleys Air Basin. The southeastern portion of this air basin exceeds the state 1-hour ozone standard and the state 24-hour particulate

matter standard for particles with a size of less than 10 microns in diameter (PM10). The air basin is in attainment or unclassifiable for all of the federal standards and the state standards for carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and particulate matter with a particle size less than 2.5 microns (PM2.5). Refer to the **Air Quality** section of this staff assessment for additional information on the Great Basin Valleys Air Basin and the GBUAPCD.

The southern half of the study area for this alternative is in the Mojave Desert Air Quality Management District (MDAQMD). The Mojave Desert Air Basin covers an area that includes the MDAQMD. The portion of the study area for the Sandy Valley Off-site Alternative that is in the Mojave Desert Air Basin is designated unclassified for the federal 8-hour ozone ambient air quality standard and for the federal PM10 ambient air quality standard. The area is in attainment or unclassified for all other federal standards and averaging times. The portion of the alternative site that is in the Mojave Desert Air Basin has been designated moderate nonattainment for the state ozone ambient air quality standard and is also designated nonattainment for the state PM10 ambient air quality standard. The area is in attainment or unclassified for all other state standards. Local rules of the MDAQMD would apply to a project located in its jurisdiction. An entirely new Determination of Compliance from MDAQMD would also be required.

Environmental Impacts Pertaining to Both Air Basins

Exhaust emissions from heavy-duty, diesel construction equipment and fugitive particulate matter (dust) emissions would occur during project construction phases for the Sandy Valley Off-site Alternative. Exhaust emissions would also be caused during worker commute trips, hauling of equipment and supplies to the site, and operation of crew trucks (e.g., derrick trucks, bucket trucks, pickups). Workers and trucks hauling equipment and supplies would have to commute approximately 46 miles southwest to the alternative site, which is comparable to the driving distance to the proposed project site from the Las Vegas area. Approximately 50 percent of the workforce from California of the total employed workforce would be lodging in the Las Vegas area. Approximately 15 percent of the workforce would lodge and commute approximately 40 miles southeast to the alternative site from the city of Pahrump area, which is about 15 miles further compared to the distance between the proposed project site and the city of Pahrump. The remaining of those would presumable be lodging and commuting from Tecopa and Shoshone (Inyo County) and the distance would be about the same from the proposed project.

The proposed HHSEGS site is 20 miles northwest of the Sandy Valley Off-site Alternative site (as the crow flies). Under this alternative, appropriate conditions of certification for potential impacts on air quality at the Sandy Valley alternative site would likely involve similar, locally-oriented recommendations such as the conditions of certification presented in the **Air Quality** section of this staff assessment.

The preliminary staff assessment for HHSEGS was prepared with input from the GBUAPCD preliminary determination of compliance (PDOC) document for the proposed HHSEGS project. The HHSEGS project would comply with GBUAPCD rules and regulations.

Construction and operation of the energy facility at the Sandy Valley Off-site Alternative site would likely achieve compliance with GBUAPCD rules and regulations, for the emitting sources located in the area under the jurisdiction of GBUAPCD.

Like the proposed HHSEGS project, this alternative would emit some greenhouse gases (GHGs). However, construction and operation of a renewable energy facility at the Sandy Valley alternative site would contribute to meeting the state's RPS program goals, and it would result in a net cumulative reduction of GHG emissions as new and existing fossil fuel-fired electricity resources would be displaced.

Electricity is produced by operation of interconnected generation resources. Operation of one renewable energy power plant at the proposed project site or the Sandy Valley alternative site would affect all other power plants in the interconnected system. Operation of a renewable energy power plant at the Sandy Valley alternative site would generally affect the overall electricity system and GHG emissions levels.

These system impacts would result in a net reduction in GHG emissions across the electricity system providing energy and capacity to California. Like the proposed project, the Sandy Valley Off-site Alternative would result in a cumulative overall reduction in GHG emissions from power plants. This alternative would not worsen current conditions or make a cumulatively considerable contribution to any significant cumulative impact associated with GHGs.

Conclusion for Air Quality Impacts

Exhaust emissions from heavy-duty, diesel construction equipment and fugitive particulate matter (dust) emissions would be essentially the same for the Sandy Valley Off-site Alternative compared to the proposed HHSEGS project.

Construction and operational emissions at the Sandy Valley alternative site would be **similar to HHSEGS** for emitting sources.

Biological Resources

Biological resources staff toured the Sandy Valley Off-site Alternative study area on January 19, 2012. The California Natural Diversity Database (CNDDB) for the Sandy Valley study area (DFG 2012) was reviewed before the site visit, along with aerial imagery. The dominant land use is agriculture, with a network of irrigation drainages and pivots, and wind rows between crop fields. Agricultural uses have fragmented and degraded native habitat in the area. Goodding's phacelia (*Phacelia pulchella* var. *gooddingii*), a special-status plant, is recorded in the study area. Staff notes that the area has probably not been subject to biological surveys; therefore, negative CNDDB results are inconclusive as to the presence of special-status plants, wildlife, and habitat. Mesquite bosques are mapped south of the Sandy Valley Off-site Alternative site (DFG 2012), and as a phreatophytic vegetation type, could be impacted by declines in groundwater supply. All mesquite-dominant communities are rare in California and Nevada (Crampton et al. 2006; Sawyer et al. 2009). Given the widespread agricultural uses and resultant degradation of natural habitat and drainage patterns in the study

area, impacts on special-status plants, habitats, waters of the U.S., and waters of the state would be **much less than at the proposed HHSEGS site**.

No threatened or endangered wildlife are known to inhabit the area, and remaining native vegetation would likely not support threatened or endangered wildlife species such as the desert tortoise (*Gopherus agassizii*), which is *state and federally listed as threatened*. Impacts on special-status wildlife species would be **much less than at the HHSEGS site**. Under this alternative, potential impacts on terrestrial biological species and habitats at the Sandy Valley Off-site Alternative site could be reduced to less than significant with implementation of mitigation measures.

Avian impacts would stem from loss of habitat, collisions with project features, and injury or mortality from exposure to concentrated solar flux in the airspace over the heliostat field. Operational impacts of the proposed project would mainly affect avian species, including raptors, through exposure to concentrated solar flux. While little research-based data exists regarding the effects of power tower technology on avian species, it has been noted that agriculture can attract certain species of birds and bats. A scientific study in the *Journal of Field Ornithology* (McCrary et al. 1986) includes a recommendation that power tower projects "should not be sited in close proximity to open water or agricultural fields." Therefore, impacts on avian species from exposure to concentrated solar flux would **similar to or somewhat greater than HHSEGS**. Feasible mitigation measures to reduce operational impacts on avian species to below a level of significance have not been identified; therefore, this impact would remain significant and unavoidable.

The same authors (McCrary et al. 1986) also noted collisions of birds with heliostats. It is not known if these collisions were secondary to exposure to concentrated solar flux, and it is possible that either retinal damage or damage to flight feathers resulted in collisions. It is also known that anthropogenic structures can polarize light. Polarization occurs when light reflects off the surfaces of built structures, altering the property of the light waves. Polarized light pollution can alter the ability of wildlife to seek out suitable habitat, elude or detect predators, and detect natural polarized light patterns, which can affect navigation and ultimately, dispersal and reproduction (Horváth et al. 2009). Polarized light pollution has been demonstrated to significantly disrupt insect breeding behavior (Horváth et al. 2010). With the potential attractive qualities of the nearby agricultural fields, avian impacts from collisions with project features such as the power towers, heliostats, and other elevated buildings and power lines would be **similar to or somewhat greater than HHSEGS**. Feasible mitigation measures to reduce operational impacts on avian species to below a level of significance have not been identified for the proposed project. Like the proposed project, this impact would remain significant and unavoidable under the Sandy Valley Off-site Alternative.

Groundwater levels in the aquifer underlying the Mesquite Valley have been declining since the latter part of the 1900s (California Department of Water Resources 2004), yet not to as great an extent as the decline in Pahrump Valley. Declines in groundwater levels primarily impact phreatophytes, or plants with deep roots that draw upon groundwater. Degradation of those types of plants may cause further degradation of the

environment and could impact associated special-status plants and wildlife. DFG has mapped mesquite bosques approximately 3 miles southeast of the Sandy Valley alternative site (DFG 2012). Mesquite is a phreatophyte. Staff has determined that impacts on the groundwater basin under this alternative would be "similar to HHSEGS" and could be mitigated to below a level of significance (see the subsection below, "Water Supply," for this alternative). Agricultural use has likely limited the presence of unmapped phreatophytes in the Sandy Valley study area; therefore, the effect of declining groundwater levels on groundwater dependent species is **somewhat less than HHSEGS** under this alternative. For the proposed HHSEGS project, conditions of certification are recommended to reduce the level of significance for potential impacts on water resources. (Refer to the **Water Supply** section of this staff assessment for a discussion of groundwater resources.) The same or similar conditions of certification could also be implemented at the Sandy Valley site, which would reduce potentially significant impacts on groundwater-dependent species (e.g., mesquite bosques) to less than significant.

Cultural Resources

This analysis is based on information from records searches conducted on behalf of staff by the San Bernardino Archaeological Information Center and the Eastern Information Center of the California Historical Resources Information System, and the Harry Reid Center for Environmental Studies at the University of Nevada, Las Vegas. Staff also relied on draft results of primary ethnographic research conducted by staff for the proposed project. Staff's analysis of available maps and remote imagery contributed key information. Absent more intensive research on the Sandy Valley Off-site Alternative site, the conclusions of this analysis have a significant margin of error.

Based on the discussions below of the environmental contexts and potential effects of the Sandy Valley Off-site Alternative on cultural resources, impacts under this alternative would be **somewhat greater than those of the proposed HHSEGS project**.

Environmental Setting

Natural Setting

The present climate in the proposed project region represents a moderately dry and harsh period relative to the last 12,000 years, the minimum timeframe for a human presence in the Mojave Desert. Since the late Pleistocene epoch (prior to 10,000 years ago), Mojave Desert climate can be split into three broad phases:

- *Pleistocene* – This geological epoch was much more moist or mesic relative to the present climate, which led to the development of a number of large permanent lakes on the floors of the region's valleys.
- *Early Holocene* – The lakes slowly evaporated during the early Holocene epoch (10,000 years ago to present) as the climate progressively became more arid.

- *Mid-Holocene Altithermal* – The period from approximately 5000 to 3000 B.C. marks a time of extreme aridity, often referred to as the mid-Holocene Altithermal (Antevs 1948), and the final desiccation of the lakes in the region.

The climate since approximately 3000 B.C. has typically been more mesic relative to conditions during the Altithermal, and evidence indicates particularly wet periods from approximately 1000 B.C. to A.D. 1, and again from approximately A.D. 500 to 1400 (Bamforth 1990, p. 72).

Cultural Setting

Prehistory

A more comprehensive discussion of the prehistory of the eastern Mojave Desert and the vicinity of the Pahrump and Mesquite valleys is in the **Cultural Resources** section of this staff assessment. The background information providing the broader prehistoric context for the proposed project site also applies to the alternative site.

The prehistory of the eastern Mojave Desert is the narrative of how human populations have adapted to marked fluctuations in the local environment over at least the last 12,000 years. The archaeological remains of the region's prehistory are relatively scarce. Sparse scatters of stone tools and chipped stone tool manufacturing debris, and isolated artifacts, resources that typically yield information of marginal value, account for 40 to 60 percent of the archaeological remains found in the Mojave and Colorado Deserts. A relative paucity of intact buried archaeological deposits contributes further to the dearth of information on the prehistory of the region (Lyneis and Macko 1986, p. 52). The availability of water and the location of high-value resource patches in otherwise unproductive habitats appear to influence the distribution of the archaeological sites on the desert landscape (Lyneis and Macko 1986, p. 57; Sutton et al. 2007, p. 230). The broad trajectory of cultural development in the Mojave Desert may be characterized by the steady decline in residential mobility as local populations began to occupy increasingly larger valley or basin bottom base camps, in a few preferred locations and over longer periods of time, rather than working out of temporary camps in particularly productive environmental zones (Bamforth 1990, p. 74).

Ethnography

A broader ethnographic context for the Pahrump Paiute, the Native American community with the most direct apparent connection to the Sandy Valley Off-site Alternative study area, is in the **Cultural Resources** section of this staff assessment. Most, if not all of the background information provided as the broader ethnographic context for the proposed project site also applies to the alternative site.

The Sandy Valley study area is in the Pahrump Paiute Tribe's ancestral territory. The valley rests between two tribal districts. The Potosi District east of the study area is traditionally represented by Chief To-ko'-pur, who was widely referred to as Chief Tecopa. He was also the head Chief for the larger seven-district ancestral territory of the Pahrump Paiute tribe. Chief Tecopa passed away in 1904. The Mo-quats District west of the study area was represented by Chief Hu-nu'na-wa. The Sandy Valley study

area was part of a commonly used area between the two districts. The Potosi District's center is Potosi Mountain, and the Mo-quats District's center is Kingston Peak. Several springs exist around the flanks of each mountain, which were centers for family units that seasonally traversed the districts' mountains, lower flanks, valley floors and the washes that drain the mountain slopes and eventually lead to Mesquite Dry Lake. Some of the significant springs that anchored family units in the vicinity of the Sandy Valley alternative study area are Potosi Spring, Cave Spring, Horsethief Spring, and Cave Spring. Although Pahrump tribal families have since moved away from the springs to Pahrump or Las Vegas or other areas, the Sandy Valley area and the mountains to the east and west of the valley are still used by Pahrump Paiute for traditional purposes.

History

Various historic-era transportation corridors/roads traverse the valley, and late-19th century homesteads and mines and mining-related features dot the region. The Sandy Valley Off-site Alternative site is between the Goodsprings and Ivanpah mining districts and in the Old Spanish Trail-Mormon Road corridor. Goodsprings Mine and Ivanpah Mine are approximately 15 miles east and 40 miles south of the Sandy Valley alternative site, respectively.

Extant Alternative Site Information

Cultural Resource Inventory

Results of the records searches conducted for the Sandy Valley Off-site Alternative indicate a relative dearth of cultural resources on the alternative site; however, one previous investigation is recorded for the alternative site (Knight and Leavitt 2003). An intensive pedestrian survey was done together with a land exchange between the American Gear Reduction Company, BLM's Barstow Field Office, and Death Valley National Park. A total of approximately 3,747 acres was surveyed on six discontiguous parcels. Parcels 2 and 3 (Knight and Leavitt 2003, Survey Area Maps 2 and 3 of 4, respectively) of the survey area cover a total of approximately 573 acres of the Sandy Valley Off-site Alternative site, which represents approximately 17.1 percent of the 3,354-acre site. The survey of parcels 2 and 3 resulted in the discovery of one prehistoric archaeological deposit (CA-SBR-12121) of groundstone fragments, chipped stone debris, and fire-affected rock; one complete prehistoric sandstone metate (CHRIS Primary No. 36-020480); one historical archaeological site (CA-SBR-12124H), a probable former homestead that includes a grave from 1940, a wellhead, and two historic refuse scatters; two complete glass condiment jars dating to the 1940s and recorded as one historical archaeological isolate (CHRIS Primary No. 36-020488); and the remains of what may be an historic irrigation ditch (CA-SBR-12123H). Study of available maps and remote imagery reveal a few scattered homes and farming operations on some properties in the study area. (See the "Land Use" subsection below for a description of land uses on the alternative site.) The buildings on the site appear to consist of non-historic age single-family homes and associated structures (e.g., sheds, detached garages, etc). Historic aerial photographs show the circular patterns of the sprinkler systems in use after 1958. The 1989 aerial photograph shows only one of the six irrigated crop circles from the earlier photograph.

The prehistory and history of the Sandy Valley area are generally known, and this investigation shows a cultural resources inventory that is broadly consistent with expectations. Prehistoric materials largely include sparse, isolate chipped stone debris, and rarely, small, more diverse deposits of chipped stone, groundstone, and fire-affected rock. These artifacts represent a light, transitory prehistoric use of the Mesquite Valley floor approximately 8 miles northwest of the center of Mesquite Lake playa. The character of the known archaeological deposits along the valley margins and the zone of relict former shorelines around Mesquite Lake indicate, at least, a later, more intensive prehistoric use of those areas. Most of the known historical archaeological materials on the alternative site represent the cycle of homesteading that General Land Office records indicate took place from approximately 1925 through 1936. Built-environment resources, including buildings, structures, and linear infrastructure elements, show evidence of the mid- to late-20th century farming operations and rural residential uses in the area. A segment of an apparent wagon road that has been identified as the 1880s Hay Road terminates outside of the alternative site's south-central boundary. No further evidence of the road has been identified on the alternative site.

A complete analysis of the potential effects of the Sandy Valley Off-site Alternative on cultural resources would require an assessment of the uses of the known inventory of archaeological and built-environment resources on the site. Extant data limitations would be identified and also considered. The prior archaeological data represents a small portion of the floor of the Mesquite Valley that did not include the valley margins where prehistoric archaeological deposits are more likely to be found. Therefore, the sample surveyed area may underrepresent the actual number of archaeological resources on the alternative site. Conversely, the mid- to late-20th century farming uses have probably disturbed or obliterated surface prehistoric and historical archaeological deposits in the area, which could also indicate potential losses of archaeological deposits in the valley margins. Farming uses might have obliterated the segment of the Hay Road that may have traversed the Sandy Valley study area. A pedestrian survey of the rest of the alternative site would be necessary to verify the extent of farming uses and note the locations and condition of disturbed archaeological deposits in those areas. This information would help establish the original frequency of surface archaeological deposits across the alternative site and also function as a potential index of the distribution of subsurface archaeological resources. The lack of information on the geoarchaeology of the alternative site and the limitations of the one extant pedestrian survey sample make it difficult to assess the potential presence of subsurface archaeological deposits and the effects of this alternative on any such deposits, if they are present. A built-environment reconnaissance or survey of the site would be necessary to verify the results of staff's analysis of available maps and remote imagery.

Complete studies have also not been conducted to identify all ethnographic resources in and around Sandy Valley. However, several resources were identified in the broader ethnographic studies for the proposed HHSEGS project, approximately 15 miles northwest of the Sandy Valley study area. These are the known ethnographic resources near the alternative site:

- *Potosi Mountain* – A vision questing place.
- *Sandy Valley* – The Coyote Trail Song goes through Sandy Valley. The valley is also the locale featured in a Pahrump Paiute legend concerning a large prehistoric bird, its large egg, and a Pahrump Paiute man that survives an encounter with the bird. The bird preyed upon humans.
- *Kingston Mountains* – A legend concerns Owl, who made his home in the Kingston Mountains. One of Owl's many feats was the creation of the Kingston Mountains as a way to turn the Colorado River towards its current course. The mountains continue to be a place where pinyon nuts are gathered, and bighorn sheep and deer are hunted.

Potential for Significant Cultural Resources and Character of Resource Values

Absent complete archaeological and built-environment surveys, a geoarchaeological analysis, and an ethnographic study, it is difficult to evaluate the likelihood of occurrence or character of any relatively intact, historically significant cultural resources that may be present on the alternative site or in its vicinity. Cultural resources may be on the alternative site or nearby that could potentially be historically significant for their informational and associative values. In general terms, resources could include relatively well-preserved transient prehistoric camps on the valley floor; larger, more long-term camps toward the valley margin; and archaeological remains of early-20th century homesteads. Based on this initial investigation, built-environment resources on the alternative site appear unlikely to be determined historically significant.

A number of linear cultural resources probably traverse and extend beyond the alternative site. Linear resources such as prehistoric trails or historic wagon roads, which have the potential to be historically significant for their informational and associative values, have probably been subject to significant degradation on the alternative site as a result of relatively recent farming activities, while the off-site portions of those resources, depending on the nuances of local land use history, may be largely intact. Any on-site trail and road segments may not have retained enough integrity to contribute to the potential historic significance of the whole linear resource(s). Intact off-site segments may retain their integrity. The alternative site and its vicinity are in the broader area of the Old Spanish National Historic Trail corridor. Intact segments of the Old Spanish Trail and the Mormon Road that relate to the broader management corridor and that could contribute to the historic significance of this National Historic Trail may exist within sight of the Sandy Valley Off-site Alternative study area. If that assumption is correct, those segments would be considered in a detailed analysis of this alternative.

The Sandy Valley Off-site Alternative could potentially degrade the visual integrity of archaeological, built-environment, and ethnographic resources both on the alternative site and in its vicinity. Off-site archaeological deposits and built-environment resources that may be historically significant for their associative values could potentially be subject to this visual degradation. Based on this initial investigation, off-site archaeological resources vulnerable to a substantive loss of integrity due to visual degradation would include clusters of the same types of transient prehistoric camps on

the valley floor that were found on the alternative site, and the larger, more long-term camps that could be present toward the valley margin. Without further analysis, it is difficult to envision how individual resources like these would be found to be historically significant for their associative values. It is possible that a multiple-deposit district of such resources, were such a district to be present in the vicinity of the alternative site, could have the potential to be historically significant for its associative values, and as a consequence, any potential loss of visual integrity would need to be considered.

Staff's review of satellite imagery and interpretation of visual vegetation association signatures indicate the potential presence of a mesquite bosque-coppice dune landscape component approximately 3.3 miles southeast of the alternative site. This vegetation association is along apparent former shorelines north of the Mesquite Lake playa that may be analogous in structure, integrity, and historic significance to the Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape identified immediately northeast of the proposed project site. Both resources overlie the Pahrump Valley fault zone, which is a segment of the Stateline fault zone discussed in the **Geology and Paleontology** section of this staff assessment. The cultural resources analysis for the proposed HHSEGS project addresses the influence of the fault zone on creation and sustenance of the vegetation association of the archaeological landscape. Additional research would be needed to verify the presence of an analogous resource near the Sandy Valley alternative site.

Based on records search data that encompass a substantial portion of the unincorporated community of Sandy Valley, Nevada, it is unlikely that historically significant built-environment resources are present in the area that could be visually impacted by this alternative.

Environmental Effects and Mitigation Measures

Construction and operation of a renewable energy facility at the Sandy Valley alternative site could potentially physically disturb and visually degrade historically significant cultural resources both on and near the alternative site. Disturbance or destruction of prehistoric and historical archaeological sites that may be on the alternative site could also alter or destroy the integrity of the information for which individual sites may be of value. Mitigation measures would be required to compensate for the loss of those data sets for which each individual archaeological deposit had been found to be significant. Such mitigation measures typically include data recovery excavations.

The potential exists for this alternative to visually impact historically significant prehistoric or historical archaeological districts that may be identified in the vicinity of the alternative site. If further study confirmed the Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape analog southeast of the site, mitigation measures would be required for the potential degradation of the setting, feeling, and association for any of these resources and the consequent inability of each respective resource to convey the associative values for which it had been found to be significant. Mitigation measures would specifically address the unique associative values for each impacted resource. Mitigation measures could include higher resolution resource

recordation, sharing of knowledge about subject resources through dissemination of public outreach materials, and implementation of compensatory mitigation.

Based on staff's analysis, any effects that construction and operation of the alternative facility could have on built-environment resources would primarily occur in the vicinity of the alternative site rather than *on* the alternative site. The one known built-environment resource on the alternative site is described above. The only remnants of historic era activity remaining on the site include fences, agricultural equipment, and cleared areas that have not yet been fully reclaimed by the desert. The presence and historic significance of the trail and road segments on and adjacent to the alternative site are unconfirmed; however, if any such resources are present, they may not have retained enough integrity to contribute to the potential historic significance of the whole linear resources. Segments adjacent to or near the alternative site may, in theory, retain such integrity, and could require mitigation measures similar to what is described above for the potential degradation or loss of archaeological resources and their respective associative values.

The potential for construction and operation of the alternative facility to significantly impact ethnographic resources is difficult to assess. Further focused study would contribute to a more substantive analysis of these resources, and as already noted, more comprehensive ethnographic work would be necessary to identify and evaluate a relatively complete inventory of local ethnographic resources. Based on this initial investigation, the alternative facility would constitute an intrusive visual element in Sandy Valley. This alternative would degrade views both from and toward Potosi Mountain and the Kingston Mountains. A more comprehensive analysis would be necessary to assess whether the alternative facility's visual effect on local ethnographic resources would qualify as a substantial adverse change in the significance of those resources determined to be eligible for listing in the California Register of Historical Resources. The Sandy Valley Off-site Alternative could potentially introduce intrusive visual elements into Sandy Valley at a scale that would exceed that of any other built visual elements in the valley. Mitigation measures would be required for the potential degradation of the integrity, setting, feeling, and association for significant ethnographic resources. Mitigation measures could include completing thorough ethnographic investigations to contextualize, document, and interpret the subject resources; and other measures to facilitate the preservation of Pahrump Valley Paiute culture. No feasible mitigation measures would resolve the significant visual effects of the alternative facility on the local ethnographic resources, and the impact would remain significant and unavoidable. A group of views in the valley and beyond that are critical to the fabric of Pahrump Valley Paiute culture would be irreparably compromised.

Comparison to the Proposed Project

Archaeological Resources

Construction and operation of the Sandy Valley Off-site Alternative could cause impacts on prehistoric and historical archaeological resources that would be **somewhat greater than the proposed project**. This off-site alternative may have a more diverse and potentially significant suite of both prehistoric and historical archaeological resources

that would most likely be subject to physical disturbance or destruction. No significant archaeological deposits are known to be located on the proposed project site. The potential effects of this alternative on archaeological resources beyond the alternative site would be comparable to the effects of the proposed project on such resources. The visual effects of this alternative on the potential Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape analog southeast of the alternative site would, in theory, be roughly equivalent to the proposed project's visual effects on the identified Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape. The net on-site effects of this alternative on archaeological resources would be **somewhat greater than those of the proposed project**, and off-site effects would be **similar to HHSEGS**.

Built-environment Resources

Regarding the built-environment cultural resources, development of a solar facility on the Sandy Valley Off-site Alternative site would most likely have a **similar level of effect compared to the proposed project**. A utility-scale renewable energy facility at either location has the potential to significantly impact different portions of the same resource—the Old Spanish Trail-Mormon Road. More site-specific information about the cultural resources on the Sandy Valley alternative site would better qualify this comparison.

Ethnographic Resources

Based on this initial investigation, the potential effect of this alternative on ethnographic resources in Sandy Valley would be **similar to the effects of the proposed project on analogous resources in the Pahrump Valley**. Like the proposed project, no feasible mitigation measures would reduce the significant visual effects of this alternative on local ethnographic resources to a less-than-significant level, and the impact would remain significant and unavoidable. Two groups of views critical to the fabric of Pahrump Valley Paiute culture would be irreparably compromised.

Fire Protection

Under the Sandy Valley Off-site Alternative, potential impacts on local fire protection resources would be similar to the impacts that would occur at the proposed HHSEGS project site. Similar to the proposed project, fire protection resources to serve the local communities are limited in the region that includes the study area for this alternative. Staff concludes that the impacts on local services would be **similar to the proposed HHSEGS project** for this off-site alternative. Impacts on fire protection from construction and operation of the proposed project are evaluated in the **Worker Safety / Fire Protection** section of this staff assessment. Like the proposed HHSEGS project, staff concludes that impacts on the local fire department would be significant under this alternative due to the predicted increase in emergency response calls during project construction and operation. Mitigation measures for these impacts would likely require payment of as yet undetermined project-specific fees to the local fire protection service to enable augmentation of resources such as staff, equipment, and facilities. With implementation of appropriate mitigation measures, impacts on local emergency services would be reduced to less than significant.

Geology and Paleontology

The Sandy Valley Off-site Alternative is located in the Mesquite Valley, approximately 17 miles southeast of the proposed HHSEGS site. Mesquite Valley is in an active geologic area along the border between southern California and southern Nevada, approximately 35 miles southwest of Las Vegas, Nevada, and 80 miles southeast of Death Valley. The alternative site could be subject to strong levels of earthquake-related ground shaking. The closest known active fault is a segment of the Stateline fault zone, which is immediately adjacent to the site's eastern boundary along the border between California and Nevada. Additional active faults in the vicinity are the Garlock fault (30 miles southwest of the alternative site) and the Southern Death Valley fault zone (33 miles southwest).

Mitigation measures would be required to reduce the effects of strong ground shaking on structures at the Sandy Valley Off-site Alternative site to the extent practicable. Mitigation measures would address structural design requirements consistent with requirements of the most recent edition of the California Building Code (CBC) (California Building Standards Commission 2010), which requires that structures be designed to resist seismic stresses from ground acceleration. Implementation of feasible mitigation measures would reduce potential impacts on structures that could be affected by strong ground shaking to less than significant.

The alternative site could also be subject to soil failure caused by liquefaction, hydrocollapse, formation of soil fissures, and/or dynamic compaction. A design-level geotechnical investigation would be required for this alternative consistent with CBC requirements (California Building Standards Commission 2010), and conditions of certification would be recommended, including implementation of standard engineering design requirements to reduce the effects of strong seismic shaking and potential excessive settlement due to collapsible soils, formation of soil fissures, and/or dynamic compaction. With implementation of mitigation measures, these impacts would be reduced to less than significant.

No known viable geologic or mineralogical resources are present at the proposed Sandy Valley Off-site Alternative site. Unique geological features (paleosprings) that exist east of the site are associated with fault scarps belonging to segments of the Stateline fault zone. There is no evidence of paleosprings on the site. However, channels and associated deposits formed by flows from these springs may traverse the site. Potential impacts on paleontological resources due to construction activities would be mitigated to less than significant through worker training and monitoring by qualified paleontologists.

Environmental Impacts Pertaining to Both Sites

Like the proposed project, the potential for geologic hazards to cause significant adverse impacts on this alternative's project facilities during its design life would be low. Similarly, the potential for construction, operation, and closure of either the proposed project or this alternative to cause significant adverse impacts on geological, mineralogical, and paleontological resources would be low. Like the proposed project,

design and construction of the Sandy Valley Off-site Alternative would be completed in accordance with all applicable LORS, and in a manner that protects environmental quality and assures public safety, to the extent practicable.

Environmental Impacts Compared to the Proposed Project

Due to the documented occurrence of fissure development in the Pahrump Valley, the proposed project has some susceptibility to soil failure caused by earth fissuring. Conversely, documentation of ground fissuring in the Mesquite Valley was not found. Therefore, the Sandy Valley Off-site Alternative has a lower susceptibility to ground fissuring than does the proposed project. Overall, potential impacts on geological and paleontological resources under this alternative would be **similar to HHSEGS**. As discussed above, implementation of all feasible mitigation measures would reduce potential impact on geological and paleontological resources to less than significant.

Hazardous Materials

Under the Sandy Valley Off-site Alternative, the project elements and major facility components would be similar to those associated with the proposed HHSEGS project. As discussed in the **Hazardous Materials** section of this staff assessment, conditions of certification requiring conformance with applicable LORS would reduce potentially significant impacts to less than significant. Staff did not identify any new or more severe significant off-site impacts posed by hazardous materials use at the alternative site. The potentially significant impacts under this alternative would be **similar to HHSEGS**.

Land Use

Environmental Setting

The study area for the Sandy Valley Off-site Alternative includes land in Inyo and San Bernardino counties. The Sandy Valley study area is sparsely developed with agricultural uses on some properties. Based on a review of Google Earth aerial images, several structures, including a few residences, are located in the study area near farmed properties. Parcels at the Sandy Valley study area are shown in **Alternatives Figure 3**. The subsections that follow describe the land use effects of a renewable energy facility at the Sandy Valley alternative site. Refer to the subsection, “Socioeconomic Resources,” (below) for a discussion of the potential effects of this alternative on landowners.

Inyo County General Plan

The northern portion of the area identified as the Sandy Valley Off-site Alternative is designated Agriculture (A) in the Inyo County General Plan (Inyo County 2001). The Agriculture land use designation provides for agricultural uses on land that is suited for the production of food and fiber on a regular and sustained basis, limited agricultural support services, agriculturally-oriented services, agricultural processing facilities, public and quasi-public uses, and certain compatible nonagricultural activities (Inyo County 2001). The Agricultural Resources Element includes a goal to “provide and maintain a viable and diverse agricultural industry in Inyo County.” Related Policies AG-1.2 and AG-1.3 address supporting continuance of agricultural production activities in the county

and discouraging the conversion of productive agricultural lands for urban development. The Land Use Element includes Policy LU-1.6, "Sandy Valley," which states that "[t]he County shall preserve agricultural and related open space uses on private lands in Sandy Valley and will not designate additional land for rural residential development." The Inyo County General Plan applies to all parts of the county, including lands that are managed by the federal government (Hart, pers. comm., 2012).

A February 23, 2012, letter from Inyo County to BrightSource Energy, Inc. describes Inyo County requirements to ensure consistency of the proposed project with the Inyo County General Plan (Inyo County 2012c). Inyo County staff lists options to bring the proposed project into consistency with the Land Use Element; these options also apply to the Sandy Valley Off-site Alternative (Hart, pers. comm., 2012). The applicant's first option is to submit a general plan amendment (GPA) to change the site's land use designation to General Industrial (GI). The second option is to process a GPA for a solar energy development land use designation or overlay that would be applied to the site.

The Sandy Valley Off-site Alternative is in the Open Space (OS) zoning district with a minimum parcel size of 40 acres; the same zoning district applies to the proposed HHSEGS site. Inyo County staff states that power plants are conditionally permitted only in the General Industrial and Extractive (M-1) zoning district (Inyo County 2012c).

Use of the northern portion of the Sandy Valley alternative site for construction and operation of the project would require local land use approvals from Inyo County, including a general plan amendment to ensure consistency of a utility-scale energy facility at the Sandy Valley alternative site with the Land Use Element. A zoning district change or zone text amendment (e.g., creation of a *solar energy zone* or similar overlay) would also be required. Other options to changing the zoning district include applying for a *planned unit development*, *renewable energy development agreement*, and/or a *renewable energy permit*. Each of these agreements would allow a waiver of zoning standards. Construction and operation of an approximately 500-MW renewable energy facility at the Sandy Valley Off-site Alternative site would be inconsistent with Inyo County's general plan land use designation and zoning district for the study area; without a general plan amendment and accompanying zoning change, this impact would be significant and unavoidable.

For the land use impact pertaining to potential conflicts with applicable land use plans, the impact would be **similar to HHSEGS** for the portion of the alternative project site that is in Inyo County. This conclusion is based primarily on discussions with Inyo County staff and planning issues outlined in the February 23, 2012, letter from Inyo County staff.

San Bernardino County General Plan

The southern portion of the area identified as the Sandy Valley Off-site Alternative is designated Resource Conservation (RC) in the San Bernardino County General Plan. This land use designation does not apply to two parcels in the Sandy Valley study area

that are managed by BLM (**Alternatives Figure 3**). The Resource Conservation land use zoning district[4] is intended to encourage limited rural development while maximizing preservation of open space, watershed, and wildlife habitat areas; identify areas where rural residences may be established on lands with limited grazing potential; prevent inappropriate urban population densities in remote and/or hazardous areas of the county; and establish areas where open space and nonagricultural activities are the primary land uses, but where agriculture and compatible uses may coexist. Lands designated as Resource Conservation include "[a]reas with limited or no infrastructure facilities and where none are planned within the next twenty years" (San Bernardino County 2011).

The Sandy Valley Off-site Alternative is located in the Resource Management zoning district, which allows for electrical power generation with approval of a conditional use permit (San Bernardino County 2012). Chapter 84.29 of the San Bernardino County Development Code addresses specific use regulations that apply to the establishment, maintenance, and decommissioning of renewable energy generation facilities. The Resource Conservation land use zoning district is one of several identified in Subsection 84.29.040 as allowing development of renewable energy facilities (San Bernardino County 2012).

Use of the southern portion of the Sandy Valley alternative site for construction and operation of a renewable energy project requires local land use approvals from San Bernardino County, including a conditional use permit for construction of an electrical power generation facility in the Resource Management zoning district. Compliance with the standards and permit procedures of Chapter 84.29 of the San Bernardino County Development Code would be required.

For the land use impact pertaining to potential conflicts with applicable land use plans, the impact would be **less than HHSEGS** for the portion of the alternative project site that is in San Bernardino County. This conclusion is based primarily on the fact that a renewable energy facility is an allowable use in the Resource Conservation land use zoning district.

Conclusion Regarding Potential Inconsistencies with General Plan Land Use Designations and Zoning

For the Sandy Valley Off-site Alternative study area as a whole, the impact pertaining to consistency with applicable plans and policies is **similar to HHSEGS**, and the impact is significant and unavoidable without a general plan amendment and zoning district change.

[4] San Bernardino County uses the term *land use zoning district* instead of *land use designation*; the latter term is more commonly used by local jurisdictions to identify designated land uses referenced in general plans.

Northern and Eastern Mojave Desert Management Plan

The study area for the Sandy Valley Off-site Alternative includes three noncontiguous parcels under federal management totaling approximately 657 acres (**Alternatives Figure 3**). These vacant, undeveloped parcels are presumed to be within the planning area of the Northern and Eastern Mojave Desert Management Plan (NEMO Plan), which was adopted in 2002 as an amendment to the CDCA Plan. The Record of Decision (ROD) approving the NEMO Plan describes several plan amendment decisions (BLM 2002). A partial list of topics addressed in the NEMO Plan includes the following:

- Establishment of regional standards for public land health and guidelines for grazing management.
- Establishment and management of areas for protection of sensitive species (e.g., desert tortoise).
- Management of areas for wild horses and burros.
- Identification of several river segments for potential inclusion in the National Wild and Scenic Rivers System.
- Establishment of the Amargosa River and Carson Slough Areas of Critical Environmental Concern in the Amargosa watershed.
- Identification of priorities for potential acquisition of private lands and disposal of public lands.

The Pahrump Valley Wilderness encompasses approximately 73,725 acres and is adjacent to the west side of the Sandy Valley Off-site Alternative. None of the properties composing the Sandy Valley study area are inside the Pahrump Valley Wilderness.

The final environmental impact statement for the NEMO Plan includes a land tenure strategy, which identifies public lands in identified disposal areas for potential conveyance out of federal ownership for future private sector use and development and for necessary public purposes (BLM 2002). A few hundred acres of public lands in the Mesquite Valley are identified as unclassified and available for future disposal; parcels identified in this manner include the two BLM properties on the east side of the Sandy Valley Off-site Alternative site (see **Alternatives Figure 3)**. The larger BLM parcel at the southwest corner of the alternative site is not identified in the land tenure strategy for the NEMO Plan.

All actions on public lands must be in conformance with applicable BLM land use plans (43 Code of Federal Regulations § 1610.5-3). Any proposals or actions determined not to be in conformance with these plans would require the analysis of a land use plan amendment. It is stated in the CDCA plan that “[s]ites associated with power generation or transmission not identified in the Plan will be considered through the Plan Amendment process” (BLM 1980). Construction and operation of a renewable energy facility at the Sandy Valley Off-site Alternative could require amending the CDCA plan prior to approving a proposed right-of-way grant for lands that are managed by BLM. Initial steps to coordinate with BLM would include filing Standard Form SF-299,

"Application for Transportation and Utility Systems and Facilities on Federal Lands." For the two parcels at the alternative site that are identified by BLM as unclassified and available for disposal, it is unknown if filing of Standard Form SF-299 would be required. If these properties remain under federal management, some type of agreement for their use or purchase could be required.

Potential Conversion of Agricultural Land

The Farmland Mapping and Monitoring Program does not maintain Important Farmland data for most of the state east of the Central Valley and the Sierra Nevada. However, several properties in the area of the Sandy Valley Off-site Alternative are in agricultural use. Alfalfa for hay, garlic, and potatoes are currently grown on the site or in the surrounding area, and three new groundwater wells were recently constructed to provide water for irrigation (Milovich and Cleland, pers. comms., 2012). The crops being grown in the Mesquite Valley are generally water intensive. Although sod used in landscaping has been grown at the site, the housing downturn in Las Vegas decreased the demand for sod to such an extent that production has practically ceased. Relatively low land values, an available groundwater supply, and a potential market for the crops that are produced have generally contributed to the success of farming operations in the Mesquite Valley (Cleland, pers. comm., 2012). For example, alfalfa for hay feeds dairy cattle in the Central Valley (Miller, pers. comm., 2012). A total of approximately 2,050 acres of land are irrigated for agricultural uses in the Mesquite Valley area of the two California counties (Milovich and Cleland, pers. comms., 2012). Based on staff's review of aerial photographs for 2008 and 2009, a total of approximately 750 acres of land may be cultivated and irrigated in the study area.

Construction and operation of a project at the site would convert approximately 750 acres of existing farmland to a nonagricultural use. Of the total acreage, approximately 325 acres are designated Agriculture (A) in the Inyo County General Plan. No agricultural land is present at the proposed HHSEGS project site. The impact related to conversion of agricultural land would be **much greater than HHSEGS** at the Sandy Valley Off-site Alternative site, and this impact is considered significant. As discussed above, construction and operation of a utility-scale renewable energy facility at the Sandy Valley alternative site would require a GPA for the portion of the site that is in Inyo County. A zoning district change or other type of agreement with Inyo County would also be required.

Implementation of one or more conditions of certification would be required to reduce the impact of converting the total approximately 750 acres of existing agricultural land to nonagricultural use. The project applicant could be required to coordinate with the Agricultural Commissioner's Offices for the two counties to determine appropriate compensation for the conversion of agricultural land. Implementation of conditions of certification would reduce the impact of conversion of agricultural land to less than significant.

Noise and Vibration

This site is located approximately 20 miles southeast of the proposed HHSEGS site and has a similar topography as the HHSEGS site. The surrounding area is populated with

slightly more noise-sensitive receptors than the proposed HHSEGS site. The noise impact is estimated to be **somewhat greater than HHSEGS** due to the higher number of receptors near the site, including a community center with recreational and administrative uses and sparsely developed residential uses. Like the proposed project, conditions of certification would be required to ensure that potentially significant noise impacts were reduced to less than significant during project construction and operation.

Public Health

Under the Sandy Valley Off-site Alternative, the project elements and major facility components would be similar to those associated with the proposed HHSEGS project; therefore, toxic air emission levels under this alternative would be **similar to HHSEGS** for construction and operations emissions. Existing land uses at this alternative site include agricultural and rural residential uses. Residential development in the unincorporated town of Sandy Valley, Nevada, is somewhat greater than at the proposed HHSEGS site in the Charleston View area. Given the somewhat greater density of housing development in the Sandy Valley area, air toxics-related health risks could be slightly greater under this alternative. As discussed in the **Public Health** section of this staff assessment, potential air toxics-related impacts from operation of the proposed HHSEGS project would be below significant levels within the 6-mile radius of typical concern to staff; therefore; potential impacts within the same 6-mile radius from the Sandy Valley Off-site Alternative would also be less than significant, and no conditions of certification would be required. This impact would be **similar to HHSEGS**.

Socioeconomic Resources

The Sandy Valley Off-site Alternative includes land in Inyo and San Bernardino counties. Due to the remote location of the study area and the fact that it would be situated in both counties, providing emergency medical and law enforcement services to the study area would be similarly challenging as the proposed HHSEGS site. This impact would be **similar to HHSEGS**.

The Inyo County portion of the study area is in the service areas of the Southern Inyo Fire Protection District (SIFPD) and Inyo County Sheriff's Department. There is no paved access to the study area from Inyo County. If the Inyo County Sheriff and SIFPD were to provide service, they would have to travel through Clark County, Nevada, or San Bernardino County to access the study area (Hidden Hills Solar I and II, LLCs 2012b).

The San Bernardino County Sheriff's Department and San Bernardino County Fire Department (SBCFD) have jurisdiction in San Bernardino County. Station #53 of the SBCFD in Baker, California, would be the closest fire station in San Bernardino County that could provide fire protection services. The nearest San Bernardino County Sheriff's office to the Sandy Valley Off-site Alternative site is the Barstow Station at 225 East Mountain View Road. The station is approximately 120 miles (a 3-hour drive) from the study area. The Inyo County Sheriff's substation in Shoshone is about the same distance to the study area.

Due to the proximity to Clark County, Nevada, the first responders for fire, medical, or law enforcement emergencies would likely come from Nevada (Hidden Hills Solar I and II, LLCs 2012b). The Clark County (Nevada) Fire Department would be called upon if needed, and as available, through a Mutual Aid Agreement with SBCFD. Within Clark County, police protection services are provided by the Las Vegas Metropolitan Police Department (LVMPD). The LVMPD is a joint city/county police force providing law enforcement services for all of Clark County, including the City of Las Vegas, with over 2,800 sworn officers (LVMPD 2010).

There are several structures near the farmed properties in the Sandy Valley study area, and a few of them are residences (Hidden Hills Solar I and II, LLCs 2012b). Although zoned Rural and Open Space, no residences are located at the proposed HHSEGS site. The impact of displacing existing rural residences would be **greater than HHSEGS** under this alternative; however, the impact would be less than significant because acquisition of properties would include appropriate compensation to the landowners displaced by this alternative.

Section 17620 of the Education Code (school impact fees) would apply to this alternative. Fees would be payable to either the Death Valley Unified School District in Inyo County, or the Baker Valley Unified School District in San Bernardino County, or both, depending on the locations of project buildings relative to the district boundaries.

The beneficial impact through construction employment and increased taxes and fees would be **similar to the proposed HHSEGS project**.

Traffic and Transportation

The transportation network in the vicinity of the Sandy Valley Off-site Alternative study area consists primarily of local roadways with limited access and state-maintained freeways. Due to the remote location of the study area and the possibility that local roadways are not designed to withstand frequent and heavy construction traffic, use of the existing roadway network during construction phases would be similarly challenging as the proposed HHSEGS site.

Access to the site is provided from two directions. The first is Sandy Valley Road, originating from Goodsprings, Nevada, northwest of Jean, Nevada, at I-15. The second access is from Nevada SR 160 to Pahrump Road, and then south to Sandy Valley. Pahrump Road is a 12-mile unpaved road. In addition to state, federal and county-maintained roads, there are numerous dirt roads throughout the area located along section lines and along the California/Nevada border (Hidden Hills Solar I and II, LLCs 2012b).

Construction workers would most likely use I-15 to commute to the alternative site from Primm, Nevada, approximately 33 miles south of the Sandy Valley study area. Workers could also commute from Las Vegas, which is approximately 45 miles east of the study area.

The addition of a similar number of daily trips as those identified for the proposed HHSEGS project (4,000 daily trips [3,820 automobile trips and 180 truck trips] are predicted for *peak month 19* under the proposed project) would have a significant impact on the structural integrity of Sandy Valley Road and Pahrump Road due to the current and future conditions of the roadway pavement. Under the proposed project, the access roads are not designed to current public works standards for the amount of the proposed construction traffic. Conditions of certification would be required to ensure that impacts on roadways from increased use for construction traffic were avoided or reduced. This impact would be **similar to HHSEGS**. With implementation of conditions of certification, impacts related to traffic and transportation would be reduced to less than significant.

Airport

The closest public-use operational airport to the study area is the Sky Ranch Airport, located in Nevada, approximately 2 miles southeast of the Sandy Valley Off-site Alternative study area. Sky Ranch Airport averages 57 aircraft flights a week (AirNav 2012). Similar sized solar towers at the Sandy Valley site could pose an obstruction hazard to aircraft. Because of the solar tower height, the applicant would be required to notify the Federal Aviation Administration (FAA) of construction pursuant to the Code of Federal Regulations, Title 14, Aeronautics and Space, Part 77. These regulations require FAA notification for any proposed structure over 200 feet in height above ground level (AGL), regardless of the distance from an airport. The impacts would likely be similar to those of the proposed project as both projects would require review and approval by the FAA. This impact would be **similar to HHSEGS**.

Glint and Glare

Similar to the proposed project, glare and/or excessive perceived brightness from the heliostat mirrors and the glowing solar receiver steam generators (SRSGs) at the tops of the power towers could impact motorists in the vicinity of the alternative site and potentially compromise driver performance. Glare can cause difficulty seeing in the presence of bright light such as direct or reflected sunlight or artificial light such as car headlamps at night. Glint can cause difficulty seeing in the presence of a transient bright light source and is generally considered to be intermittent.

Staff concludes that the proposed HHSEGS project would pose no risk for photothermal retinal damage, and the potential for photochemical damage to residents and motorists is less than significant (see **Appendix TT 1**, **Glint and Glare Safety Impact Assessment**). Glint and glare can also affect aircraft pilots in the area. Staff concludes that the glint and glare effects from the heliostats would be mildly discomforting to pilots with the potential to be significantly discomforting under certain low probability conditions. Based on the analysis for the proposed project (see the **Traffic and Transportation** section and **Appendix TT 1** in this staff assessment), the glare effects from the SRSGs are unavoidable and would produce a distinct visual distraction effect. However, these glare effects are not considered to be sufficient to be visually debilitating and thus would not cause a safety hazard from an operator control perspective, such as operating a vehicle or flying an airplane. A condition of certification

is proposed in the **Traffic and Transportation** section requiring preparation and implementation of a "Heliostat Operations Positioning and Monitoring Plan." (See Condition of Certification **TRANS-8** in this staff assessment.)

The project elements and major facility components of this alternative would be the same as those of the proposed HHSEGS project. It is assumed that potential impacts related to glint and glare would be **similar to the proposed HHSEGS project**.

Transmission Line Safety and Nuisance

Under the Sandy Valley Off-site Alternative, the project's elements and major facility components would be similar to those that would be constructed at the proposed project site.

The project applicant provided a data response showing a potential transmission line alignment for the Sandy Valley Off-site Alternative (see **Alternatives Figure 4**) (Hidden Hills Solar I and II, LLCs 2012b). The potential alignment for the transmission line would exit the east side of the alternative site study area in California to generally parallel Quartz Avenue through Sandy Valley, Nevada, before turning northeast to parallel Kingston Road east of Sandy Valley.

Based on a review of Google Earth aerial images, the Sandy Valley Library, several single-family residences, and Peace Park are adjacent to Quartz Avenue where the transmission line associated with this alternative could be sited. Staff observes that no studies have been done on the potential feasibility of constructing a 230-kV transmission line along the described route. If it was determined that further work was needed to evaluate this alternative, it would include an analysis of the potential effects of the transmission line on the Sandy Valley community. Like the proposed project, this alternative transmission line would be subject to applicable design and operational plans and requirements and regulations of CPUC.

Sky Ranch Airport is a small, public-use airport in Sandy Valley, Nevada, near the southeast corner of the Sandy Valley alternative study area. The airport has two runways, including a 3,340-foot asphalt runway and a 3,300-foot dirt runway (AirNav 2012). As discussed in the **Transmission Line Safety and Nuisance** section of this staff assessment, notification of the FAA is required for structures that could cause obstruction hazards in navigable space. The transmission line associated with this alternative could be less than 1 mile from the two runways at Sky Ranch Airport; therefore, notification of FAA would be required if this transmission line was proposed for construction along Quartz Avenue. Compliance with applicable regulations and standards would be required to ensure that the transmission line for this alternative would not cause aviation hazards.

The magnitude of these transmission line-related impacts would be similarly less than significant under the Sandy Valley Off-Site Alternative as for the proposed project at the HHSEGS site. This impact would be **similar to HHSEGS**.

Visual Resources

Environmental Setting

The Sandy Valley Off-site Alternative site is best accessed from Sandy Valley Road, leading from Goodsprings, Nevada to the valley. Goodsprings is northwest of Jean, Nevada, at I-15. Sandy Valley Road passes through a small mountain range that includes Table Mountain. The road is narrow and windy as it climbs through the range, and views are enclosed. The road straightens as it descends to the valley floor. Panoramic views from the Sandy Valley area include Black Butte to the northwest, in the southern portion of the Pahrump Valley Wilderness, and the Kingston Range to the west. An alternate route into Sandy Valley is from Nevada SR 160 and Pahrump Road, a 12-mile, unpaved road. There is no route through the valley for most motorists. **Alternatives Figure 6** shows views of the Sandy Valley area.

The study area for the Sandy Valley Off-site Alternative is partly enclosed by the Pahrump Valley Wilderness to the northwest, the North Mesquite Mountains Wilderness to the southwest, and the Mesquite Wilderness to the south, all located in California. BLM wilderness areas by their very nature are of high scenic quality.

Staff conducted a site visit to the study area in January 2012 and observed sparse rural development near farmed properties, including a few residences. Roughly 750 acres in the study area are potentially farmed, using a circular irrigation technique that is distinct from aerial views and, to some degree, on the ground because of the unique equipment in use. Residences and associated outbuildings have low-profiles, and no structures appear to exceed two stories in height. The streets are unpaved, and some existing transmission poles are visible along an unnamed north-south oriented street that intersects with Stateline Road. Another transmission line runs east-west along West Nickel Avenue north of and parallel to Quartz Avenue. Quartz Avenue coincides with the county line between Inyo and San Bernardino counties.

Sandy Valley is a residential community. As discussed above, 2010 U.S. Census data records 811 housing units at an average density of 14.5 units per square mile. A community center with a library, ball field, park, and administrative services is located at the intersection of Quartz Avenue and Osage Street in Sandy Valley; these community facilities are adjacent to the east side of the Sandy Valley Off-site Alternative study area. Staff observed a café, store, and post office in Sandy Valley. The Sky Ranch Airport is in Nevada near the southeast corner of the study area. Refer to the subsections, “Traffic and Transportation,” and “Transmission Line Safety and Nuisance,” for discussions of this airport.

The Sandy Valley area generally has a higher number of permanent viewers (residents) and a lower number of transient viewers (motorists) than the proposed HHSEGS project in Charleston View. The Sandy Valley alternative site has scenic backdrops in the form of wilderness areas, although the scale of landscape features and visual drama is somewhat lower than in the Charleston View area. Like Charleston View, the landscape is disturbed at ground level, but no tall structures pierce the horizon line of the surrounding ranges. The topography and vegetation are more variable than in

Charleston View, with some thickets of desert trees and some rise and fall of the ground plane partially obscuring some of the distant views.

Views from the community of Sandy Valley toward this alternative site are unimpeded by major obstacles, but visual clutter in the foreground at ground level (e.g., structures and minor topography changes) interrupt the panoramic views of the mountain ranges in the background (**Alternatives Figure 6**). The few trees that are noticeable in foreground views partially block middle ground and background views.

Environmental Impacts

Construction-related visual impacts would be **similar to the proposed HHSEGS project**. Views during project construction phases would include views of equipment, stored materials, and the rise of the towers and cranes. At ground level, much of the construction activity would be screened, and conditions of certification would be implemented to screen views and reduce the impacts of construction area lighting. No feasible mitigation measures would screen views of the towers and cranes during construction. These structures would be visible from the Sandy Valley community, the Pahrump Valley Wilderness Area, and possibly from portions of the North Mesquite Wilderness Area and Kingston Range.

Project operations impacts would be **similar to the proposed HHSEGS project,** and similar conditions of certification would be implemented to reduce impacts on visual resources. With part of the alternative site located in San Bernardino County, this alternative may not be consistent with the San Bernardino County General Plan goal and related policies for the desert region. The Conservation Element includes a goal to "[p]reserve the unique environmental features and natural resources of the Desert Region, including native wildlife, vegetation, water and scenic vistas" (San Bernardino County 2011). Many of the project structures would not be consistent with the height restriction (35 feet maximum) for the Resource Conservation land use zoning district. No scenic routes are located in the vicinity of the Sandy Valley alternative site. The Conservation Element includes a goal to "[p]reserve the dark night sky as a natural resource in the Desert Region communities" (San Bernardino County 2011). With implementation of conditions of certification, this alternative would likely be consistent with the San Bernardino General Plan goal and related policies for all lighting to be in accordance with the Night Sky Protection Ordinance.

Similar to the proposed project, for the portion of the alternative site that is in Inyo County, the Sandy Valley Off-site Alternative could be inconsistent with height restrictions that apply to development in the Open Space (OS) zoning district. This alternative could also be inconsistent with the Inyo County Renewable Energy Ordinance (Title 21) in that it could affect scenic views of the wilderness areas and from the wilderness areas. The Sandy Valley Off-site Alternative would otherwise conform to applicable LORS with implementation of conditions of certification to reduce the visual effects of this alternative.

As discussed above under the subsection, "Land Use," Inyo County would require processing of a GPA and zoning district change or zone text amendment to ensure

consistency of a renewable energy project at the Sandy Valley Off-site Alternative site with the Inyo County General Plan.

In general, renewable energy projects that involve use of the SPT technology would cause significant and unavoidable impacts on visual resources. Like the proposed project, this alternative would include a brightly glowing SRSG at the top of each 750-foot-tall (total height) tower. Views of these structures would dominate the landscape at the alternative site. Views of the wilderness areas would be partially blocked and certainly impeded. The number of resident viewers in the Sandy Valley area is considerably higher than in the Charleston View area. These residents would have long-term views of the alternative site. Based on the high numbers of viewers, long duration of views, moderate to high visibility of the alternative site, and high viewer concern (residential), overall visual sensitivity is considered high for this alternative. The introduction of the project components into the landscape, particularly the SPTs, would impede views of the wilderness areas, dominate views of the background mountain ranges, and introduce the stark visual contrast of very large and bright industrialized structures into existing open space views. Therefore, the degree of visual change would be high at the Sandy Valley site. **Similar to the proposed HHSEGS project**, the magnitude of the visual change would cause significant and unavoidable visual impacts at the alternative site.

Conclusion for Impacts on Visual Resources

Like the proposed HHSEGS project, implementation of conditions of certification would reduce potential impacts on visual resources for views at the ground plane. Potential impacts of structural lighting could be reduced to less than significant with implementation of standard conditions of certification to control lighting. No feasible mitigation measures would reduce the visual impacts of the SPTs, brightness of the SRSGs, and potential visual effects of FAA night safety lighting. **Similar to the proposed HHSEGS project**, these impacts would remain significant and unavoidable.

Waste Management

Construction and operation of a renewable energy facility at the Sandy Valley Off-site Alternative site would produce approximately the same amount of waste as the proposed HHSEGS project. There is available Class III landfill capacity in San Bernardino County and Nevada landfills. Similar to the proposed project, staff considers project compliance with LORS and staff's conditions of certification to be sufficient to ensure that no significant impacts would occur as a result of waste management associated with the Sandy Valley Off-site Alternative. Impacts related to waste management would be **similar to the proposed HHSEGS project**.

The term, recognized environmental condition (REC), refers to the presence or likely presence of any hazardous substances or petroleum products on a property under the conditions that indicate an existing release, past release, or a material threat of a release of any hazardous substance or petroleum products into structures on the property or in the ground, groundwater, or surface water of the property. The Sandy Valley study area has a higher concentration of agricultural land uses compared to the

HHSEGS project site. Therefore, there is a chance that various parcels could be contaminated with herbicides or pesticides that would require remediation. There was limited agricultural use at the proposed HHSEGS site.

Construction and operation of a renewable energy facility at the Sandy Valley Off-site Alternative site would require preparation of a Phase I Environmental Site Assessment (ESA). Depending on the analysis and conclusions in a Phase I ESA, RECs could potentially be identified in the agricultural area that would require remediation. Impacts related to the potential presence of RECs at the alternative site could be **somewhat greater than HHSEGS**. Mitigation measures would be required to reduce any potentially significant impacts to less than significant.

Soil and Surface Water

Water resources staff participated in a site visit to the Sandy Valley Off-site Alternative study area on January 19, 2012. Average annual precipitation ranges from about 4 to 6 inches, which is similar to the proposed HHSEGS site. Surface runoff from the bordering mountains drains toward Mesquite Lake (California Department of Water Resources 2004), which is an internal drainage lake located approximately 10 miles southeast of the Sandy Valley Off-site Alternative site.

Lahontan Regional Water Quality Control Board identifies the portion of Mesquite Valley located within California as the Mesquite Hydrologic Unit (HU). The Lahontan Basin Plan recognizes “all minor surface waters” and Mesquite Lake as resources of the Mesquite HU. The beneficial use designations, both existing and potential, are the same as those listed for the Pahrump HU’s “all minor surface waters” with the following exceptions:

- Pahrump HU’s minor surface waters potentially supports habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened, or endangered. (This beneficial use is not listed within Mesquite HU.)
- Mesquite Lake is an inland saline water habitat (supporting inland saline water ecosystems) and it supports natural enhancement or improvement of water quality of other surface waters.

Because the water resources of both HUs have similar beneficial uses, similar conditions of certification could be used to ensure water quality protection at either location. Therefore, impacts from contaminated storm water and discharge of process wastewater would be the same for either location. A septic system for proper disposal of domestic sanitary waste would not change, so these impacts would also remain the same. These water quality impacts would be the **same as HHSEGS** for the Sandy Valley Off-site Alternative.

NRCS soils data is incomplete for the Mojave Desert area on the California side of the state boundary. Based on data extrapolated from the NRCS soil survey, the map unit for an extensive region encompassing the Sandy Valley study area is the Hypoint-Vegastorm association, which has somewhat similar hydrologic properties as the soils

mapped on the proposed HHSEGS site. However, agricultural activity in the study area for the Sandy Valley Off-site Alternative has likely altered much of the area's native soils. With this in mind, staff estimates moderate soil characteristics equivalent to Hydrologic Group C (relatively slow infiltration rates with moderately fine to fine texture). With this assumption, soil erosion impacts during project construction and operations would be **similar to the proposed HHSEGS site**.

The portion of this alternative site that is located within Inyo County is not within the 100-year floodplain (as shown on Federal Emergency Management Agency [FEMA] maps). Maps for the portion of the alternative site located within San Bernardino County are not readily available on FEMA's website. A review of the USGS quadrangle topographic map of the area shows potential ephemeral flows originating from the Spring Mountains in Nevada and traveling through the community of Sandy Valley before entering the Sandy Valley study area and on to Mesquite Lake to the south. Although the site appears relatively flat on the USGS map, ephemeral flows are difficult to predict. Without a comprehensive hydrology analysis, and based on the January 2012 site visit, staff estimates that the hydrology of the Sandy Valley Off-site Alternative site is similar to the proposed HHSEGS site. Therefore, impacts from 100-year flood flows are estimated to be **similar to the proposed HHSEGS project** as well as the potential for on-site/off-site flooding or storm damage.

Water Supply

Groundwater levels in the aquifer underlying the Mesquite Valley have been in decline since the latter part of the 1900s (California Department of Water Resources 2004). Impacts on water supply include potential drawdown of local wells and impacts on groundwater basin balance; these impacts would be **similar to HHSEGS** for the Sandy Valley Off-site Alternative.

For the proposed HHSEGS project, staff developed conditions of certification to reduce these types of impacts to a level that is less than significant. Under this alternative, the same or similar conditions of certification could also be implemented at the Sandy Valley Off-site Alternative site, which would reduce potentially significant impacts on water supply to less than significant.

See the discussion on the potential effects of this alternative on groundwater dependent ecosystems under the subsection, "Biological Resources," above.

SOLAR POWER TOWER (SPT) WITH ENERGY STORAGE ALTERNATIVE

Overview

This alternative would use BrightSource Energy's solar thermal technology with added molten-salt storage at the proposed project site. Thermal energy storage (TES) allows solar energy to be captured during the day and retained in a liquid salt heat transfer fluid (HTF). Liquid salt has inherent TES properties. In its liquid state, salt has a viscosity similar to water. Salt remains in a liquid state at very high temperatures whereas water turns to steam (Energy Commission 2010a). A significant quantity of liquified petroleum

gas (propane) would be used prior to plant start-up for the initial melting, heating, and conditioning of the salt thermal storage medium. No other fossil fuel supply would be required for plant operations.

Like the proposed HHSEGS project, heliostats would concentrate the sun's rays on the water-filled solar boiler at the top of the central receiver tower in each solar field. The resulting high-temperature, pressurized steam would be piped through a conventional steam turbine generator to produce electricity. To store the heat, some of the steam produced during the day would be used to superheat molten salts held in a tank (Press-Enterprise 2012). The heat retained in the molten salts would be available to convert water to steam, which would be used to run the plant's steam turbine generators to produce electricity during solar transients (e.g., cloud cover), and on the *shoulders* later in the evening and earlier in the morning.

This technology offers some additional stability and flexibility of generator operation inherent with liquid salt solar systems that is similar to that associated with supplemental natural gas firing (Hidden Hills Solar I and II, LLCs 2011a). Because this technology uses liquid salt, a medium that can be heated to a very high temperature, the steam cycle is efficient. Because the liquid salt can be stored with very little heat loss, this system allows power to be generated on demand during the day or night regardless of short-term weather fluctuations.

The storage capacity for a BrightSource Energy solar plant with integral thermal storage could be from 3 to 6 hours, which would allow more flexible electricity production (Press-Enterprise 2012). **Alternatives Figure 7** shows an artist's rendering of a power tower project with molten-salt storage.

According to recent CPUC documents, BrightSource Energy proposed adding energy storage to three of the five power purchase agreements (PPAs) with SCE. Of those five PPAs, two applied to the Siberia 1 and 2 solar thermal power plants, which were planned in the Mojave Desert in San Bernardino County. The third solar thermal project, Sonoran West, is being planned for siting in Riverside County approximately 13 miles southwest of Blythe. On October 25, 2012, CPUC rejected the PPAs for one of BrightSource Energy's Rio Mesa Solar Electric Generating Facility (SEGF) projects (proposed without storage) and both of the Siberia projects, which had been planned to include storage. The PPA for the Sonoran West solar thermal project was approved with the proviso that it would include molten-salt storage, and it is currently the only BrightSource Energy project that would incorporate thermal energy storage.

Descriptions of two projects under development that include molten-salt storage are provided below.

Rice Solar Energy Project (RSEP)

RSEP is a 150-MW SPT project that was approved for construction and operation by the Energy Commission in December 2010. SolarReserve will develop RSEP on approximately 1,500 acres of private land in the Colorado Desert in eastern Riverside County.

Similar to BrightSource Energy's solar thermal technology with added molten-salt storage, SolarReserve's projects include a central receiver tower surrounded by heliostats. Instead of super heating water in the solar boiler at the top of the tower, the sun's rays directly heat molten salt that can be stored to generate electricity late at night (Press-Enterprise 2012). The technology used by SolarReserve allows large quantities of thermal energy to be captured and retained for several days and extracted on demand (Energy Commission 2010a). SolarReserve expects RSEP to generate stable, predictable, and controllable electricity.

The Commission Decision for RSEP describes the project technology, stating that RSEP will use liquid salt as the HTF (Energy Commission 2010a). A total of seventy million pounds (4.4 million gallons) of liquid salt will be stored in insulated hot (1,050°F) and cold (550°F) above-ground tanks to retain solar energy. The thermal storage component allows generation of electricity after dark and during periods of cloud cover, for an average of 8.4 hours per day. To produce electricity, the salt circulates through the receiver and steam generation system where superheated steam is used in a steam turbine generator. Steam turbine exhaust will be condensed in a 20-cell air-cooled condenser.

Based on the summary of structural dimensions in the AFC for RSEP, the hot salt tank was planned with a diameter of 167 feet, wall height of 42 feet, and domed top height of 64.5 feet (SolarReserve 2009). The cold salt tank was planned to be slightly smaller with a diameter of 159 feet and a domed top height of 63.5 feet.

The liquid salt solar generating system for RSEP is proprietary technology of United Technologies Corporation. The technology was successfully used in the 1990s in a 10-MW project located in Barstow, California.

Propane will be used prior to plant start-up in two small boilers for the initial melting, heating, and conditioning of the salt thermal storage medium (Energy Commission 2010a). The salt conditioning process will take place once during plant commissioning, resulting in a closed loop system of liquid salt storage and circulation that will remain heated and contained for the life of the project. RSEP requires no other fossil fuel supply for plant operations.

Crescent Dunes Solar Energy Project (Crescent Dunes SEP)

Crescent Dunes SEP is a 110-MW SPT project with integral thermal storage. SolarReserve is developing Crescent Dunes SEP on approximately 1,600 acres of BLM land near Tonopah, Nevada. Construction began in September 2011 and is expected to be completed in late 2013. Construction was recently completed on the approximately 540-foot SPT for the project. Crescent Dunes SEP is planned for 10 hours of energy storage (Press-Enterprise 2012). Like RSEP, Crescent Dunes SEP will not require a natural gas supply to maintain project operations. **Alternatives Figure 7** shows the completed solar power tower for the Crescent Dunes SEP.

Potential to Attain Project Objectives

Development of an approximately 500-MW SPT project with energy storage at the proposed project site could potentially meet the project objectives related to construction and operation of a utility-scale renewable electrical generation facility, leading to the sale of renewable energy and contributing to achieving California's renewable energy goals; approval of amendments to the PPAs by CPUC could be required. This alternative could potentially satisfy the project objectives addressing the requirement to comply with applicable LORS and avoid or minimize significant impacts to the greatest extent feasible. This alternative would satisfy the project objective to develop a renewable energy facility in an area with high solar value and minimal slope. See the discussions below under, "Environmental Analysis," for analyses of the environmental effects of this alternative compared to the proposed project.

The project objectives include an objective to develop a renewable energy facility capable of providing grid support by offering power generation that is flexible. Adding energy storage capabilities would increase this alternative's operational flexibility to some degree relative to the proposed HHSEGS project.

The proposed project would be located on approximately 3,277 acres, including the 180-acre construction staging and laydown area. To accomplish an approximate electrical capacity of 500 MWs, this alternative could require additional measurable acreage to add energy storage components to the proposed project. The additional acreage would be needed to accommodate the molten-salt storage tanks and additional heliostats that would be required to generate heat for the thermal storage component. The heat stored in the molten salts would be used to generate steam to run the turbines later in the day than would be possible under the proposed project. The project applicant has stated that adding thermal storage requires the addition of at least 18 percent more heliostats to the solar field (Rio Mesa Solar I, II, and III, LLCs 2012).

For BrightSource Energy's two proposed SPT projects without energy storage—HHSEGS and the Rio Mesa SEGF—land use efficiency is approximately 6.6 and 7.6 acres per MW, respectively[5]. (Land use efficiency for the proposed project with the construction laydown area removed from the total project acreage would be approximately 6.2 acres per MW.) Land use efficiency would be reduced under this alternative. In other words, the SPT with Energy Storage Alternative would likely require more acres per MW of capacity. If this alternative was limited to the existing 3,277-acre site, total plant capacity would likely be reduced.

The SPT with Energy Storage Alternative with an increased site boundary could potentially satisfy five or six of the seven project objectives. This alternative would partially satisfy the project objective addressing operational flexibility, and it would go further toward satisfying this project objective compared to the proposed project. Changing the technology and expanding the 3,277-acre project site could result in a project schedule delay, potentially affecting project viability.

[5] The Rio Mesa SEGF project is proposed as a 500-MW facility on approximately 3,805 acres.

Construction of the SPT with Energy Storage Alternative at the proposed project site with no site expansion would probably reduce the total proposed electrical capacity of 500 MWs. Construction and operation of this alternative with no site expansion could potentially satisfy five or six of the seven project objectives, and it would partially satisfy the first project objective to construct and operate a renewable electrical generation facility resulting in sales of competitively priced renewable energy consistent with the needs of California utility companies; however, the total proposed 500-MW capacity would not necessarily be achieved.

Potential Feasibility Issues

Staff submitted data requests for information on the potential feasibility of adding energy storage to the proposed HHSEGS project. In the corresponding data responses, the applicant states that adding energy storage capabilities to the proposed HHSEGS project would be infeasible because of contractual obligations, site limitations, and economics (Hidden Hills Solar I and II, LLCs 2012b). The site limitations discussed by the applicant include the need to redesign the heliostat field and project layout if energy storage was added to the project. The applicant states that the site footprint would have to be expanded. The applicant refers to the signed and approved PPAs, stating that "it would not be feasible to complete the development and engineering of an energy storage system for HHSEGS on a timeline that would allow [the] Applicant to meet its contractual obligations under the PPAs." The applicant states that the addition of energy storage would be extremely costly "and would jeopardize the project's schedule and financial viability."

The power generated by the proposed HHSEGS project would be sold to PG&E under two PPAs approved by CPUC in 2010, which demonstrates that CPUC deems HHSEGS appropriate for helping to meet the state's RPS program goals. As stated above, the applicant has targeted the first or second quarter of 2015 for commercial operation of the proposed project. Staff contacted the CPUC to inquire about the overall process involving CPUC's approval of PPAs for renewable energy projects. CPUC staff stated that filing of amended advice letters requesting amendments to PPAs is not an uncommon occurrence during the 5-year development process for renewable energy projects (Simon, pers. comm., 2012). Once a PPA is approved, submittal of an amended advice letter to CPUC requesting an amended PPA is required unless the change to the project was accounted for in the original PPA for the project (e.g., a PPA that allows a project site change). CPUC's review of requests for amended PPAs considers resultant changes to the pricing structure of the PPA, project viability, and value compared to cost. For example, in considering a hypothetical amendment to a PPA to add energy storage to a solar thermal project, CPUC would assess the net economic benefit of the added storage.

In October 2011, the project applicant filed an AFC with the Energy Commission for development of three 250-MW solar power plants for the Rio Mesa SEGF, which would use the same technology as the proposed HHSEGS project. Since filing the AFC for the Rio Mesa SEGF project, the applicant filed an amended AFC to eliminate one of the three power plants for that project. The planned development schedules for the proposed HHSEGS project and Rio Mesa SEGF overlap with the Sonoran West project

that is being planned under a PPA with SCE. Given the immensity and complexity of these renewable energy projects, and CPUC's strong encouragement of storage for such projects, it is reasonable to conclude that BrightSource Energy management is fully aware of the potential for project changes to affect project scheduling and financing.

Altering the proposed HHSEGS project and expanding the site to include TES would delay the project schedule and increase project costs. It is unknown what other circumstances could affect the potential for site expansion (e.g., site topography, the potential presence of biological or cultural resources, etc.).

The work required to alter the project to include storage would delay the project schedule. It is not known at what point a project schedule delay and increased project costs would affect project viability.

Environmental Analysis

Alternatives Table 4 presents a summary comparison of impacts of the proposed HHSEGS project to the same or similar potential impacts of the SPT with Energy Storage Alternative. Comparative discussions for each environmental topic area follow the table.

Alternatives Table 4
Summary Comparison of the Proposed Project's Impacts to the Solar Power Tower with Energy Storage Alternative

Environmental Effect	Proposed Project	SPT with Energy Storage Alternative
Air Quality		
Construction-related emissions	SM	Similar to HHSEGS (SM)
Project operations emissions	SM	Similar to HHSEGS (SM)
Biological Resources		
Impacts on special-status plant species	SM	Similar to or somewhat greater than HHSEGS (SM)
Impacts on waters of the U.S. and waters of the state	SM	Similar to or somewhat greater than HHSEGS (SM)
Impacts on desert tortoise	SM	Similar to or somewhat greater than HHSEGS (SM)
Impacts on special-status terrestrial wildlife species (other than desert tortoise)	SM	Similar to or somewhat greater than HHSEGS (SM)
Impacts on avian species from collisions with project	PSU	Similar to or

Alternatives Table 4 Summary Comparison of the Proposed Project's Impacts to the Solar Power Tower with Energy Storage Alternative		
Environmental Effect	**Proposed Project**	**SPT with Energy Storage Alternative**
features (see biological resources note)		somewhat greater than HHSEGS (PSU)
Impacts on avian species from exposure to concentrated solar flux	PSU	Similar to or somewhat greater than HHSEGS (PSU)
Potential impacts on groundwater dependent ecosystems	PSM	Somewhat greater than HHSEGS (PSM)
Biological resources note: Collisions could be secondary to exposure to concentrated solar flux.		
Cultural Resources		
Potential to disturb, destroy, or visually degrade significant prehistoric and historical archaeological sites *on* the site (see cultural resources note)	LS	Similar to HHSEGS (LS)
Potential to disturb, destroy, or visually degrade significant prehistoric and historical archaeological sites *beyond* the site	SU	Similar to HHSEGS (SU)
Potential impacts on significant built-environment cultural resources (Old Spanish Trail – Mormon Road Northern Corridor) *on* the site	SM	Similar to HHSEGS (SM)
Potential impacts on significant built-environment cultural resources (Old Spanish Trail – Mormon Road Northern Corridor) *beyond* the site	SU	Similar to HHSEGS (SU)
Potential to disturb, destroy, or visually degrade significant ethnographic resources *on* the site	SU	Similar to HHSEGS (SU)
Potential to disturb, destroy, or visually degrade significant ethnographic resources *beyond* the site	SU	Similar to HHSEGS (SU)
Cultural resources note: "Site" means the facility site proper and does not include linear or ancillary infrastructure away from the facility site.		
Fire Protection		
Potential impacts on local fire protection resources	PSM	Similar to HHSEGS (PSM)
Potential impacts on emergency response services	PSM	Similar to HHSEGS (PSM)
Geology and Paleontology		
Potential impacts from strong seismic shaking	SM	Same as HHSEGS (SM)

Alternatives Table 4 Summary Comparison of the Proposed Project's Impacts to the Solar Power Tower with Energy Storage Alternative		
Environmental Effect	**Proposed Project**	**SPT with Energy Storage Alternative**
Potential impacts from soil failure caused by liquefaction, hydrocollapse, formation of soil fissures, and/or dynamic compaction	SM	Same as HHSEGS (SM)
Potential impacts on paleontological resources	SM	Same as HHSEGS (SM)
Potential impacts on geological or mineralogical resources	LS	Same as HHSEGS (LS)
Hazardous Materials		
Potential for release of hazardous materials to occur on-site	SM	Similar to HHSEGS (SM)
Potential for release of hazardous materials to occur off-site	SM	Similar to HHSEGS (SM)
Land Use		
Conflicts or inconsistencies with general plan land use designations and zoning	SU	Same as HHSEGS (SU)
Conversion of agricultural land	—	—
Noise and Vibration		
Potential for noise to impact noise-sensitive receptors	PSM	Somewhat greater than HHSEGS (PSM)
Public Health		
Potential for project construction to cause air toxics-related impacts that could affect public health	LS	Similar to HHSEGS (LS)
Potential for project operations to cause air toxics-related impacts that could affect public health	LS	Similar to HHSEGS (LS)
Socioeconomic Resources		
Construction employment and increased taxes and fees	B	Similar to HHSEGS (B)
Displacement of existing rural residences	—	—
Potential impacts on emergency medical and law enforcement services	PSM	Similar to HHSEGS (PSM)
Traffic and Transportation		
Potential impacts on roadway infrastructure	SM	Same as HHSEGS (SM)
Potential for glint and glare to cause safety hazards or a distinct visual distraction effect from an operator control perspective (i.e., vehicle drivers and aircraft pilots)	PSM	Same as HHSEGS (PSM)

Alternatives Table 4 Summary Comparison of the Proposed Project's Impacts to the Solar Power Tower with Energy Storage Alternative		
Environmental Effect	**Proposed Project**	**SPT with Energy Storage Alternative**
Potential for construction equipment and/or permanent structures to exceed 200 feet in height above ground level	SM	Same as HHSEGS (SM)
Transmission Line Safety and Nuisance		
Potential for impacts related to aviation safety, hazardous shocks, nuisance shocks, and electric and magnetic field exposure	SM	Similar to HHSEGS (SM)
Visual Resources		
Construction-Related Impacts		
Potential to substantially degrade the existing visual character or quality of the site and its surroundings	SU	Similar to HHSEGS (SU)
Potential to create a new source of substantial light or glare which would adversely affect day or nighttime views in the area	SU	Similar to HHSEGS (SU)
Project Operations Impacts		
Potential to substantially degrade the existing visual character or quality of the site and its surroundings	SU	Same as HHSEGS (SU)
Potential to create a new source of substantial light or glare which would adversely affect day or nighttime views in the area	SU	Same as HHSEGS (SU)
Waste Management		
Potential for disposal or diversion of project materials to cause impacts on existing waste disposal or diversion facilities	SM	Similar to HHSEGS (PSM)
Potential for impacts on human health and the environment related to past or present soil or water contamination	PSM	Similar to HHSEGS (PSM)
Soil and Surface Water		
Soil erosion by wind and water during project construction	SM	Greater than HHSEGS (SM)
Soil erosion by wind and water during project operations	PSM	Somewhat greater than HHSEGS (PSM)
Water quality impacts from contaminated storm water runoff	SM	Somewhat greater than HHSEGS (SM)
Water quality impacts from storm damage	PSM	Similar to HHSEGS (PSM)

Alternatives Table 4 Summary Comparison of the Proposed Project's Impacts to the Solar Power Tower with Energy Storage Alternative		
Environmental Effect	**Proposed Project**	**SPT with Energy Storage Alternative**
Water quality impacts from power plant operations	SM	Somewhat greater than HHSEGS (SM)
Water quality impacts from sanitary waste	SM	Same as HHSEGS (SM)
Potential impacts from on-site and off-site flooding	SM	Similar to HHSEGS (SM)
Potential to impede or redirect 100-year flood flows, as shown on Federal Emergency Management Agency maps	LS	Similar to HHSEGS (LS)
Water Supply		
Potential impacts on local wells	PSM	Somewhat greater than HHSEGS (PSM)
Potential impacts on groundwater basin balance	PSM	Somewhat greater than HHSEGS (PSM)

Air Quality

Staff reviewed the air quality staff assessment of RSEP as a basis to compare the potential air quality effects of this alternative to those of the proposed project. Staff assumes that a project constructed and operated to include molten-salt energy storage would be generally comparable to the proposed HHSEGS project regardless of the specific technology that would be used to facilitate the energy storage.

Under the SPT with Energy Storage Alternative, power plant start-up would require combustion of propane to heat two small boilers for the initial melting, heating, and conditioning of the salt thermal storage medium (Energy Commission 2010a). As discussed above, RSEP requires no other fossil fuel supply for plant operations. The SPT with Energy Storage Alternative would not require other project operations emitting sources during regular plant operations. Net air quality emissions impacts would be **similar to HHSEGS** for this alternative technology. No auxiliary boilers would be required for project operations of this alternative, and much less fuel would be used at the beginning of project operations to liquefy the salt compared to the fuel use that would be required to operate the auxiliary boilers for the proposed project. However, use of the small boilers during power plant start-up could generate air emissions equating to a higher level of emissions than would occur during the initial commissioning phase for a natural gas-fired power plant. The potential for this temporary increase in emissions cannot be quantified, but it could be incrementally greater under this alternative. Mitigation measures similar to those recommended under

the proposed project would reduce impacts to less than significant. Construction-related emissions and impacts would be **similar to HHSEGS** for this alternative.

Incorporating molten-salt storage would require a portion of the area containing the heliostat array to be used to heat the molten salt for energy storage, and thus more land would be required for the same electrical capacity of 250 MWs. This would not cause any significant change in air emissions during project operations. Refer to the discussion below under, “Engineering Assessment of the Alternatives,” for an analysis of power plant efficiency and reliability.

The SPT with Energy Storage Alternative would result in a greater overall cumulative reduction in GHG emissions from power plants compared to the proposed HHSEGS project. This alternative would not worsen current conditions or make a cumulatively considerable contribution to any significant cumulative impact associated with air quality.

Biological Resources

Engineering staff has determined that this alternative technology, compared to the proposed HHSEGS project, would require more land to achieve the same approximate electrical capacity as the proposed project. As discussed above, this alternative would require additional, measurable acreage. (See also the discussion of the SPT with Energy Storage Alternative below under, “Engineering Assessment of the Alternatives.”) The exact size or configuration of a power tower project with added thermal storage is unknown; therefore, comparisons to the proposed HHSEGS project are somewhat speculative. Because recorded locations of special-status plants, animals, and habitats are distributed across the project site and adjacent areas, a reconfigured project could encompass more special-status resources compared to the proposed project. Under this alternative, impacts on special-status plant species would be **similar to or somewhat greater than HHSEGS**.

All surface waters on the project site are ephemeral (flow during storm events) and are presumed to be supported by precipitation (not groundwater) due to their ephemeral hydrology. The washes enter the site from the east and southeast, and trend northwest towards the playa. The channels increase in number and density but decrease in size as they flow down the alluvial fan. Flow volume decreases due to seepage into the unconsolidated sediments of the fan, and transition into unconfined sheet flood areas in the western half of the project site. The size or configuration of a power tower project with added energy storage is unknown and would influence the extent and nature of impacts; for example, an expansion of the project boundary to the east would likely encompass more jurisdictional drainages. Based on staff’s field visit and review of maps showing blue line streams, impacts would likely be **similar to or somewhat greater than HHSEGS** for potential impacts on waters of the U.S. and waters of the state. Under this alternative, conditions of certification would be implemented to reduce potentially significant impacts on waters of the U.S. and waters of the state to less than significant.

With a potentially larger project site, impacts on desert tortoise and other special-status terrestrial species would be **similar to or somewhat greater than HHSEGS**, as impacts on individuals in regional populations are generally directly correlated to a project's size. Under this alternative, conditions of certification could be implemented to reduce potentially significant effects to less than significant.

Water use at solar farms is influenced in part by how many heliostats are installed and how often heliostats are washed. For this analysis, it is assumed that operational water use would be somewhat greater than what is proposed for the HHSEGS project because of the increased number of heliostats that would be required to generate heat for the thermal storage component. The incremental increase in groundwater consumption would result in somewhat greater impacts on groundwater resources and, therefore, also **somewhat greater impacts on local groundwater dependent plants**, and the many unique assemblages of plants and wildlife that they support. For the proposed HHSEGS project, feasible mitigation measures exist to reduce potentially significant groundwater impacts to less than significant. Similar conditions of certification would reduce impacts on groundwater dependent ecosystems to below a level of significance.

Impacts on special-status avian species under this alternative would stem from exposure to concentrated solar flux, collisions with project features, and loss of habitat. A somewhat larger project site with more buildings could pose a greater collision risk. If this alternative incorporated more heliostats, the risk of collision with those structures could increase. The impact of collision with project features on avian species would be **similar to or somewhat greater than HHSEGS**. Similarly, additional heliostats would increase the volume and influence the location of airspace containing concentrated solar flux. Impacts on avian species from exposure to concentrated solar flux would be **similar to or somewhat greater than HHSEGS**.

Cultural Resources

Construction and operation of the SPT with Energy Storage Alternative at the proposed project site would most likely require additional measureable acreage and increased physical ground disturbance on the project site compared to the proposed project. Under this alternative, a **similar degree of visual intrusion** on off-site resources would occur relative to the proposed project because the vertical profile of HHSEGS would remain largely unchanged. A similar degree of physical disturbance of resources at the facility site would occur relative to the proposed project because the portions of the resources on the facility site, which are small relative to the broad scales of the subject landscapes, would be roughly comparable to the disturbance anticipated under the proposed project. The discussion of archaeological resources under, "Comparison to the Proposed Project," (above) for the Sandy Valley Off-site Alternative states that "[n]o significant archaeological deposits are known to be located on the proposed project site." Therefore, the net effect of this alternative on historical resources would most likely be **similar to that of HHSEGS**. Because the extent and location of additional acreage for this alternative is unknown, no more definitive conclusion is possible.

Fire Protection

Enhancement of the SPT technology with several hours of TES would not cause an increase in the need for or level of fire protection services compared to the proposed project. Staff concludes that this alternative would not change fire risk or the potential for impacts on local fire protection resources. This impact would be **similar to the proposed HHSEGS project**. Like the proposed HHSEGS project, staff has determined that impacts on the local fire department would be significant under this alternative due to the predicted increase in emergency response calls during project construction and operation. Mitigation measures would likely require payment of as yet undetermined project-specific fees to the local fire protection service to enable augmentation of resources such as staff, equipment, and facilities. With implementation of appropriate mitigation measures, impacts on local emergency services would be reduced to less than significant.

Geology and Paleontology

The SPT with Energy Storage Alternative would require construction of additional equipment not included in the proposed HHSEGS project. The additional equipment and structures required for this alternative would not cause any new or more severe impacts on geological and paleontological resources; therefore, these impacts would be the **same as HHSEGS**.

As discussed above under the subsection, “Overview,” for this alternative, additional measureable acreage would be required to generate the same electrical capacity of the two 250-MW solar power plants. The construction techniques and methods used for the alternative technology would be similar to the proposed HHSEGS project. The impacts of constructing and operating the additional equipment associated with this alternative would be the **same as HHSEGS**.

Hazardous Materials

Enhancement of the SPT technology with several hours of TES would not cause an increase in potential risks associated with the release of hazardous materials. Staff concludes that this alternative would not change staff’s determination that with implementation of conditions of certification requiring conformance with applicable LORS, no significant impacts would occur off-site related to the potential release of hazardous materials. This impact is **similar to HHSEGS**.

Land Use

Construction and operation of the SPT with Energy Storage Alternative at the proposed project site would be inconsistent with Inyo County’s designated land uses of Open Space and Recreation, and Recreation (OSR and REC, respectively), and zoning for the Charleston View area (Open Space 40-acre minimum – OSR). An amendment to the Inyo County General Plan would be required to ensure consistency of this alternative with the Land Use Element. Land use impacts would be the **same as HHSEGS** for the SPT with Energy Storage Alternative.

Noise and Vibration

Enhancement of the SPT technology with several hours of TES would increase the noise impact mainly due to the project's potential for the extension of operation before and after sunset. For this analysis, staff assumes that the impact would be **somewhat greater than HHSEGS**. Like the proposed project, conditions of certification would be required to ensure that potentially significant noise impacts were reduced to less than significant during project construction and operation.

Public Health

Enhancement of the SPT technology with several hours of TES would extend this alternative's operations beyond the hours of available sunlight. Staff concludes that use of this alternative technology would result in toxic air emissions and health impacts that would be **similar to those identified under the proposed HHSEGS project** for construction and operations emissions. No significant impacts would occur, and no conditions of certification would be required.

Socioeconomic Resources

Under the SPT with Energy Storage Alternative, the beneficial impact through construction employment and increased taxes and fees would be **similar to HHSEGS**. Potential impacts on emergency medical and law enforcement services would be **similar to HHSEGS**. Like the proposed HHSEGS project, this alternative would increase demand for these public services; however, similar mitigation measures would reduce these impacts to less than significant.

Traffic and Transportation

As discussed in the **Traffic and Transportation** section of this staff assessment, SR 160 is located approximately 10 miles east of the proposed project site, and it provides access to the site via the Old Spanish Trail Highway.

Like the proposed project, daily trips under this alternative would have a significant impact on the structural integrity of the Old Spanish Trail Highway in Nevada and California. Use of Old Spanish Trail Highway for heavy construction traffic and hauling of equipment and materials could cause a significant impact on the structural integrity of the road due to the current and predicted future conditions of the roadway pavement. Old Spanish Trail Highway in Inyo County is approximately 22 feet wide. It lacks shoulders and designed drainage, and is not built or designed for the proposed level of construction traffic that would occur under this alternative. This impact would be the **same as HHSEGS**.

Many of the project elements and major facility components that could produce glint and glare effects under this alternative would be the same as those of the proposed HHSEGS project. It is assumed that the potential impact related to glint and glare would be the **same as the proposed HHSEGS project**. Because of the solar tower height, the applicant would be required to notify the FAA of construction pursuant to the Code of Federal Regulations, Title 14, Aeronautics and Space, Part 77. These regulations

require FAA notification for any proposed structure over 200 feet in height AGL regardless of the distance from an airport. This impact would be the same as the proposed project because both projects would require review and approval by the FAA. This impact would be **the same as HHSEGS**.

Transmission Line Safety and Nuisance

Under the SPT with Energy Storage Alternative, staff concludes that use of this alternative technology would require the use of transmission lines of the same voltage and carrying-capacity as is proposed for HHSEGS. This means that the magnitude of these transmission line-related impacts would be similarly less than significant. This impact would be **similar to HHSEGS**.

Visual Resources

Under the SPT with Energy Storage Alternative, the addition of structures for energy storage, while substantial in size, would be lower in height than the air-cooled condenser and auxiliary boiler stack, which are 120 and 135 feet tall, respectively. As discussed above under, “Rice Solar Energy Project (RSEP),” the summary of structural dimensions lists the domed top heights of the above-ground salt tanks as 64.5 feet and 63.5 feet (SolarReserve 2009). Like the proposed HHSEGS project, implementation of conditions of certification would reduce potential impacts on visual resources for views at the ground plane. Potential impacts of structural lighting could be partially mitigated with implementation of standard conditions of certification to control lighting and screen views. No feasible mitigation measures would reduce the visual impacts of the SPTs, brightness of the SRSGs, and potential visual effects of FAA night safety lighting. Similar to the proposed HHSEGS project, these impacts would remain significant and unavoidable. The potential visual effects of the SPT with Energy Storage Alternative would be **similar to HHSEGS** for construction-related impacts and the **same as the proposed HHSEGS project** for project operations impacts.

This alternative would not worsen impacts of the proposed project nor make a cumulatively considerable contribution to any significant cumulative impact associated with visual resources.

Waste Management

The location of the SPT with Energy Storage Alternative would be the same as the proposed project, and it would be no closer to any unidentified recognized environmental conditions. Similar to the proposed project, staff would require investigation and remediation of soil and groundwater contamination if it was encountered during construction and operation of this alternative. Site characterization and remediation requirements would remain the same as for the proposed project.

The SPT with Energy Storage Alternative would require additional measureable acreage to provide the same energy generation capacity. Construction of additional facilities and equipment installation would be required. Staff anticipates this would also increase the volume of the waste stream by some amount. Although the waste volume would increase somewhat, there is adequate available Class III landfill capacity in

Nevada landfills. Similar to the proposed project, staff considers project compliance with LORS and staff's condition of certification to be sufficient to ensure that no significant impacts would occur as a result of waste management associated with the SPT with Energy Storage Alternative. Potential impacts on existing waste disposal facilities and human health and the environment would be **similar to HHSEGS**.

Soil and Surface Water

Staff assumes that the energy capacity of the SPT with Energy Storage Alternative would be similar to the 500-MW capacity of the proposed project, with the ability to also produce power for extended amounts of time (i.e., during cloudy days, beyond the hours of available sunlight). This alternative would require additional measurable acreage. However, the amount of additional land needed is difficult to estimate, because energy storage introduces several sizing options for balancing the size of the thermal storage tank(s) with the required number of additional heliostats.

Depending on the amount of additional land needed, the impacts could range from **somewhat greater up to much greater than the proposed HHSEGS project**. Although a larger solar field is needed for this alternative, installation of the supports for the heliostats does not require significant grading of the heliostat array fields. Assuming additional dirt roads would be created throughout the larger area for access and maintenance of the heliostats, and the footprint for each solar plant would increase to accommodate additional facilities for energy storage, impacts related to soil erosion during construction would be **greater than the proposed HHSEGS project**. Impacts related to soil erosion during project operations would be **somewhat greater than HHSEGS** because of vehicle travel on the dirt roads to clean the additional heliostats.

The additional facilities required for thermal storage could slightly increase the impacts of process wastewater and contamination of storm water runoff; therefore, these impacts are **somewhat greater than HHSEGS**. A septic system for proper disposal of domestic sanitary waste would not change, so these impacts would be the **same as HHSEGS**.

Because of the HHSEGS fixed borders to the east (Nevada state line) and to the south (Old Spanish Trail Highway), it is assumed that the additional acres needed for an energy storage alternative would be obtained by extending the western border of the project site. This larger footprint would extend further into the 100-year flood flows (as shown on FEMA maps). Because of the low impact flow-through layout of the heliostat supports, impacts from 100-year flood flows are **similar to the proposed HHSEGS project** as well as the potential for on-site/off-site flooding or storm damage.

Water Supply

As discussed above, engineering staff has determined that this alternative technology, compared to the proposed HHSEGS project, would require more land to produce the same electrical output. For this discussion, staff assumes that adding energy storage components to the project would require additional, measurable acreage.

Water use at solar farms is influenced in part by how many heliostats are installed, and how often heliostats are washed. Adding thermal storage would require the addition of at least 18 percent more heliostats to the solar field (Rio Mesa Solar I, II, and III, LLCs 2012). Staff assumes water use would also likely be somewhat greater than currently proposed at the HHSEGS site in order to service longer hours of operation. Increased groundwater consumption would result in somewhat greater impacts on groundwater resources. Staff lacks specific information on a potential footprint for this alternative and the exact water needs of a project with energy storage. Staff assumes the level of impacts on water supply could increase proportionally with increased water usage. Impacts related to groundwater depletion would be **somewhat greater than HHSEGS** for the SPT with Energy Storage Alternative. The same conditions of certification proposed by staff for the proposed HHSEGS project would be recommended for this alternative. With implementation of conditions of certification, potential impacts on water supply and groundwater resources would be reduced to less than significant.

SOLAR PHOTOVOLTAIC (PV) ALTERNATIVE

Overview

This alternative would involve constructing and operating a utility-scale PV project at the proposed project site. Solar PV technology involves the direct conversion of photons (i.e., sunlight) into electricity. PV modules (also called solar panels) absorb solar radiation and convert it into direct current electricity (Hidden Hills Solar I and II, LLCs 2011a). This direct current power is then converted into alternating current electricity for delivery to the electrical grid system. This conversion occurs when direct current (DC) flows through a device called an *inverter*, which converts the electrical characteristics to alternating current (AC) that can be tied to the power distribution system for power delivery. The electrical current produced is directly dependent on how much light strikes the module. Multiple PV panels are wired together to form an array, an arrangement that increases the total system output. PV technology does not involve thermal energy or the production of steam to power turbines. PV systems are relatively simple to operate and maintain and require little water for project operations compared to solar thermal energy systems.

A traditional fixed-tilt PV system is composed of flat-plate collectors (i.e., PV solar panels or modules) installed in arrays at a fixed tilt facing south. Maximum yearly solar radiation can be achieved using a tilt angle approximately equal to a site's latitude. Larger, more complex installations use tracking flat-plate collectors that tilt the panels toward the sun for maximum efficiency. PV trackers use either single-axis (east-west) tracking or dual-axis (east-west and north-south) tracking in order to maximize the panels' absorption of sunlight during the day and throughout the year (Hidden Hills Solar I and II, LLCs 2011a). Tracking PV modules produce more electricity annually compared to fixed-tilt modules. **Alternatives Figure 8** includes photographs showing fixed-tilt and tracking PV modules.

Staff requested additional information to compare the proposed HHSEGS project to an alternative using PV technology. In its responses, the applicant questions "whether a PV project could be developed that would generate a net 500 MWs and be capable of

selling competitively priced renewable energy, consistent with the procurement obligations of California's publicly owned and privately owned utilities" (Hidden Hills Solar I and II, LLCs 2012b). Examples of PV projects provided by the applicant include a 21-MW project on 200 acres in Blythe and a 48-MW project on 350 acres in Boulder City, Nevada (Copper Mountain Solar 1) that was completed in late 2010. (Conflicting online news sources report the total capacity of Copper Mountain Solar 1 as either 48 MWs or 58 MWs.) **Alternatives Figure 8** includes a photograph of the Copper Mountain Solar 1 project. Expansion of the Copper Mountain PV complex is underway; when construction of Copper Mountain Solar 2 is completed, it will include an additional 150 MWs of generating capacity (Sempra U.S. Gas & Power 2012). Based on staff's review of various online news sources, at least four utility-scale PV projects are approved and in development in California, including the Topaz Solar Farm Project (further described below); **Alternatives Table 5** summarizes the four approved projects. Based on data in the final, approved environmental documents for these PV projects, average land use efficiency is approximately 7 acres per MW. Based on a total acreage of approximately 3,277 acres, land use efficiency is approximately 6.6 acres per MW for the proposed project and 7.6 acres per MW for the proposed Rio Mesa SEGF project.

The Draft Solar Programmatic Environmental Impact Statement (Draft Solar PEIS) prepared by BLM in 2010 summarizes "utility-scale PV facilities" that were scheduled for completion in several countries in 2008 and beyond. Many of these facilities had capacities (expressed as megawatt peak [MWp]) in the range of 10–25 MWp (BLM 2010). The Draft Solar PEIS listed average land use efficiency for PV facilities as 9 acres per MW (BLM 2010). The largest of the PV facilities listed in Table F.3.2-2 of the Draft Solar PEIS is the 550-MW Topaz Solar Farm Project (see below), and the total plant acreage is shown as 6,200 acres. When San Luis Obispo County approved the Topaz Solar Farm Project in March 2011, the selected alternative reduced the facility's fence line to encompass approximately 3,500 acres (see **Alternatives Table 5**). The project was reconfigured to reduce impacts on biological resources and avoid Williamson Act lands, and the 550-MW generating capacity was maintained.

The April 2012 DRECP Stakeholder Committee Meeting included a review of an update to the renewable energy calculator that was developed by Energy Commission staff to use as a tool for framing an understanding of renewable energy supply and demand for the 2040 planning horizon. Partly in response to comments on an earlier version of the 2040 planning scenario, the acreage requirement for all central station solar projects, including solar thermal and PV project types, was reduced from 9.1 acres per MW to 7 acres per MW. Although it was acknowledged at the meeting that scenarios will vary depending partly on the portfolio[6], the modified efficiency ratio is considered to be plausible and reasonable. Adjustments to the portfolio will be made every 5 years during the planning horizon. Of the four PV projects summarized by staff in **Alternatives Table 5**, the two 550-MW projects show land use efficiencies that are slightly below 7 acres per MW. (The proposed HHSEGS and Rio Mesa SEGF projects are also close to that

[6] The portfolio includes central station solar thermal, central station PV, wind, biomass/fuels, geothermal, utility-side distributed generation, and small rooftop solar.

land use efficiency ratio). For this alternatives analysis, staff assumes that the Solar PV Alternative could be implemented at the proposed project site with no site expansion.

Site disturbance or grading for the PV projects shown in **Alternatives Table 5** is generally described in the environmental review documents for the projects. For the California Valley Solar Ranch Project, the final EIR states that "[l]imited grading is expected to be required because of the relatively flat terrain and because the arms of the solar arrays would be adjustable and would therefore not need to be located on completely leveled ground" (San Luis Obispo County 2011a). The siting criteria for the California Valley Solar Ranch Project includes a criterion to deploy the project in a "minimally invasive manner, including minimal landform alteration (low or no grading) to minimize impacts to biology, ecology, and air quality, among other resources." The final EIS for the Desert Sunlight Solar Farm Project describes site preparation techniques to reduce the required volume of earth movement. A process of *micrograding* or *isolated cut and fill and roll* is described to trim off high spots and use the material to fill in low spots for areas that make up more than half of the solar field; standard cut and fill techniques are intended for use in specific arrays to limit slope to within 3 percent (BLM 2011). It is stated in the final EIS for the Topaz Solar Farm Project that "[g]rading would not be required under most PV arrays" (San Luis Obispo County 2011b).

Operational water use for the PV projects shown in **Alternatives Table 5** varies from less than 0.3 acre-feet per year (afy) for the Desert Sunlight Solar Farm Project to approximately 12 afy for the AV Solar Ranch One Project. The proposed HHSEGS project would require approximately 140 afy for project operations.

Alternatives Table 5
Summary Descriptions of Four Approved Utility-Scale Solar Photovoltaic Projects in California

Project Name and Location	PV Technology	Capacity, Land Use Efficiency, and Energy Production	Schedule
AV Solar Ranch One Project, Antelope Valley area of northern Los Angeles County	First Solar thin-film PV technology with cadmium telluride (CdTe) as the semiconductor material enclosed in two sheets of glass; of the total 230 MWs, 52 MWs are horizontal trackers and 178 MWs are fixed-tilt panels; about 3 million panels total	230 MWs; total of 1,955 acres will be subject to direct ground disturbance; about 8.5 acres per MW; 592 gigawatt hours per year (GWh/yr)	Project approved December 2010;will be fully operational at the end of 2013

Alternatives Table 5 Summary Descriptions of Four Approved Utility-Scale Solar Photovoltaic Projects in California			
Project Name and Location	**PV Technology**	**Capacity, Land Use Efficiency, and Energy Production**	**Schedule**
Desert Sunlight Solar Farm Project, Chuckwalla Valley of the Sonoran Desert in eastern Riverside County	First Solar thin-film PV technology with CdTe as the semiconductor material; all fixed-tilt panels; about 9 million panels total	550 MWs; total of 3,761 acres, as stated in the Record of Decision; about 6.9 acres per MW; 1,190 GWh/yr	Project approved August 2011 and will be fully operational by the first quarter of 2015
Topaz Solar Farm Project, Carrizo Plain, eastern San Luis Obispo County	First Solar thin-film PV technology with CdTe as the semiconductor material enclosed in two sheets of glass; all fixed-tilt panels; about 9 million panels total	550 MWs; total of 3,500 acres; about 6.4 acres per MW; 1,096 GWh/yr	Project approved summer 2011; construction began in late 2011 and will be finished in 2015
California Valley Solar Ranch Project, northeastern edge of the Carrizo Plain in southeastern San Luis Obispo County	Crystalline silicon PV panels attached to the SunPower T0 Tracker® system (1,032 tracker units in ten arrays); single-axis tracking; about 757,320 panels	250 MWs; total of 1,500 acres; about 6 acres per MW; 688 GWh/yr	Project approved April 2011 and will be fully operational by 2013
Sources: AV Solar Ranch One Project: <http://planning.lacounty.gov/case/view/project_no._r2009-02239_tract_map_no._tr071035_av_solar_ranch_one_project> Desert Sunlight Solar Farm Project: <http://www.blm.gov/ca/st/en/fo/palmsprings/Solar_Projects/Desert_Sunlight.html> Topaz Solar Farm Project: <http://www.slocounty.ca.gov/planning/environmental/EnvironmentalNotices/optisolar.htm> California Valley Solar Ranch Project: <http://www.slocounty.ca.gov/planning/environmental/EnvironmentalNotices/sunpower.htm> (Bernheimer and Ekstrom, pers. comms., 2012)			

Potential to Attain Project Objectives

Recent approvals and ongoing construction of utility-scale PV projects in California and Nevada indicates the suitability of using PV technology for development of a large, renewable energy power plant with a capacity of several hundred MWs. Development of an approximately 500-MW solar PV project at the proposed project site could potentially meet the project objectives related to construction and operation of a utility-scale renewable electrical generation facility, which would lead to the sale of renewable energy and contribute to achieving California's renewable energy goals. It is unknown whether approval of amendments to the PPAs by CPUC would be required. This

alternative could potentially satisfy the project objectives addressing the requirement to comply with applicable LORS and avoid or minimize significant impacts to the greatest extent feasible. This alternative would satisfy the project objective to develop a renewable energy facility in an area with high solar value and minimal slope. See the discussions below under, "Environmental Analysis," for general analyses of the potential environmental effects of this alternative.

The Solar PV Alternative could potentially satisfy five or six of the seven project objectives. This alternative would not satisfy the project objective addressing operational flexibility. It is not known whether the proposed 3,277-acre project site could be used for construction of a PV project that would achieve close to the 500-MW capacity of the proposed project. Although based on staff's review of the four utility-scale PV projects discussed above, land use efficiencies of less than 7 acres per MW are being achieved at other sites in the state. Because this alternative would use the proposed project site, the objective to obtain site control and use within a reasonable period of time would be attained.

Potential Feasibility Issues

The applicant's data responses on the feasibility of a PV alternative describe how this alternative would not comply with provisions of the PPAs for the proposed project. The applicant states that "[f]ailure to satisfy this contractual obligation means that such an alternative is infeasible taking into account economic factors and it could not be accomplished successfully in a reasonable time period, given the long-lead time for the utility [request for offer] process and CPUC contract approval" (Hidden Hills Solar I and II, LLCs 2012b). The applicant states that this alternative may be infeasible because "it could not be accomplished in a reasonable time frame, given the lead time to negotiate for the use of another proprietary technology and the follow-on development process."

The work required to redesign the project to use a PV technology would delay the project schedule, and it is not known at what point a project schedule delay would affect project viability.

Environmental Analysis

Alternatives Table 6 presents a summary comparison of impacts of the proposed HHSEGS project to the same or similar potential impacts of the Solar PV Alternative. Comparative discussions for each environmental topic area follow the table.

Alternatives Table 6
Summary Comparison of the Proposed Project's Impacts to the Solar Photovoltaic Alternative

Environmental Effect	Proposed Project	Solar PV Alternative
Air Quality		
Construction-related emissions	SM	Similar to HHSEGS (SM)

Alternatives Table 6 Summary Comparison of the Proposed Project's Impacts to the Solar Photovoltaic Alternative		
Environmental Effect	**Proposed Project**	**Solar PV Alternative**
Project operations emissions	SM	Less than HHSEGS (SM)
Biological Resources		
Impacts on special-status plant species	SM	Same as HHSEGS (SM)
Impacts on waters of the U.S. and waters of the state	SM	Same as HHSEGS (SM)
Impacts on desert tortoise	SM	Same as HHSEGS (SM)
Impacts on special-status terrestrial wildlife species (other than desert tortoise)	SM	Same as HHSEGS (SM)
Impacts on avian species from collisions with project features	PSU	Unknown (PSU)
Impacts on avian species from exposure to concentrated solar flux	PSU	—
Potential impacts on groundwater dependent ecosystems	PSM	Somewhat less than HHSEGS (PSM)
Cultural Resources		
Potential to disturb, destroy, or visually degrade significant prehistoric and historical archaeological sites *on* the site (see cultural resources note)	LS	Similar to HHSEGS (LS)
Potential to disturb, destroy, or visually degrade significant prehistoric and historical archaeological sites *beyond* the site	SU	Much less than HHSEGS (PSM)
Potential impacts on significant built-environment cultural resources (Old Spanish Trail – Mormon Road Northern Corridor) *on* the site	SM	Similar to HHSEGS (SM)
Potential impacts on significant built-environment cultural resources (Old Spanish Trail – Mormon Road Northern Corridor) *beyond* the site	SU	Much less than HHSEGS (PSM)
Potential to disturb, destroy, or visually degrade significant ethnographic resources *on* the site	SU	Similar to HHSEGS (PSU)
Potential to disturb, destroy, or visually degrade significant ethnographic resources *beyond* the site	SU	Somewhat less than HHSEGS (PSU)
Cultural resources note: "Site" means the facility site proper and does not include linear or ancillary infrastructure away from the facility site.		
Fire Protection		
Potential impacts on local fire protection resources	PSM	Less than HHSEGS (PSM)
Potential impacts on emergency response services	PSM	Less than HHSEGS (PSM)

Alternatives Table 6 Summary Comparison of the Proposed Project's Impacts to the Solar Photovoltaic Alternative		
Environmental Effect	**Proposed Project**	**Solar PV Alternative**
Geology and Paleontology		
Potential impacts from strong seismic shaking	SM	Much less than HHSEGS (PSM)
Potential impacts from soil failure caused by liquefaction, hydrocollapse, formation of soil fissures, and/or dynamic compaction	SM	Much less than HHSEGS (PSM)
Potential impacts on paleontological resources	SM	Less than HHSEGS (PSM)
Potential impacts on geological or mineralogical resources	LS	Same as HHSEGS (LS)
Hazardous Materials		
Potential for release of hazardous materials to occur on-site	SM	Similar to HHSEGS (SM)
Potential for release of hazardous materials to occur off-site	SM	Similar to HHSEGS (SM)
Land Use		
Conflicts or inconsistencies with general plan land use designations and zoning	SU	Same as HHSEGS (SU)
Conversion of agricultural land	—	—
Noise and Vibration		
Potential for noise to impact noise-sensitive receptors	PSM	Much less than HHSEGS (PSM)
Public Health		
Potential for project construction to cause air toxics-related impacts that could affect public health	LS	Similar to HHSEGS (LS)
Potential for project operations to cause air toxics-related impacts that could affect public health	LS	Less than HHSEGS (LS)
Socioeconomic Resources		
Construction employment and increased taxes and fees	B	Similar to HHSEGS (B)
Displacement of existing rural residences	—	—
Potential impacts on emergency medical and law enforcement services	PSM	Similar to HHSEGS (PSM)
Traffic and Transportation		
Potential impacts on roadway infrastructure	SM	Same as HHSEGS (SM)
Potential for glint and glare to cause safety hazards or a distinct visual distraction effect from an operator control perspective (i.e., vehicle drivers and aircraft pilots)	PSM	Much less than HHSEGS (LS)
Potential for construction equipment and/or permanent	SM	—

Alternatives Table 6 Summary Comparison of the Proposed Project's Impacts to the Solar Photovoltaic Alternative		
Environmental Effect	**Proposed Project**	**Solar PV Alternative**
structures to exceed 200 feet in height above ground level		
Transmission Line Safety and Nuisance		
Potential for impacts related to aviation safety, hazardous shocks, nuisance shocks, and electric and magnetic field exposure	SM	Similar to HHSEGS (SM)
Visual Resources		
Construction-Related Impacts		
Potential to substantially degrade the existing visual character or quality of the site and its surroundings	SU	Less than HHSEGS (SM)
Potential to create a new source of substantial light or glare which would adversely affect day or nighttime views in the area	SU	Less than HHSEGS (SM)
Project Operations Impacts		
Potential to substantially degrade the existing visual character or quality of the site and its surroundings	SU	Much less than HHSEGS (PSM)
Potential to create a new source of substantial light or glare which would adversely affect day or nighttime views in the area	SU	Much less than HHSEGS (PSM)
Waste Management		
Potential for disposal or diversion of project materials to cause impacts on existing waste disposal or diversion facilities	SM	Similar to HHSEGS (PSM)
Potential for impacts on human health and the environment related to past or present soil or water contamination	PSM	Somewhat greater than HHSEGS (PSM)
Soil and Surface Water		
Soil erosion by wind and water during project construction	SM	Somewhat less than HHSEGS (SM)
Soil erosion by wind and water during project operations	PSM	Less than HHSEGS (PSM)
Water quality impacts from contaminated storm water runoff	SM	Much less than HHSEGS (LS)
Water quality impacts from storm damage	PSM	Somewhat greater than HHSEGS (PSM)
Water quality impacts from power plant operations	SM	Much less than HHSEGS (LS)

Alternatives Table 6 Summary Comparison of the Proposed Project's Impacts to the Solar Photovoltaic Alternative		
Environmental Effect	**Proposed Project**	**Solar PV Alternative**
Water quality impacts from sanitary waste	SM	Similar to HHSEGS (SM)
Potential impacts from on-site and off-site flooding	SM	Similar to HHSEGS (SM)
Potential to impede or redirect 100-year flood flows, as shown on Federal Emergency Management Agency maps	LS	Similar to HHSEGS (LS)
Water Supply		
Potential impacts on local wells	PSM	Somewhat less than HHSEGS (PSM)
Potential impacts on groundwater basin balance	PSM	Somewhat less than HHSEGS (PSM)

Air Quality

The number of permitted fuel-consuming and air pollutant emitting sources would be significantly fewer under the Solar Photovoltaic Alternative. This alternative would not be subject to Energy Commission jurisdiction and would be permitted locally, including the air permits from the air district. Construction-related emissions and impacts would be **similar to HHSEGS** for this alternative. Staff reviewed the air quality analyses for the four approved utility-scale PV projects summarized above under the subsection, "Overview." Operational impacts related to criteria pollutant emissions for those projects were described to include normal maintenance truck activity, periodic fire water pump engine testing, and use of water trucks coinciding with the infrequent work to wash the PV modules. Operational emissions are described as "limited" or "minimal." Of the four reviewed PV projects, two required preparation and implementation of an operational dust control plan. Use of fossil fuel-fired energy generation is not required under this alternative.

Impacts on air quality from operation of the Solar Photovoltaic Alternative would be **less than HHSEGS**. This alternative would result in a greater overall cumulative reduction in GHG emissions from power plants compared to the proposed HHSEGS project. The Solar Photovoltaic Alternative would not worsen current conditions or make a cumulatively considerable contribution to any significant cumulative impact associated with air quality.

Biological Resources

Solar PV technology employs either fixed-tilt or tracking solar panels to collect incident radiation. Between these two options, slight differences in potential impacts are identified related to the amount of site grading and preparation that could be required. This discussion of potential impacts on biological resources from the Solar PV

Alternative presents a general analysis of PV solar collectors without choosing a particular type of technology. It is assumed that the Solar PV Alternative would use a low-impact design that would minimize on-site grading and manage remaining native vegetation under the solar panels by mowing. It is possible that no grading would be necessary under most of the solar panels for the Solar PV Alternative. Assuming the same project boundary under this alternative, impacts on special-status plant species, waters of the state, and waters of the U.S., would be the **same as HHSEGS**.

The PV Alternative would remove habitat occupied by desert tortoise and other special-status terrestrial wildlife species; this alternative would cause other direct and indirect impacts such as weed proliferation and increased dust. These impacts would be the **same as HHSEGS**.

Impacts on avian species would occur through conversion of the project site from native habitat to a solar farm and potential collisions with project features such as PV panels and transmission lines. This technology does not require central collector towers (e.g., an SPT at the center of a heliostat array) or concentrate solar energy over a heliostat field; therefore, **no impacts** on avian species would occur from exposure to solar flux. The Solar PV Alternative would cause **no impact** on avian species from exposure to solar flux.

Little research-based data is available to determine the extent of collision impacts on avian species from either the photovoltaic or solar power tower technologies. Similar to concentrating solar power technology, the PV Alternative would have the potential to cause a “mirage” effect from the appearance of the sky reflected off the solar panels when viewed from a distance (see **Alternatives Figure 8**). Properties of the smooth, glass surfaces of the PV panels are known to cause polarized light pollution (Horváth et al. 2009 and 2010). The final EIS for the Topaz Solar Farm Project (San Luis Obispo County 2011b) identified solar modules, or panels, as posing a possible risk of collision for birds, including golden eagle. The analysis discussed the possibility of birds colliding with the PV panels depending on the potential effects of “glare or polarized light” from the panels. Both of these potential effects (i.e., the mirage effect or the effects of polarized light) could attract birds or bats to the facility, where they could be susceptible to mortality or injury by collision.

While little data is available addressing how reflectivity of different solar collector surfaces may influence avian collisions, a 2009 technical memorandum on a review of potential impacts of solar array developments on biological resources states that “non-reflective flat plate panels are preferred over reflective technologies, such as CSP, for sites with burrowing owls. It is recommended that the impact of solar panel reflective properties be part of the procurement selection criteria to minimize impacts on avian wildlife” (City of San Jose 2009). Burrowing owl are present at the proposed project site, and although the owls would be evicted from the site during construction, owls could potentially reenter the site during or following construction. Impacts on burrowing owl from installation of solar panels under this alternative would cause similar effects on other bird species and not be limited to burrowing owl. The 2009 technical memorandum does not address the potential effects of polarized light from PV panels.

The extent and severity of potential collision impacts on avian species under the Solar PV Alternative is unquantifiable and cannot be reasonably compared to the proposed project. Impacts on avian species from collisions with solar panels and other structures are **unknown compared to HHSEGS**. Impacts on avian species stemming from habitat loss could be mitigated to below a level of significance. However, no evidence exists demonstrating that impacts related to collisions with project structures could be reduced to below a level of significance, and these impacts could remain significant and unavoidable.

Photovoltaic solar plants require less operational water use, and less groundwater pumping, compared to the proposed project. Therefore, potential impacts on groundwater dependent plants and wildlife species would be **somewhat less than HHSEGS**.

Cultural Resources

Construction and operation of the Solar PV Alternative at the proposed project site would require roughly the same extent of physical ground disturbance on the project site. The extent of the visual intrusion on off-site resources relative to the proposed project would be **much less than HHSEGS**, while the extent of physical disturbance of resources at the facility site relative to the proposed project would be **similar to that of HHSEGS**.

The overall scale of this alternative and the vertical profile would be substantially reduced with elimination of the proposed project's power towers. Compared to the solar power towers and heliostats for the proposed project, the PV structures would not be visible from some portions of the broad, landscape-scale resources that are the subjects of concern; and where the terrain would allow views of portions of the PV arrays, the level of the visual intrusion in the landscape would be much less than HHSEGS. In addition to the dramatically reduced vertical scale of the Solar PV Alternative, the much less reflective surfaces of the PV modules would be less intrusive compared to the mirrored heliostats. The overall physical disturbance of the portions of the resources on the facility site, although small relative to the broad scales of the subject landscapes, would nonetheless be roughly comparable to the site disturbance that would occur under the proposed project. Staff characterizes the net effect of this alternative on historical resources as **much less than HHSEGS**. Of the impacts identified by cultural resources staff, two impacts addressing archaeological and built-environment resources *beyond* the site that are considered "significant and unavoidable" under the proposed project would be reduced to "potentially significant" under this alternative (see **Alternatives Table 6**). These two impacts could be reduced to less than significant with implementation of appropriate compensatory mitigation measures.

Impacts addressing two ethnographic resources *on* and *beyond* the site that are considered "significant" under the proposed project are considered "potentially significant" under this alternative. These two impacts are considered, **similar to HHSEGS**, and, **somewhat less than HHSEGS**, respectively. Because no feasible means of compensation are available to reduce these impacts on aboriginal ancestral

territory, staff concludes that these two impacts would remain significant and unavoidable under the Solar PV Alternative.

Fire Protection

The Solar PV Alternative would use photovoltaic cells to convert solar radiation directly into electrical current. This alternative would pose reduced fire risks and impacts on local fire protection resources compared to those associated with the proposed project, and the corresponding mitigation measures needed by the authority having jurisdiction for emergency response would also be reduced. This impact would be **less than the proposed HHSEGS project**. Compared to the SPT technology of the proposed HHSEGS project, staff expects that this alternative could require smaller work crews during construction and operation. This alternative would require far less flammable and hazardous materials use. Due to the simpler construction and operational requirements and the less complex equipment set associated with the PV technology, the potential for this alternative to place significant extra demands on local emergency response services (due to the predicted fewer worker accidents, fires, and hazardous materials spills) would be **less than the proposed HHSEGS project**. Staff concludes that impacts would be potentially significant; mitigation measures would likely require payment of as yet undetermined project-specific fees to the local fire protection service determined to be necessary to enable augmentation of resources such as staff, equipment, and facilities. With implementation of appropriate mitigation measures, impacts on local emergency services would be reduced to less than significant.

Geology and Paleontology

Construction and operation of the Solar PV Alternative at the proposed project site could have fewer impacts compared to the proposed HHSEGS project. Primarily, the Solar PV Alternative would not require the deep or otherwise specialized foundations that would be required for the SPTs and the numerous heliostat foundations of the proposed project. The elimination of deep foundations would decrease the potential for encountering fossil-bearing strata, and due to elimination of tall tower structures, this alternative as a whole would be much less susceptible to the effects of strong seismic shaking. Depending on the type of embedded foundation that would support tracker or fixed-tilt PV units (e.g., drilled concrete piers, driven piers, or screw-type foundations), the potential impact on fossil-bearing strata could be somewhat less than or similar to the proposed project. The net effect of this alternative on geological and paleontological resources would be **less than HHSEGS**.

Hazardous Materials

The Solar PV Alternative would use photovoltaic cells to create electrical power at the proposed HHSEGS site instead of the proposed SPT project. This alternative would pose no potential for new or more severe off-site impacts from required use of hazardous materials at the site. Thus, this alternative would be similar to the proposed project regarding the potential risk for an accidental release of hazardous materials to occur at the site. This impact would be **similar to HHSEGS**.

Land Use

Construction and operation of the Solar PV Alternative at the proposed project site would be inconsistent with Inyo County's designated land uses (OSR and REC) and zoning for the Charleston View area (OS-40). An amendment to the Inyo County General Plan would be required to ensure consistency of this alternative with the Land Use Element. Land use impacts would be the **same as HHSEGS** for the Solar Photovoltaic Alternative.

Noise and Vibration

Photovoltaic cells convert solar radiation directly into electrical current. No mechanical equipment (which is the major source of noise) is used for this technology. The only source of noise would be the inverters, which are generally quiet at relatively short distances. Impacts related to noise would be **much less than HHSEGS** under this alternative. Depending on the location of sensitive noise receptors relative to the inverters, conditions of certification could be required to reduce potentially significant impacts to less than significant.

Public Health

The Solar PV Alternative would not cause minor combustion-related boiler emissions. Based on staff's review of the operational water use for the four PV projects described above, washing of the PV panels under this alternative could be necessary once or twice per year. Staff assumes that infrequent washings of the panels could include the use of diesel-fueled water trucks, which would cause some toxic air emissions (i.e., diesel particulate matter). Due to the infrequent washings of PV panels, toxic air emissions under this alternative from the use of diesel-fueled vehicles could be substantially less compared to the proposed project. Some high-performance solar PV cells are known to contain small amounts of cadmium, selenium, and arsenic, and these substances could be emitted if any solar cells were broken. However, staff does not consider any such emission hazards to be significant because under normal project operations, the PV panels would remain intact. Staff thus considers potential public health risks from this alternative technology to be **less than the proposed HHSEGS project** for project operations emissions. For project construction emissions, the impact on public health would be **similar to HHSEGS**.

Socioeconomic Resources

Under the Solar PV Alternative, the beneficial impact through construction employment and increased taxes and fees would be **similar to HHSEGS**. Potential impacts on emergency medical and law enforcement services would be **similar to HHSEGS**. Like the proposed HHSEGS project, this alternative would increase demand for these public services; however, similar mitigation measures would reduce these impacts to less than significant.

Traffic and Transportation

Similar to the proposed project, the Solar PV Alternative would require use of SR 160 and the Old Spanish Trail Highway for hauling of equipment and materials to the project

site, which could cause a significant impact on the structural integrity of the road due to the current and predicted future conditions of the roadway pavement. This impact would be the **same as HHSEGS**.

Because solar PV panels absorb sunlight, impacts related to glint and glare would be **much less than HHSEGS**. The Solar PV Alternative would not have the potential to cause safety hazards from an operator control perspective (i.e., vehicle drivers and aircraft pilots). See the discussion below under the subsection, "Visual Resources," for an analysis of glint and glare impacts for the Solar PV Alternative.

Staff reviewed the traffic and transportation analyses for the four approved utility-scale PV projects summarized above under the subsection, "Overview." No construction equipment or permanent structures were identified for those projects that would be taller than the projects' transmission lines, which are less than 200 feet tall. As discussed in the **Traffic and Transportation** section of this staff assessment, McCarran International Airport in Las Vegas, Nevada, is approximately 45 miles east of the proposed HHSEGS site. The proposed Pahrump Valley General Aviation airport would be approximately 10 miles northwest of the proposed project site. No structures associated with the proposed project would penetrate the navigable airspace of these airports. The Department of Defense determined that the proposed project would cause no military mission impacts. Under the Solar PV Alternative, no structures would necessarily require review and approval by FAA, and **no impact** would occur under the Solar PV Alternative.

Transmission Line Safety and Nuisance

Under the Solar PV Alternative, photovoltaic cells would be used at the proposed HHSEGS site instead of the proposed technology. (The proposed project would result in minor combustion-related boiler emissions.) Since this alternative would be located at the proposed HHSEGS site, staff expects the utilized transmission lines and related impacts to be similar, conferring no benefit regarding the field and nonfield impacts of concern in staff's **Transmission Line Safety and Nuisance** testimony in this staff assessment. This means that the magnitude of these transmission line-related impacts would be similarly less than significant. This impact would be **similar to HHSEGS**.

Visual Resources

Comparison of the Proposed HHSEGS Project to the Solar PV Alternative

The Solar PV Alternative would not use heliostats or any other type of mirrored-surface solar collector. Although the acreage requirement for this alternative would not change compared to the proposed HHSEGS project, the most notable difference between the proposed project and the Solar PV Alternative is the lack of the visually dominant power towers, brightly glowing SRSGs, and FAA safety lighting. The Solar PV Alternative would not use boilers, turbines, steam, and cooling equipment. The number and complexity of structures associated with this alternative would be reduced compared to the proposed HHSEGS project. Elimination of the 135-foot air-cooled condenser and 120-foot stack and other structures from the base of the power tower would potentially lower the profile of the Solar PV Alternative to that of 2–3 story buildings.

Although a potential configuration for this alternative is unknown, the PV arrays could resemble those of the 550-MW Topaz Solar Farm Project that is under construction in eastern San Luis Obispo County. The PV solar modules for that project are being installed in approximately 460 arrays (San Luis Obispo County 2011b). Each array will consist of up to approximately 20,000 modules. The fixed-tilt PV modules will be mounted on steel support structures called tables, each holding about 16 modules. Once mounted, the front of each table will be about 1½ feet above grade and the rear will be about 5½ feet above grade. The total distance from the ground to the top of the PV module table may vary depending on the topography. (The above-grade maximum module height for a tracking PV system would be a few feet higher.) Each array will require approximately 7 acres and be equipped with a power conversion station, including two inverters and one transformer. For the Topaz Solar Farm Project, drawings showing a typical array configuration show modules grouped in rows that are approximately 240 feet long. This general layout will be repeated to cover the site uniformly. Permanent building heights will not exceed 30 feet and on-site electrical collection system poles will not exceed 43 feet, except within one-half mile of the project substation, where the pole height will not exceed 52 feet.

The visual simulations of PV solar arrays in Section C.2, “Aesthetics,” in the final EIR for the Topaz Solar Farm Project depict a near-continuous surface area covering visible portions of the project site. The PV modules would likely cast shadows on the ground. The collector side of the panels is variably seen as dark to lighter in color. The visual effect of what appears to be a continuous surface area may sometimes resemble a lake. As stated in the final EIR for the Topaz Solar Farm Project, “[t]he dark-colored, glass-surfaced PV fields would exhibit strong color and texture contrast against the light-colored and non-reflective grassland…” (San Luis Obispo County 2011b). The visual effects of the heliostat mirrors associated with the proposed project would be very different. The tops of the heliostat units would be more than 13 feet above the ground surface, and would move constantly to keep the reflective angle targeted on the SRSGs at the tops of the power towers. The site design for the Solar PV Alternative would include expanses of relatively uniform rows of PV modules that would absorb solar radiation. The overall visual effect of the proposed HHSEGS project would be greater with the heliostats arranged in a circular pattern around the base of the SPT to constantly reflect the sun’s rays to the top of the tower.

Environmental Impacts

Construction-related visual impacts of the Solar PV Alternative would be **less than the proposed HHSEGS project**. Views during project construction phases would include views of equipment and stored materials. The lack of extremely tall structures and cranes with FAA safety lighting under this alternative would reduce the severity of construction-related impacts on visual resources. At ground level, much of the construction activity would be screened, and conditions of certification would be implemented to screen views and reduce the impacts of construction area lighting.

PV solar modules would be less visually dominant than the heliostats and 750-foot SPTs and related structures. The Solar PV Alternative would not include structures that

would contrast with the scenic backdrops of the Nopah Wilderness Area, Pahrump Valley Wilderness Area, and the Spring Mountains and overwhelm the views. The Solar PV alternative would present similar challenges to screening the structures from view at key observation point (KOP) 3, but the potential impacts on the more distant views toward the site from KOPs 4, 5, and 7 would be lower without the visually dominant SPTs. In fact, it might be that this alternative would not be visible at all from KOPs 4 and 7. The view from KOP 5 would be of an array that could resemble a lake surface. This view could slightly mimic views of the Pahrump dry lake bed north of Charleston View. (Refer to the **Visual Resources** section of this staff assessment for detailed assessments of the KOPs for the proposed project.)

The proposed HHSEGS site is relatively flat, and the heights of the PV modules for this alternative, mounted on their support posts, would be relatively consistent across the site. The visual impacts of the Solar PV Alternative in Charleston View could potentially be reduced to less than significant, assuming the impacts of this alternative would be much lower for views of wilderness and recreation areas. The extent and severity of glint and glare effects would be lower compared to the proposed project. Views from the wilderness and recreation areas, including the Old Spanish National Historic Trail alignment, would be impacted but to a lesser degree. Overall, the visual impacts of this alternative would be **much less than the proposed HHSEGS project**.

Waste Management

The location of the Solar PV Alternative would be the same as the proposed project, and it would be no closer to any unidentified recognized environmental conditions. Similar to the proposed project, staff would require investigation and remediation of soil and groundwater contamination if it was encountered during construction and operation of this alternative.

A solar panel (PV module or PV panel) is a packaged, connected assembly of PV cells. The materials presently used in PV modules include, but are not limited to, mono-crystalline silicon, poly-crystalline silicon, and thin-film/amorphous silicon. The crystalline silicon is not considered hazardous. The thin-film PV modules can be fabricated from amorphous silicon, cadmium telluride (CdTe), or copper indium gallium (di) selenide. CdTe is a commonly used solar cell material for the manufacture of thin-film PV panels. The disposal and long term safety of cadmium telluride as a potentially hazardous waste is a known concern in the large-scale commercialization of cadmium telluride solar panels.

Construction and operation of the Solar PV Alternative could produce more hazardous wastes compared to the proposed HHSEGS project, depending on the chosen PV module technology. **Alternatives Table 5** describes four PV projects, including three projects that will use CdTe PV panels. Regardless of whether wastes from this alternative were determined to be hazardous, hazardous landfill capacity is available in Nevada, which is similar to the proposed project. Staff considers project compliance with LORS and staff's conditions of certification to be sufficient to ensure that no significant impacts would occur as a result of waste management associated with the

Solar PV Alternative. Impacts related to waste management would be **similar to the proposed HHSEGS project**.

If hazardous wastes were inadvertently discharged on the site, site characterization and remediation requirements would remain the same as for the proposed project. Staff concludes that compliance with applicable LORS and implementation of appropriate conditions of certification would be sufficient to ensure that no significant impacts would occur; however, there is an increased risk of potential impacts from PV cells that could contain potentially hazardous substances, which could be discharged to the environment. Depending on the type of PV module selected, the potential impact on human health and the environment would be **somewhat greater than the proposed HHSEGS project**.

Soil and Surface Water

Staff has not identified significant differences regarding the amount of grading needed for installation of PV panels that are either the fixed-tilt or tracking type. The same is true for the potential effects of this alternative on flood flows during project operations. This discussion of the potential impacts of the Solar PV Alternative on water quality applies to both types of PV panels.

PV systems do not use steam generators because receiver units directly generate electricity and thus do not require the steam boilers, generators, steam condensers, and/or auxiliary heat rejection equipment generally associated with a traditional power plant. As a result, characteristic impacts on water quality caused by the presence of power plant facilities would be **much less than HHSEGS** for a PV alternative, namely the disposal of industrial wastewater and the risk of storm water exposure to industrial chemicals. Domestic sanitary waste would still need a septic system for proper disposal, and impacts related to sanitary waste would be **similar to HHSEGS**.

As discussed above under, “Waste Management,” depending on the PV module technology, use of PV panels could cause the release of hazardous CdTe waste if panels were damaged. The inadvertent discharge of hazardous waste during a large storm event would increase the potential for water quality impacts from storm damage to **somewhat greater than HHSEGS**.

As discussed above, information in the final project approval documents for four solar PV projects in California indicate an average land use efficiency of approximately 7 acres per MW. Land use efficiencies of less than 7 acres per MW are being achieved at some utility-scale PV installations in the state (**Alternatives Table 5**). Assuming that PV module supports would involve similar low impact flow-through installation with similar land use efficiency as the proposed project, impacts from 100-year flood flows would be **similar to the proposed HHSEGS project** as well as the potential for on-site/off-site flooding.

The possible need to reconfigure the proposed HHSEGS site for installation of either fixed-tilt or tracking PV modules could change the site layout, including the dirt roads that would be constructed for access and maintenance of PV panels. Because of the

decrease in frequency for washing of PV panels compared to what would be required to maintain the heliostats under the proposed project, this alternative would create less dust overall from washer vehicles driving on the dirt roads. Impacts related to soil erosion during project operations would be **less than HHSEGS**.

Much like installation of heliostats for the proposed project, installation of the PV panels would not necessarily require significant site grading, and the Solar PV Alternative and the proposed project would need similar areas for construction laydown and temporary parking. The Solar PV alternative would not require the same level of construction activities needed to build traditional power plant facilities. Compared to the proposed project, this alternative would not require a temporary concrete batch plant for the solar tower or large foundations, or a temporary assembly building to construct heliostats. These construction activities for the proposed project would require more excavation, heavy equipment, personnel, and truck traffic, resulting in a higher erosion potential than the Solar PV Alternative. Based on these factors, the impacts from the PV Alternative related to soil erosion during construction would be **somewhat less than HHSEGS**.

Water Supply

Solar PV technology employs either fixed-tilt or tracking solar panels to collect incident radiation. Between these two options, staff has not identified significant differences in the potential impacts on groundwater resources.

The Solar PV Alternative would require less water for project operations, given the less frequent washings required for PV solar panels. Operational water use is estimated up to approximately 12 afy under the Solar PV Alternative. Impacts on the Pahrump groundwater basin and local well owners would be reduced relative to the proposed HHSEGS project. Given the lower water use for this alternative, potential impacts on water supply would be **somewhat less than HHSEGS**.

The groundwater basin is already in overdraft; therefore, any additional water use, no matter how little, could result in a cumulatively significant impact. If significant impacts were identified on water supply, the same conditions of certification proposed for the HHSEGS project would be recommended for this alternative, which would mitigate the impacts to a level that is less than significant.

PARABOLIC TROUGH ALTERNATIVE

Overview

This alternative would involve constructing and operating a utility-scale parabolic trough project at the proposed project site. A parabolic trough system converts solar radiation into electricity using sunlight to heat a thermal fluid, typically synthetic oil (i.e., the HTF). Parabolic trough power plants consist of horizontal, trough-shaped solar collectors that are arranged in parallel rows and aligned on a north-south horizontal axis. Each parabolic trough collector has a linear parabolic-shaped reflector that focuses the sun's rays on a linear receiver tube (i.e., heat collection element) suspended at the focal point of the curve-shaped collector. The trough rotates east to west to track the sun during

the day, heating the HTF circulating in the collection element. The heated HTF is then piped through a series of heat exchangers where it releases its stored heat to generate high pressure steam. The steam is then fed to a traditional steam turbine generator where electricity is produced. **Alternatives Figure 9** shows photographs of existing parabolic trough project facilities.

Beginning in 1984, nine solar power plants using parabolic trough technology were constructed in the Mojave Desert in San Bernardino County. Solar Electric Generating Systems (SEGS) III through VII are at Kramer Junction (**Alternatives Figure 9**), SEGS VIII and IX are at Harper Lake, and SEGS I and II are at Daggett near Barstow. The nine SEGS projects have a combined total capacity of 354 MWs. Natural gas-fired facilities provide additional operational flexibility for each of the SEGS projects. These power plants cover a combined total of more than 1,600 acres. Several online sources report that SEGS VIII and IX have operated successfully and without interruption from the beginning (i.e., since they began operating in 1990 and 1991, respectively).

In February 1999, a 900,000-gallon storage tank containing the HTF, therminol, exploded at the SEGS II solar power plant, sending flames and smoke into the sky. As reported at the time, “[f]irefighters ‘tried to put water on it and said it was like putting out a house fire with a garden hose’” (Los Angeles Times 1999). At the time of the accident, authorities worked to keep flames away from two adjacent containers that held sulfuric acid and caustic soda, both toxic substances. Police and fire officials evacuated a half-square-mile area around the facility; no injuries were reported.

In 2008 and 2009, the Energy Commission received AFCs for several renewable energy projects that were proposed to use parabolic trough technology. Staff is monitoring construction of two of the projects that were licensed by the Energy Commission in September 2010—the Abengoa Mojave Solar Project (AMSP) and the Genesis Solar Energy Project (GSEP). Neither of these projects includes energy storage.

AMSP is near Harper Lake in San Bernardino County, about 9 miles northwest of the community of Hinkley. The SEGS VIII and IX facilities are immediately northwest of the AMSP site. GSEP is in the Sonoran Desert of east central Riverside County, about 25 miles west of Blythe. Each project consists of two 125-MW power plants for a combined total capacity of 500 MWs. Commercial operation of AMSP is anticipated in winter 2013. Commercial operation of the two GSEP power plants is anticipated to occur consecutively in spring 2013 and 2014. Natural gas-fired auxiliary boilers will provide equipment and HTF freeze protection for each 125-MW power island for the two projects.

When construction of AMSP is finished, it will cover approximately 1,765 acres. GSEP will cover approximately 1,800 acres. Land use efficiency for each project is a little over 7 acres per MW, which is comparable to the average land use efficiency for BrightSource Energy’s proposed HHSEGS and Rio Mesa SEGF projects.

AMSP will use wet cooling, and maximum operational water use for the project will total approximately 2,160 afy. GSEP will use dry cooling, requiring approximately 202 afy.

Potential to Attain Project Objectives

Development of an approximately 500-MW parabolic trough project at the proposed project site could potentially meet the project objectives related to construction and operation of a utility-scale renewable electrical generation facility, which would lead to the sale of renewable energy and contribute to achieving California's renewable energy goals; approval of amendments to the PPAs by CPUC could be required. This alternative could potentially satisfy the project objective to meet permitting requirements and comply with applicable LORS. This alternative would satisfy the project objective to develop a renewable energy facility in an area with high solar value and minimal slope. The Parabolic Trough Alternative could potentially satisfy the project objective to avoid or minimize significant impacts to the greatest extent feasible, although site grading and earthwork for a parabolic trough project generally requires removal of all vegetation and mass grading to level the site. Construction of engineered drainage channels is required to direct stormwater runoff around the solar field(s). The extent and intensity of ground disturbance could be greater under this alternative compared to the proposed project. See the discussions below under, "Environmental Analysis," for general analyses of the potential environmental effects of the Parabolic Trough Alternative.

Staff submitted data requests for additional information to compare the proposed HHSEGS project to an alternative using parabolic trough technology at the HHSEGS site. In the corresponding data responses, the applicant describes how "the HHSEGS site is roughly triangular in shape, and trough plants can only be built in large rectangles. An analysis of the HHSEGS site shows that about 25 percent of the site could not be exploited for a reasonable trough alternative…." (Hidden Hills Solar I and II, LLCs 2012b). Staff does not have information to confirm the accuracy of this estimate.

The Parabolic Trough Alternative could potentially satisfy five or six of the seven project objectives. Like the proposed project, this alternative would have a limited ability to satisfy the project objective addressing operational flexibility. The proposed 3,277-acre project site could possibly be used for construction of a parabolic trough project. Because this alternative would use the proposed project site, the objective to obtain site control and use within a reasonable period of time would be attained. The total potential generating capacity of this alternative is unknown and could be less than the proposed 500-MW capacity of the proposed project.

Potential Feasibility Issues

Changing the project technology at the HHSEGS site to a parabolic trough technology would likely require filing of an amended advice letter with CPUC requesting amendments to the PPAs, at least with regard to schedule. The work required to redesign the project and reconfigure the site to use a parabolic trough technology would delay the project schedule, and it is not known whether CPUC would approve amendments to the PPAs allowing the change, if such approvals would be necessary. It is not known at what point a project schedule delay would affect project viability.

Environmental Analysis

Alternatives Table 7 presents a summary comparison of impacts of the proposed HHSEGS project to the same or similar potential impacts of the Parabolic Trough Alternative. Comparative discussions for each environmental topic area follow the table.

Alternatives Table 7
Summary Comparison of the Proposed Project's Impacts to the Parabolic Trough Alternative

Environmental Effect	Proposed Project	Parabolic Trough Alternative
Air Quality		
Construction-related emissions	SM	Similar to HHSEGS (SM)
Project operations emissions	SM	Similar to HHSEGS (SM)
Biological Resources		
Impacts on special-status plant species	SM	Same as HHSEGS (SM)
Impacts on waters of the U.S. and waters of the state	SM	Same as HHSEGS (SM)
Impacts on desert tortoise	SM	Same as HHSEGS (SM)
Impacts on special-status terrestrial wildlife species (other than desert tortoise)	SM	Same as HHSEGS (SM)
Impacts on avian species from collisions with project features (see biological resources note)	PSU	Unknown (PSU)
Impacts on avian species from exposure to concentrated solar flux	PSU	—
Potential impacts on groundwater dependent ecosystems	PSM	Similar to HHSEGS (PSM)
Biological resources note: Collisions could be secondary to retinal damage from glint or glare.		
Cultural Resources		
Potential to disturb, destroy, or visually degrade significant prehistoric and historical archaeological sites *on* the site (see note)	LS	Similar to HHSEGS (LS)
Potential to disturb, destroy, or visually degrade significant prehistoric and historical archaeological sites *beyond* the site	SU	Much less than HHSEGS (PSM)
Potential impacts on significant built-environment cultural resources (Old Spanish Trail – Mormon Road Northern Corridor) *on* the site	SM	Similar to HHSEGS (SM)
Potential impacts on significant built-environment cultural resources (Old Spanish Trail – Mormon Road Northern Corridor) *beyond* the site	SU	Somewhat less than HHSEGS (PSM)
Potential to disturb, destroy, or visually degrade significant ethnographic resources *on* the site	SU	Similar to HHSEGS (PSU)

Alternatives Table 7 Summary Comparison of the Proposed Project's Impacts to the Parabolic Trough Alternative		
Environmental Effect	**Proposed Project**	**Parabolic Trough Alternative**
Potential to disturb, destroy, or visually degrade significant ethnographic resources *beyond* the site	SU	Somewhat less than HHSEGS (PSU)
Note: "Site" means the facility site proper and does not include linear or ancillary infrastructure away from the facility site.		
Fire Protection		
Potential impacts on local fire protection resources	PSM	Much greater than HHSEGS (SM)
Potential impacts on emergency response services	PSM	Much greater than HHSEGS (SM)
Geology and Paleontology		
Potential impacts from strong seismic shaking	SM	Much less than HHSEGS (PSM)
Potential impacts from soil failure caused by liquefaction, hydrocollapse, formation of soil fissures, and/or dynamic compaction	SM	Much less than HHSEGS (PSM)
Potential impacts on paleontological resources	SM	Less than HHSEGS (PSM)
Potential impacts on geological or mineralogical resources	LS	Same as HHSEGS (LS)
Hazardous Materials		
Potential for release of hazardous materials to occur on-site	SM	Somewhat greater than HHSEGS (SM)
Potential for release of hazardous materials to occur off-site	SM	Somewhat greater than HHSEGS (SM)
Land Use		
Conflicts or inconsistencies with general plan land use designations and zoning	SU	Same as HHSEGS (SU)
Conversion of agricultural land	—	—
Noise and Vibration		
Potential for noise to impact noise-sensitive receptors	PSM	Similar to HHSEGS (PSM)
Public Health		
Potential for project construction to cause air toxics-related impacts that could affect public health	LS	Similar to HHSEGS (LS)
Potential for project operations to cause air toxics-related impacts that could affect public health	LS	Similar to HHSEGS (LS)
Socioeconomic Resources		
Construction employment and increased taxes and fees	B	Similar to HHSEGS (B)

Alternatives Table 7 Summary Comparison of the Proposed Project's Impacts to the Parabolic Trough Alternative		
Environmental Effect	**Proposed Project**	**Parabolic Trough Alternative**
Displacement of existing rural residences	—	—
Potential impacts on emergency medical and law enforcement services	PSM	Similar to HHSEGS (PSM)
Traffic and Transportation		
Potential impacts on roadway infrastructure	SM	Same as HHSEGS (SM)
Potential for glint and glare to cause safety hazards or a distinct visual distraction effect from an operator control perspective (i.e., vehicle drivers and aircraft pilots)	PSM	Less than HHSEGS (PSM)
Potential for construction equipment and/or permanent structures to exceed 200 feet in height above ground level	SM	—
Transmission Line Safety and Nuisance		
Potential for impacts related to aviation safety, hazardous shocks, nuisance shocks, and electric and magnetic field exposure	SM	Similar to HHSEGS (SM)
Visual Resources		
Construction-Related Impacts		
Potential to substantially degrade the existing visual character or quality of the site and its surroundings	SU	Similar to HHSEGS (SU)
Potential to create a new source of substantial light or glare which would adversely affect day or nighttime views in the area	SU	Similar to HHSEGS (PSM)
Project Operations Impacts		
Potential to substantially degrade the existing visual character or quality of the site and its surroundings	SU	Somewhat less than HHSEGS (SU)
Potential to create a new source of substantial light or glare which would adversely affect day or nighttime views in the area	SU	Somewhat less than HHSEGS (SU)
Waste Management		
Potential for disposal or diversion of project materials to cause impacts on existing waste disposal or diversion facilities	SM	Similar to HHSEGS (PSM)
Potential for impacts on human health and the environment related to past or present soil or water contamination	PSM	Similar to HHSEGS (PSM)
Soil and Surface Water		
Soil erosion by wind and water during project construction	SM	Much greater than HHSEGS (SM)

Alternatives Table 7 Summary Comparison of the Proposed Project's Impacts to the Parabolic Trough Alternative		
Environmental Effect	**Proposed Project**	**Parabolic Trough Alternative**
Soil erosion by wind and water during project operations	PSM	Less than HHSEGS (PSM)
Water quality impacts from contaminated storm water runoff	SM	Somewhat greater than HHSEGS (SM)
Water quality impacts from storm damage	PSM	Greater than HHSEGS (PSM)
Water quality impacts from power plant operations	SM	Similar to HHSEGS (SM)
Water quality impacts from sanitary waste	SM	Similar to HHSEGS (SM)
Potential impacts from on-site and off-site flooding	SM	Much less than HHSEGS (SM)
Potential to impede or redirect 100-year flood flows, as shown on Federal Emergency Management Agency maps	LS	Similar to HHSEGS (LS)
Water Supply		
Potential impacts on local wells	PSM	Similar to HHSEGS (PSM)
Potential impacts on groundwater basin balance	PSM	Similar to HHSEGS (PSM)

Air Quality

The number and type of emitting sources during project operations under the Parabolic Trough Alternative would be the same or similar to those of the proposed project; however, this alternative would likely use a heat transfer fluid (HTF) in the receiver tubes of the parabolic mirrors during project operations. When HTF leaks from project apparatus (e.g., piping, flanges, leaks, etc.) it vaporizes into small amounts of volatile organic compounds (VOCs), which are ozone precursors. The local air district would most likely require controls to minimize impacts at the project site. Overall, air quality impacts would be **similar to HHSEGS** for the Parabolic Trough Alternative. Construction-related emissions and impacts would be **similar to HHSEGS** for this alternative. Similar to the proposed project, this alternative would cause an overall cumulative reduction in GHG emissions from power plants; however, more stringent conditions of certification would be required compared to the proposed project to ensure that the Parabolic Trough Alternative would not make a cumulatively considerable contribution to a significant cumulative impact associated with air quality.

Biological Resources

The Parabolic Trough Alternative would be constructed and operated at the proposed HHSEGS site. Therefore, impacts on special-status plants, waters of the state, and

waters of the U.S. would be **the same as HHSEGS**. Impacts on desert tortoise and other special-status wildlife species would also be **the same as HHSEGS**.

Parabolic trough technology has the potential to impact avian species from collisions with solar troughs and other project facilities or transmission lines, exposure to glint and glare and the effects of polarized light pollution, and loss of habitat. The analysis of glint and glare impacts for the Blythe Solar Power Project (originally licensed by the Energy Commission as a parabolic trough project) concluded that pedestrians within approximately 60 feet of the solar field perimeter fencing could experience unsafe light intensity (Energy Commission 2010b). It is unknown how glint and glare effects from the Parabolic Trough Alternative would affect the vision of avian species; therefore, the level of significance of this impact is unclear. Similarly, the extent and severity of injury and mortality from collision with project structures under the Parabolic Trough Alternative are unknown, although the Energy Commission decision for the Blythe Solar Power Project concluded that impacts on avian species could be mitigated below a level of significance with implementation of Condition of Certification **BIO-15**, which would have been achieved through preparation and implementation of an "Avian Protection Plan" to monitor the death and injury of birds from collisions with facility features. **BIO-15** further requires that the monitoring data would be "used to inform an adaptive management program that would avoid and minimize project-related impacts" (Energy Commission 2010c). The Parabolic Trough Alternative would not require central collector towers, which would eliminate the potential for avian species to collide with extremely tall structures. However, without further data, staff concludes that impacts on avian species from collisions with project features under this alternative cannot be reasonably compared to the proposed project; and a conclusion for comparative avian impacts is **unknown**. No on-site avoidance measures for this impact are feasible; therefore, avian collision impacts would remain potentially significant and unavoidable.

By comparison, the proposed project would also have the potential to impact avian species through exposure to concentrated solar flux and loss of habitat. Parabolic trough technology does not concentrate solar flux over the solar field; therefore, **no impacts** on avian species from exposure to concentrated solar flux would occur under this alternative. Impacts related to habitat loss could be reduced to less than significant with implementation of appropriate mitigation measures.

Staff assumes this alternative would use dry cooling processes, with groundwater pumping for operational use similar to that of the proposed project. Under those conditions, potential impacts on groundwater dependent plants and associated wildlife species would be **similar to HHSEGS**. Conditions of certification would be recommended to reduce the project's potential effects on groundwater dependent plants and wildlife species to below a level of significance.

Cultural Resources

Construction and operation of the Parabolic Trough Alternative at the proposed project site could increase the extent of physical ground disturbance on the project site due to the extensive site grading and leveling that would be required. However, staff has concluded that the potential to disturb, destroy, or visually degrade significant

prehistoric and historical on-site archaeological resources would be **similar to HHSEGS**; like the proposed project, the impact conclusion is less than significant for archaeological and built-environment resources. Due to the character of the ethnographic resources present *on* the facility site, the impact on those resources would remain potentially significant and unavoidable.

The vertical profile of this alternative would be dramatically reduced without the proposed HHSEGS power towers. The overall visual impacts of this alternative on the broad, landscape-scale resources that are of concern to staff and the relative visual intrusion on off-site resources would be **much less than HHSEGS** for the Parabolic Trough Alternative. The overall physical disturbance of the portions of the resources on the facility site, although small relative to the broad scales of the subject landscapes, would nonetheless be roughly comparable to the site disturbance that would occur under the proposed project. Staff characterizes the net effect of this alternative on historical resources as **much less than HHSEGS**. Of the impacts identified by cultural resources staff, two impacts addressing archaeological and built-environment resources *beyond* the site that are considered "significant and unavoidable" under the proposed project would be reduced to "potentially significant" under this alternative (see **Alternatives Table 7**). These two impacts could be reduced to less than significant with implementation of appropriate compensatory mitigation measures.

Impacts addressing two ethnographic resources *on* and *beyond* the site that are considered "significant" under the proposed project are considered "potentially significant" under this alternative. These two impacts are considered, **similar to HHSEGS**, and, **somewhat less than HHSEGS**, respectively. Because no feasible means of compensation are available to reduce these impacts on aboriginal ancestral territory, staff concludes that these two impacts would remain significant and unavoidable under the Parabolic Trough Alternative.

Fire Protection

The Parabolic Trough Alternative would require the use of significant amounts of combustible HTFs, which would significantly increase the fire risk at the facility and would also increase the potential for project construction and operations impacts on local fire protection resources that protect communities currently served by such resources. This alternative would also require a significant number of deliveries of HTF to the site during project construction. Traffic accidents, including those that could potentially cause spillage of flammable materials, would increase the need for emergency response services and potential impacts on local fire protection resources. Impacts on fire protection services and resources under the Parabolic Trough Alternative would be **much greater than HHSEGS**. Staff has determined that impacts on the local fire department would be significant under this alternative due to the predicted increase in emergency response calls during project construction and operation. Mitigation measures would require payment of as yet undetermined project-specific fees to the local fire protection service to enable augmentation of resources such as staff, equipment, and facilities. With implementation of appropriate mitigation

measures, impacts on local emergency services would be reduced to less than significant.

Geology and Paleontology

Construction and operation of the Parabolic Trough Alternative at the proposed project site could have fewer impacts compared to the proposed HHSEGS project. As discussed above, the Solar PV Alternative would not require the deep or otherwise specialized foundations that would be required for the SPTs and the numerous heliostat foundations of the proposed project. However, the Parabolic Trough Alternative would require relatively deep foundations (as deep as 20 feet below ground surface), but they would fewer in number, larger in diameter, and constructed in drilled soil borings from which soils could be monitored and fossils recovered. The reduction in the number of deep foundations would decrease the potential for encountering fossil-bearing strata, and due to the elimination of the SPTs, this alternative as a whole would be much less susceptible to the effects of strong seismic shaking. The net effect of potential impacts on geological and paleontological resources under this alternative would be **less than HHSEGS**.

Hazardous Materials

The Parabolic Trough Alternative would require the use of significant amounts of HTF, which is a combustible material. The potential for off-site impacts in the event of an accidental release of hazardous materials would increase under this alternative due to the substantial increase in use of combustible liquid that is required with this technology. However, because of the site's remote location, an accidental release of hazardous materials is unlikely to cause significant impacts at the facility. This alternative would also involve the transport of significant amounts of combustible HTF to the site, which could increase risks to road users and populations living along transportation routes to the facility if an accidental release of hazardous materials occurred. Additional conditions of certification would be required to reduce significant impacts to less than significant. This impact is **somewhat greater than HHSEGS**.

Land Use

Construction and operation of the Parabolic Trough Alternative at the proposed project site would be inconsistent with Inyo County's designated land uses (OSR and REC) and zoning for the Charleston View area (OS-40). An amendment to the Inyo County General Plan would be required to ensure consistency of this alternative with the Land Use Element. Land use impacts would be the **same as HHSEGS** for the Parabolic Trough Alternative.

Noise and Vibration

Similar to the SPT technology, in an alternative project using the parabolic trough technology, the power blocks would be the chief noise producers. This technology, with its power blocks located in the center of each mirror field, would have similar noise impacts as those expected from HHSEGS. Impacts related to noise would be **similar to HHSEGS** under this alternative. Like the proposed project, conditions of certification

would be required to ensure that potentially significant noise impacts were reduced to less than significant during project construction and operation.

Public Health

The Parabolic Trough Alternative would require the use of similar equipment and apparatus for project operations as the proposed project. For both technologies, emissions would occur from vehicles and equipment that would be used to clean the mirrors. However, this alternative could cause emissions of small amounts of VOCs from potential leaks of HTF from flanges or that could be lost during routine maintenance activities such as HTF pipeline repair or replacement. Combustion-related criteria pollutants and hazardous air pollutants (HAPs) emissions are also possible from process boilers. Such emissions would occur at low levels; therefore, this alternative technology would not pose a significant risk from the emissions of concern in the public health analysis. This impact would be **similar to HHSEGS** for construction and operations emissions. No significant impacts would occur, and no conditions of certification would be required.

Socioeconomic Resources

Under the Parabolic Trough Alternative, the beneficial impact through construction employment and increased taxes and fees would be **similar to HHSEGS**. Potential impacts on emergency medical and law enforcement services would be **similar to HHSEGS**. Like the proposed HHSEGS project, this alternative would increase demand for these public services; however, similar mitigation measures would reduce these impacts to less than significant.

Traffic and Transportation

Similar to the proposed project, the Parabolic Trough Alternative would require use of SR 160 and the Old Spanish Trail Highway for hauling of equipment and materials to the project site, which could cause a significant impact on the structural integrity of the road due to the current and predicted future conditions of the roadway pavement. This impact would be the **same as HHSEGS**.

A parabolic trough is constructed as a long parabolic mirror. The trough is usually aligned on a north-south axis and rotated east-west to track the sun. Glint and glare from specular reflection off the troughs could occur when the troughs are moving from a stow to a tracking position and from a tracking to a stow position. This rotation occurs at the beginning and end of daily operations. This flash of brightness can be classified as an intrusive bright nuisance and optical hazard at short distances. As such, there would be the potential for specular reflection from the parabolic troughs associated with this alternative to affect motorists on the Old Spanish Trail Highway. Given that this alternative would not include power towers topped by SRSGs, it is assumed that potential impacts related to glint and glare would be **less than the proposed HHSEGS project**. Like the proposed project, this alternative would require preparation and implementation of a plan to ensure continuous monitoring of the heliostat mirrors for malfunctions and to ensure that they would remain properly aligned with the sun. (See Condition of Certification **TRANS-8** in this staff assessment.)

Staff reviewed the decisions for several of the parabolic trough projects that were licensed by the Energy Commission in 2010. No construction equipment or permanent structures were identified for those projects that would be taller than the projects' transmission lines, which are less than 200 feet tall. No structures would necessarily require review and approval by FAA, and **no impact** would occur under the Parabolic Trough Alternative.

Transmission Line Safety and Nuisance

Under the Parabolic Trough Alternative, the utilized transmission lines and related impacts would be of the same magnitude as those discussed for the proposed HHSEGS project in this staff assessment. This means that the magnitude of these transmission line-related impacts would be similarly less than significant. This impact would be **similar to HHSEGS**.

Visual Resources

Comparison of the Proposed HHSEGS Project to the Parabolic Trough Alternative

Similar to the Solar PV Alternative, the solar collectors associated with the Parabolic Trough Alternative would be arranged in parallel rows across the site. However, the basic processes to produce electricity under this alternative are similar to those of a power tower project. Project components for the Abengoa Mojave Solar Project include the two steam turbine generator buildings, each measuring approximately 73 feet tall, 42 feet long, and 108 feet wide. Most other structures will be less than 50 feet tall. The solar collector arrays are approximately 21 feet tall. The tallest structures are the 80- to 110-foot-tall transmission line monopoles. The overall vertical profile of the Parabolic Trough Alternative would be more uniform across the site compared to the proposed project.

Under this alternative, the parabolic trough solar collectors would be reflective on the mirror side. Sufficient setback distances, use of non-reflective finishes on the back side of the troughs, and visual screening measures could potentially mitigate the effects of glint and glare at KOP 3. Intervening ground plane elements would likely block views of the troughs from KOP 1, KOP 2, and KOP 4, but the project's other taller structures could be partially visible from KOPs 1 and 4. Conditions of certification, such as specifying the use of non-reflective surface finishes complementary to the desert landscape, could reduce impacts to less than significant at KOP 4. Views from KOP 5 would still be significantly altered because of the higher angle of views toward the reflective array of solar troughs. These impacts would remain significant and unavoidable under the Parabolic Trough Alternative. Visual resources impacts at KOP 6 could be reduced to less than significant with implementation of appropriate mitigation measures. It is difficult to characterize the visual impact on the view from KOP 7 without a visual simulation. It is likely that the arrays would appear prominently in the middle ground, as would this alternative's taller structures. Under existing conditions, there is little to impede the view from KOP 7. The visual impacts on the view from the Old Spanish National Historic Trail and the Pahrump Valley Wilderness would remain significant and unavoidable.

Environmental Impacts

Construction-related visual impacts of the Parabolic Trough Alternative would be **similar to the proposed HHSEGS project**. Views during project construction phases would include views of equipment and stored materials. The lack of extremely tall structures and cranes with FAA safety lighting under this alternative would reduce the severity of construction-related impacts on visual resources. At ground level, much of the construction activity would be screened, and conditions of certification would be implemented to partially screen views and reduce the impacts of construction area lighting. Staff identifies a "significant and unavoidable" impact for construction-related light or glare effects under the proposed project. Because the Parabolic Trough Alternative would not require lighting of extremely tall construction equipment and support structures, construction-related light or glare effects could be reduced compared to the proposed project to "less than significant" with implementation of appropriate mitigation measures. However, implementation of feasible mitigation measures would not be sufficient to reduce the overall level of effects to less than significant, and construction-related impacts on the existing visual character or quality of the site and its surroundings would remain significant and unavoidable.

Conditions of certification requiring sufficient setback distances, use of non-reflective finishes on the backs of the troughs, and visual screening measures could potentially reduce the visual impacts at KOPs 3 and 4 to less than significant. Overall, the visual impacts identified for the proposed project would be reduced under the Parabolic Trough Alternative. The visual analysis for the proposed HHSEGS project identifies significant and unavoidable impacts at six of the seven KOPs. Visual impacts under this alternative at KOPs 5 and 7 would be significant and unavoidable under the Parabolic Trough Alternative. The overall alternative project operations impacts on visual resources would be **somewhat less than the proposed HHSEGS project**. The net effect of this alternative on visual resources is considered significant and unavoidable due to the high reflectivity of the parabolic mirrors; no feasible mitigation measures could fully reduce the net effect to a less-than-significant level.

Waste Management

The location of the Parabolic Trough Alternative would be the same as the proposed project, and it would be no closer to any unidentified recognized environmental conditions. Similar to the proposed project, staff would require investigation and remediation of soil and groundwater contamination if it was encountered during construction and operation of this alternative. Site characterization and remediation requirements would remain the same as for the proposed project.

The Parabolic Trough Alternative would produce less waste than the proposed HHSEGS project based on a comparison to waste estimates provided for two parabolic trough projects that were licensed by the Energy Commission in 2010 (Genesis and Beacon Solar Energy Projects). Similar to the proposed project, staff considers project compliance with LORS and staff's conditions of certification to be sufficient to ensure that no significant impacts would occur as a result of waste management associated

with the Parabolic Trough Alternative. Potential impacts on existing waste disposal facilities and human health and the environment would be **similar to HHSEGS**.

Soil and Surface Water

The Parabolic Trough Alternative would require traditional power plant facilities similar to the proposed project; therefore, potential impacts caused by the disposal of industrial wastewater would be **similar to HHSEGS**. However, the added risk of accidental leaks or spills of heat transfer fluid would increase the potential impacts of contaminated storm water runoff for the Parabolic Trough Alternative. This is an impact that would be unique to the Parabolic Trough Alternative; therefore, potential impacts related to contaminated storm water runoff would be **somewhat greater than HHSEGS**. Domestic sanitary waste would still need a septic system for proper disposal, so these impacts would be the **similar to HHSEGS**.

A technical limitation for parabolic trough facilities is the need for very flat terrain. Because the piping interconnecting of the troughs has a very low tolerance for change in slope, the parabolic troughs need to be on less than 2 percent slope, and preferably less than 1 percent (BLM 2010). Land requirements for utility-scale parabolic trough power plants that have been reviewed by staff range from about 5 acres per MW to a little over 7 acres per MW. Assuming a project site with the same net MW output as the proposed project, the acreage requirement for a parabolic trough alternative could be about the same as the proposed project. The additional amount of total soil disturbance would significantly increase due to the need to level the site for installation of parabolic troughs. As a result, impacts related to soil erosion during construction would be **much greater than HHSEGS** for the Parabolic Trough Alternative as thousands of acres would require vegetation removal and grading, compared to the low impact flow-through layout required for installation of heliostats.

The need for flat terrain results in very different approaches to storm water management between the two technologies. For parabolic trough technologies, large channels just within the project borders would typically be constructed to divert off-site flows away from the solar fields. These channels would help protect the site from off-site flows, so impacts due to on-site flooding would be reduced to less than significant and, therefore, would be **much less than HHSEGS**. However, potential impacts on these diversion channels from storm damage would be **greater than HHSEGS** because flows from multiple existing ephemeral channels would combine, which would increase discharge rates and runoff volumes. Impacts from 100-year flood flows (as shown on the FEMA maps) would be **similar to HHSEGS** for this alternative because the published flood plain boundaries cross the project footprint at two relatively small areas where diversion channels would not adversely impede or redirect flows.

A parabolic trough alternative would utilize soil stabilizers within the solar fields to reduce the amount of dust deposited on the solar collectors (dust adversely affects their efficiency). Therefore, despite the fact that many more acres of land would be disturbed, impacts related to soil erosion during operations likely would be **less than the proposed HHSEGS project**. In addition, the flat slopes and grading would prevent on-

site runoff from concentrating, resulting in shallow sheet flow which minimizes the potential for surface erosion.

Water Supply

Parabolic technology employs a similar steam cycle, and water use for this type of project would be similar to water use proposed for the HHSEGS project assuming dry cooling. Therefore, potential impacts on the Pahrump groundwater basin and local well owners would be **similar to HHSEGS**. These impacts would be potentially significant, and the proposed conditions of certification would be similar to those proposed for the HHSEGS project. Potential impacts on water supply would be mitigated to below a level of significance.

REDUCED ACREAGE ALTERNATIVE

Overview

The Reduced Acreage Alternative would involve reducing the total project acreage of the proposed project to approximately 1,694.5 acres and constructing and operating an approximately 250-MW SPT project at the proposed HHSEGS site. The technology for the Reduced Acreage Alternative would be the same as described for the proposed HHSEGS project. This alternative retains Solar Plant 2 from the proposed HHSEGS project, including one 750-foot SPT, and the adjacent 103-acre common area. **Alternatives Figure 10** shows the alternative site. The proposed natural gas pipeline and transmission line for this alternative are shown to follow the same routes as for the proposed project. A total of approximately 85,000 heliostats would be installed under this alternative. The temporary construction area for the proposed project is reduced to approximately 90 acres and relocated to the northwest corner of the alternative site. The total acreage for this alternative includes the 90-acre temporary construction area.

The Reduced Acreage Alternative was added to staff's alternatives analysis for publication in the final staff assessment and responds to comments on staff's alternatives analysis in the preliminary staff assessment requesting consideration of an alternative with a smaller site footprint.

Potential to Attain Project Objectives

Development of an approximately 250-MW SPT project using the same technology as the proposed HHSEGS project would partially satisfy the first project objective to construct and operate a renewable electrical generation facility resulting in the sale of competitively priced renewable energy consistent with the needs of California utility companies; however, the total proposed 500-MW capacity would not be achieved. The Reduced Acreage Alternative could potentially meet the project objective related to development of a renewable energy facility to contribute to achieving California's renewable energy goals.

This alternative could potentially satisfy the project objectives addressing the requirement to comply with applicable LORS and avoid or minimize significant impacts to the greatest extent feasible. Staff observes that impacts on some resources would be

reduced under this alternative compared to the proposed project, particularly when there is a direct correlation between project acreage and the extent of the impact. It is likely that the objective to obtain site control and use within a reasonable period of time could be attained for this alternative. The Reduced Acreage Alternative would satisfy the project objective to develop a renewable energy facility in an area with high solar value and minimal slope. See the discussions below under, "Environmental Analysis," for general analyses of the potential environmental effects of the Reduced Acreage Alternative.

The Reduced Acreage Alternative could potentially satisfy five of the seven project objectives. Like the proposed project, this alternative would have a limited ability to satisfy the project objective addressing operational flexibility. This alternative could potentially satisfy the project objective to construct and operate a renewable electrical generation facility, although the total energy capacity of approximately 500 MWs would not be achieved; this objective would be partially satisfied.

Potential Feasibility Issues

Staff presumes that the two solar plants under the proposed project are each the subject of one of the PPAs approved by CPUC in 2010. If the total energy capacity was reduced to approximately 250 MWs under the Reduced Acreage Alternative, it is unknown whether an amendment to either of the approved PPAs by CPUC would be required. It is not known whether eliminating Solar Plant 1 from the northern portion of the proposed HHSEGS site would result in a project schedule delay, which could potentially affect project viability.

Environmental Analysis

Alternatives Table 8 presents a summary comparison of impacts of the proposed HHSEGS project to the same or similar potential impacts of the Reduced Acreage Alternative. Comparative discussions for each environmental topic area follow the table.

Alternatives Table 8
Summary Comparison of the Proposed Project's Impacts to the Reduced Acreage Alternative

Environmental Effect	Proposed Project	Reduced Acreage Alternative
Air Quality		
Construction-related emissions	SM	Similar to HHSEGS (SM)
Project operations emissions	SM	Somewhat less than HHSEGS (SM)
Biological Resources		
Impacts on special-status plant species	SM	Much less than HHSEGS (SM)
Impacts on waters of the U.S. and waters of the state	SM	Much less than HHSEGS (SM)

Alternatives Table 8 Summary Comparison of the Proposed Project's Impacts to the Reduced Acreage Alternative		
Environmental Effect	**Proposed Project**	**Reduced Acreage Alternative**
Impacts on desert tortoise	SM	Much less than HHSEGS (SM)
Impacts on special-status terrestrial wildlife species (other than desert tortoise)	SM	Much less than HHSEGS (SM)
Impacts on avian species from collisions with project features	PSU	Less than HHSEGS (PSU)
Impacts on avian species from exposure to concentrated solar flux	PSU	Less than HHSEGS (PSU)
Potential impacts on groundwater dependent ecosystems	PSM	Somewhat less than HHSEGS (PSM)
Cultural Resources		
Potential to disturb, destroy, or visually degrade significant prehistoric and historical archaeological sites *on* the site (see note)	LS	Somewhat less than HHSEGS (LS)
Potential to disturb, destroy, or visually degrade significant prehistoric and historical archaeological sites *beyond* the site	SU	Somewhat less than HHSEGS (SU)
Potential impacts on significant built-environment cultural resources (Old Spanish Trail – Mormon Road Northern Corridor) *on* the site	SM	Somewhat less than HHSEGS (SM)
Potential impacts on significant built-environment cultural resources (Old Spanish Trail – Mormon Road Northern Corridor) *beyond* the site	SU	Somewhat less than HHSEGS (SU)
Potential to disturb, destroy, or visually degrade significant ethnographic resources *on* the site	SU	Somewhat less than HHSEGS (SU)
Potential to disturb, destroy, or visually degrade significant ethnographic resources *beyond* the site	SU	Somewhat less than HHSEGS (SU)
Note: "Site" means the facility site proper and does not include linear or ancillary infrastructure away from the facility site.		
Fire Protection		
Potential impacts on local fire protection resources	PSM	Somewhat less than HHSEGS (PSM)
Potential impacts on emergency response services	PSM	Somewhat less than HHSEGS (PSM)
Geology and Paleontology		
Potential impacts from strong seismic shaking	SM	Much less than HHSEGS (PSM)
Potential impacts from soil failure caused by liquefaction, hydrocollapse, formation of soil fissures, and/or dynamic compaction	SM	Much less than HHSEGS (PSM)

Alternatives Table 8 Summary Comparison of the Proposed Project's Impacts to the Reduced Acreage Alternative		
Environmental Effect	**Proposed Project**	**Reduced Acreage Alternative**
Potential impacts on paleontological resources	SM	Much less than HHSEGS (PSM)
Potential impacts on geological or mineralogical resources	LS	Same as HHSEGS (LS)
Hazardous Materials		
Potential for release of hazardous materials to occur on-site	SM	Similar to HHSEGS (PSM)
Potential for release of hazardous materials to occur off-site	SM	Similar to HHSEGS (PSM)
Land Use		
Conflicts or inconsistencies with general plan land use designations and zoning	SU	Same as HHSEGS (SU)
Conversion of agricultural land	—	—
Noise and Vibration		
Potential for noise to impact noise-sensitive receptors	PSM	Similar to HHSEGS (PSM)
Public Health		
Potential for project construction to cause air toxics-related impacts that could affect public health	LS	Similar to HHSEGS (LS)
Potential for project operations to cause air toxics-related impacts that could affect public health	LS	Less than HHSEGS (LS)
Socioeconomic Resources		
Construction employment and increased taxes and fees	B	Similar to HHSEGS (B)
Displacement of existing rural residences	—	—
Potential impacts on emergency medical and law enforcement services	PSM	Similar to HHSEGS (PSM)
Traffic and Transportation		
Potential impacts on roadway infrastructure	SM	Same as HHSEGS (SM)
Potential for glint and glare to cause safety hazards or a distinct visual distraction effect from an operator control perspective (i.e., vehicle drivers and aircraft pilots)	PSM	Similar to HHSEGS (PSM)
Potential for construction equipment and/or permanent structures to exceed 200 feet in height above ground level	SM	Same as HHSEGS (SM)
Transmission Line Safety and Nuisance		
Potential for impacts related to aviation safety, hazardous shocks, nuisance shocks, and electric and magnetic field exposure	SM	Similar to HHSEGS (SM)

Alternatives Table 8 Summary Comparison of the Proposed Project's Impacts to the Reduced Acreage Alternative		
Environmental Effect	**Proposed Project**	**Reduced Acreage Alternative**
Visual Resources		
Construction-Related Impacts		
Potential to substantially degrade the existing visual character or quality of the site and its surroundings	SU	Similar to HHSEGS (SU)
Potential to create a new source of substantial light or glare which would adversely affect day or nighttime views in the area	SU	Similar to HHSEGS (SU)
Project Operations Impacts		
Potential to substantially degrade the existing visual character or quality of the site and its surroundings	SU	Similar to HHSEGS (SU)
Potential to create a new source of substantial light or glare which would adversely affect day or nighttime views in the area	SU	Similar to HHSEGS (SU)
Waste Management		
Potential for disposal or diversion of project materials to cause impacts on existing waste disposal or diversion facilities	SM	Similar to HHSEGS (PSM)
Potential for impacts on human health and the environment related to past or present soil or water contamination	PSM	Similar to HHSEGS (PSM)
Soil and Surface Water		
Soil erosion by wind and water during project construction	SM	Less than HHSEGS (SM)
Soil erosion by wind and water during project operations	PSM	Less than HHSEGS (PSM)
Water quality impacts from contaminated storm water runoff	SM	Less than HHSEGS (SM)
Water quality impacts from storm damage	PSM	Somewhat less than HHSEGS (PSM)
Water quality impacts from power plant operations	SM	Less than HHSEGS (SM)
Water quality impacts from sanitary waste	SM	Somewhat less than HHSEGS (SM)
Potential impacts from on-site and off-site flooding	SM	Similar to HHSEGS (SM)
Potential to impede or redirect 100-year flood flows, as shown on Federal Emergency Management Agency maps	LS	Similar to HHSEGS (LS)

Alternatives Table 8 Summary Comparison of the Proposed Project's Impacts to the Reduced Acreage Alternative		
Environmental Effect	**Proposed Project**	**Reduced Acreage Alternative**
Water Supply		
Potential impacts on local wells	PSM	Somewhat less than HHSEGS (PSM)
Potential impacts on groundwater basin balance	PSM	Somewhat less than HHSEGS (PSM)

Air Quality

The setting and existing conditions for this alternative are the same as for the proposed project. The existing ambient air quality does not change and the facility would still be within the same air basin and subject to the same LORS.

Assessment of Impacts and Discussion of Mitigation

The Reduced Acreage Alternative would essentially reduce the total construction and operations emissions of the proposed project by approximately 50 percent over each time period by eliminating the northern solar plant unit (Solar Plant 1). However, the maximum daily and annual construction emissions are assumed to be **similar to the proposed project**, assuming the same level of maximum activity but reducing the overall construction schedule from 29 months to slightly more than half the time, probably 15–18 months. Therefore, maximum construction emissions would be approximately the same as those shown in **Air Quality Table 7** in the **Air Quality** section of this staff assessment. Maximum construction period impacts for this alternative would also be approximately the same as shown in **Air Quality Table 9**. The maximum daily and annual operating emissions would be approximately 50 percent of those shown in **Air Quality Table 8** and **Air Quality Table 10**, respectively.

The maximum short-term and maximum annual construction pollutant concentration impacts for the Reduced Acreage Alternative could be as high, but no higher than that estimated for the proposed project, assuming the same maximum daily and annual construction activities. Therefore, the worst-case short-term and annual construction pollutant concentration impacts for this alternative are likely to be **similar to impacts shown for the proposed project** in **Air Quality Table 9**.

The maximum short-term and maximum annual operational air quality impacts for the Reduced Acreage Alternative are also likely to be **somewhat less than the proposed project** as shown in **Air Quality Table 10**. Because the duration of construction is about half, there is less likelihood that adverse meteorological conditions would occur, due to the stochastic nature of the atmosphere. However, any reduction in impacts is uncertain as the worst case impacts are also based on factors such as proximity to receptors and terrain as well as total emissions.

The Reduced Acreage Alternative would result in the following:

- The worst-case short-term construction emissions and ground level pollutant concentration impacts would be **similar to the proposed project** and would require the same level of mitigation. The total construction period and total construction emissions would be reduced from those required to construct the proposed project.
- The operation emissions and ground level pollutant concentration impacts would be **somewhat less than the proposed project**, but the same level of mitigation would be required.
- The benefits of the proposed project in displacing fossil fuel fired generation and reducing associated criteria pollutant and greenhouse gas emissions, potentially anywhere in the Western Electricity Coordinating Council, would be reduced by half.

CEQA Level of Significance

The level of significance under CEQA for the Reduced Acreage Alternative would be the **same as for the proposed project**, with the same significance rationale. Construction and operation of this alternative could cause significant NOx and particulate matter emission impacts. The mitigation measures recommended by staff for the proposed project would also apply to the Reduced Acreage Alternative, and impacts would be reduced to less than significant.

Biological Resources

This alternative would reduce the total project acreage to approximately 1,694.5 acres, using the southern portion of the site, which is Solar Plant 2 under the proposed project. A total of eleven special-status plant species are known to be located on the proposed project site, and of these, impacts on four plant species are considered significant and require mitigation to reduce the impacts to less than significant. The four plant species are gravel milk-vetch, Wheeler's skeletonweed, Torrey's joint, and Preuss' milk-vetch; and these species are distributed rather evenly across the Solar Plant 1 and Solar Plant 2 fields for the proposed project. The Reduced Acreage Alternative would generally avoid half of the mapped locations of these rare plant species identified at the proposed project site, and these impacts would be **much less than the proposed project**. Jurisdictional waters of the U.S. and the state, as identified and mapped all along the eastern boundary of the proposed project site, include slightly more acreage within the northern half of the project site (the Solar Plant 1 area). Impacts on waters of the U.S. and waters of the state under this alternative would be halved, and would, therefore, be **much less than HHSEGS**. Desert tortoise sign and tracks, along with other fully protected furbearing mammals (kit fox) and state species of special concern (burrowing owl) are known to have higher abundance within the northern portion of the proposed project site; therefore, impacts on these species under this alternative would be **much less than HHSEGS**.

The Reduced Acreage Alternative would eliminate one solar power tower and its associated heliostat field. Similar to the proposed project, the structures associated with this alternative could attract birds; it is unknown the extent to which eliminating one solar field would reduce the potential for collisions with project features. By the same reasoning, it is unknown the extent to which eliminating one solar field would reduce the

potential for exposure to concentrated solar flux. Staff concludes that impacts on avian species would be **less than HHSEGS**, to an unquantifiable degree, with elimination of one of the two solar fields. Potential impacts on the groundwater basin would be somewhat less than HHSEGS (see the subsection below, “Water Supply”); therefore, the impacts on groundwater dependent vegetation and associated plant and wildlife species would also be **somewhat less than HHSEGS**.

Cultural Resources

Construction and operation of the Reduced Acreage Alternative at the proposed project site would, by design, significantly reduce the extent of physical ground disturbance due to the reduced areal extent of the facility site. This alternative would produce a similar level of visual intrusion on off-site resources relative to the proposed project because the overall vertical profile of HHSEGS would remain essentially the same. Staff characterizes the net effect of this alternative on historical resources as **similar to that of HHSEGS**. The equivalent height of the vertical profile of the Reduced Acreage Alternative, although one power tower less dense, would nonetheless constitute a profound visual intrusion on the same off-site resources that would be impacted by the proposed project.

Fire Protection

The potential for incidents to occur under the Reduced Acreage Alternative would be similar to the proposed project (e.g., injuries, fires, hazardous materials spills), although because the site acreage and numbers of project structures would be reduced by approximately one-half, the occurrence probability for accidents and incidents would likely be reduced compared to the proposed project. Staff assumes that this alternative would require approximately half the crew size, half the number of heliostats to install and maintain, one less solar tower, and less traffic. In general, construction and operation of the Reduced Acreage Alternative would require half the tasks to be accomplished. Accidents and incidents requiring emergency response services would be expected to have somewhat less probability of occurring on average.

Similar to the proposed HHSEGS project, staff has determined that impacts on the local fire department would be potentially significant under this alternative due to the predicted increase in emergency response calls during project construction and operation. Mitigation measures would likely require payment of undetermined fees specific to this alternative to enable augmentation of resources such as staff, equipment, and facilities. Impacts on fire protection services and resources and corresponding fees under this alternative would be **somewhat less than HHSEGS**; implementation of appropriate mitigation measures would reduce potentially significant impacts to less than significant.

Geology and Paleontology

Construction and operation of the Reduced Acreage Alternative at the proposed project site could have significantly fewer impacts compared to the proposed HHSEGS project. Primarily, the Reduced Acreage Alternative would require installation of a deep or otherwise specialized foundation for the one power tower. This alternative would reduce

installation of heliostat foundations to approximately one-half of the number required for the proposed project. The reduced number of deep foundations would decrease the potential for encountering fossil-bearing strata, and due to elimination of one of the tall tower structures, this alternative as a whole would be less susceptible to the effects of strong seismic shaking. Potential impacts on geological and paleontological resources under this alternative would be **much less than HHSEGS**.

Hazardous Materials

Under the Reduced Acreage Alternative, the proposed project site would be reduced by approximately one half. The elements and major facility components for the solar plant that would be closest to the Old Spanish Trail Highway would be the same as described for the proposed project. This alternative would not necessarily reduce the potential risk of spillage or release of hazardous substances. As described for the proposed project, conditions of certification requiring conformance with applicable LORS would reduce potentially significant impacts to less than significant. No new or more severe significant off-site impacts would occur under this alternative. The potentially significant impacts under the Reduced Acreage Alternative would be **similar to HHSEGS**.

Land Use

The Reduced Acreage Alternative would be constructed and operated on approximately one half of the proposed project site. These lands are designated as Open Space and Recreation (OSR) and Recreation (REC) in the Inyo County General Plan. The zoning district is OS-40. The OSR and REC designations and OS-40 zoning do not allow for the development of large scale solar projects. As with the proposed project, the applicant would be required to apply for a general plan amendment and a zoning reclassification. Although this alternative would be constructed on less land compared to the proposed project, the Reduced Acreage Alternative would be inconsistent with Inyo County's designated land uses and zoning for the Charleston View area, and this land use impact would be the **same as the proposed HHSEGS project**.

Noise and Vibration

The Reduced Acreage Alternative would involve construction and operation of the one solar plant closest to the Old Spanish Trail Highway and approximately 900 feet from the closest sensitive receptors near the south side of the highway. The solar plant in the northern portion of the proposed HHSEGS site that is furthest from sensitive receptors would not be part of this alternative. Given the proximity of the power plant to the rural residences in the Charleston View area, impacts related to noise would be **similar to HHSEGS** under this alternative. Like the proposed project, conditions of certification would be required to ensure that potentially significant noise impacts were reduced to less than significant during project construction and operation.

Public Health

The technology for the Reduced Acreage Alternative would be the same as described for the proposed HHSEGS project. The Reduced Acreage Alternative would essentially reduce the total construction and operations emissions of the proposed project by

approximately 50 percent over each time period by eliminating one of the two units. With a smaller site footprint, toxic air emission levels under this alternative would be **less than HHSEGS** during operational periods. However, assuming the same level of maximum activity but reducing the overall construction schedule from 29 months to slightly more than half the time, probably 15–18 months, short-term emissions and impacts from toxic air contaminants during construction would be **similar to HHSEGS**. As discussed in the **Public Health** section of this staff assessment, potential air toxics-related impacts from operation of the proposed HHSEGS project would be below significance levels within the 6-mile radius of typical concern to staff; therefore; potential impacts within the same 6-mile radius from the Reduced Acreage Alternative would also be less than significant and no conditions of certification would be required. Any **short-term construction impacts would be similar to HHSEGS** and **long-term project operations impacts would be less than HHSEGS**.

Socioeconomic Resources

Under the Reduced Acreage Alternative, the beneficial impact through construction employment and increased taxes and fees would be less than HHSEGS. However, as noted in **Appendix Socio-1,** *Socioeconomic and Fiscal Impacts of the Hidden Hills Solar Electric Generating System on Inyo County*, Inyo County's gains would be positive even if the amount of materials subject to sales tax is cut in half. Therefore, under the Reduced Acreage Alternative, the net present value of the project's fiscal impact on the County would still be positive. This impact would be **similar to HHSEGS**. Potential impacts on emergency medical and law enforcement services would be **similar to HHSEGS**. Like the proposed HHSEGS project, this alternative would increase demand for these public services; however, similar mitigation measures would reduce these impacts to less than significant.

Traffic and Transportation

Similar to the proposed project, the Reduced Acreage Alternative would require use of SR 160 and the Old Spanish Trail Highway for hauling of equipment and materials to the project site. Like the proposed project, daily trips under this alternative would have a significant impact on the structural integrity of the Old Spanish Trail Highway in Nevada and California due to the current and predicted future conditions of the roadway pavement. Although this alternative would reduce the number of trips by approximately half (2,000 daily trips compared to 4,000 daily trips, which are predicted for *peak month 19* under the proposed project), Old Spanish Trail Highway lacks shoulders and designed drainage, and is not built or designed for the proposed level of construction traffic that would occur with implementation of this alternative. This impact would be the **same as the proposed HHSEGS project**.

Many of the project elements and major facility components (e.g., heliostat mirrors) that could produce glint and glare effects under this alternative would be the same as those of the proposed HHSEGS project. However, this alternative would include one power tower topped by an SRSG compared to two power towers for the proposed project and approximately half the number of heliostats. Although this alternative would reduce the number of sources that could create glint and glare, the potential for glint and glare

effects would remain. Therefore, it is assumed that potential impacts related to glint and glare would be **similar to the proposed HHSEGS project**.

Because of the solar tower height, the applicant would be required to notify the FAA of construction pursuant to the Code of Federal Regulations, Title 14, Aeronautics and Space, Part 77. These regulations require FAA notification for any proposed structure over 200 feet in height AGL regardless of the distance from an airport. This impact would be **the same as HHSEGS**.

Transmission Line Safety and Nuisance

Under the Reduced Acreage Alternative, the transmission lines would be the same as shown for Solar Plant 2 under the proposed project. No differences in field and nonfield impacts are identified under this alternative, and the magnitude of impacts discussed for the proposed project would be **similar to those described for the proposed HHSEGS project** under this alternative.

Visual Resources

Under the Reduced Acreage Alternative, the project would consist of a single SPT with an SRSG at the location of Solar Plant 2, related generation facilities, and a 103-acre common area. Solar Plant 2 includes the power tower closest to Old Spanish Trail Highway/Tecopa Road as depicted for the proposed HHSEGS project. Like the proposed HHSEGS project with two power towers, implementation of conditions of certification would reduce potential impacts on visual resources for views at the ground plane. Potential impacts of structural lighting could be partially mitigated with implementation of standard conditions of certification to control lighting and screen views. No feasible mitigation measures would reduce the visual impacts of the SPT, brightness of the SRSG, and potential visual effects of FAA night safety lighting. Similar to the proposed project, this alternative could cause substantial degradation of the existing visual character or quality of the site and its surroundings. Visual resources impacts would remain significant and unavoidable. The potential visual effects of the Reduced Acreage Alternative would be **similar to the proposed HHSEGS project**.

This alternative would not worsen impacts of the proposed project nor make a cumulatively considerable contribution to any significant cumulative impact associated with visual resources.

Waste Management

The potential presence of environmental concerns under the Reduced Acreage Alternative would be similar to the proposed project. Site characterization and remediation requirements would remain the same as for the proposed project.

Development of one solar power tower facility instead of two facilities under this alternative would decrease the volume of the waste stream. Adequate available Class III landfill capacity is available in Nevada landfills. Similar to the proposed project, staff considers project compliance with LORS and staff's conditions of certification to be sufficient to ensure that no significant impacts would occur as a result of waste

management associated with the Reduced Acreage Alternative. Potential impacts on existing waste disposal facilities and human health and the environment would be **similar to HHSEGS**, even with the waste stream volume reductions.

Soil and Surface Water

Because the footprint for the Reduced Acreage Alternative would decrease to roughly half that of HHSEGS, impacts related to soil erosion during construction (grading of roadways and power plant construction) and operations (heliostat washing and vegetation maintenance) would be **less than the proposed HHSEGS project**. Operation of one power plant compared to two would decrease the volume of process wastewater and contamination of storm water runoff; therefore, these impacts would be **less than HHSEGS**. The number of septic systems for proper disposal of domestic sanitary waste would decrease from three to two, so these impacts would be **somewhat less than HHSEGS**. Because the majority of off-site flows pass through HHSEGS Solar Plant 2, impacts from 100-year flood flows and flooding for the Reduced Acreage Alternative would be **similar to the proposed HHSEGS project**. However, by avoiding storm damage impacts in the Solar Plant 1 solar field, the overall impacts of storm water damage for the Reduced Acreage Alternative would be **somewhat less than HHSEGS**.

Water Supply

The Reduced Acreage Alternative would require less operational water use for process and heliostat washing compared to the proposed HHSEGS project. Assuming installation of approximately half the total number of heliostats compared to the proposed project, operational water use could be reduced up to approximately 68 afy under this alternative. Potential impacts on the Pahrump groundwater basin and local well owners would be reduced relative to the proposed HHSEGS project. The Reduced Acreage Alternative would involve construction of the solar field that is closest to Stump Springs and the rural development south of the proposed project site. Although operational water use would be reduced under this alternative, the potential effects of increased groundwater use on local well owners and sensitive resources that are relatively close to the project site would not necessarily be reduced to half that of the proposed project. Therefore, staff concludes that potential impacts on water supply would be **somewhat less than HHSEGS**.

The groundwater basin is already in overdraft; therefore, any additional water use, no matter how little, could result in a cumulatively significant impact. If significant impacts were identified on water supply, the same conditions of certification proposed for the HHSEGS project would be recommended for this alternative, which would reduce the impacts to a less-than-significant level.

PROJECT ALTERNATIVES COMPARED TO THE PROPOSED PROJECT

The environmental effects of constructing and operating the proposed project are described in detail for each resource topic in the **Environmental Assessment** section of this staff assessment. The summary table shown in **Alternatives Appendix-3** compares the environmental impacts of the proposed project to the same or similar impacts that would be expected to occur with construction and operation of each of the

project alternatives, including the No-Project Alternative. **Alternatives Appendix-3** is included at the end of this section of the staff assessment.

ENGINEERING ASSESSMENT OF THE ALTERNATIVES

POWER PLANT EFFICIENCY AND RELIABILITY

This section evaluates the efficacy of each project alternative in providing an efficient and reliable source of power generation and compares the project alternatives using alternative technologies to the proposed project. The proposed HHSEGS project would use a solar power tower technology (SPT), which is one of a variety of solar thermal power systems called concentrating solar power (CSP). Solar technologies in California include CSP and PV technologies. The SPT with Energy Storage Alternative, the Parabolic Trough Alternative, and the Reduced Acreage Alternative in this analysis of project alternatives are CSP technologies.

The energy generation system for the proposed HHSEGS project is a solar thermal system that would use approximately 85,000 sun-tracking, flat mirrors (heliostats) to focus and concentrate the sun's rays on a solar receiver steam generator (SRSG) at the top of a 750-foot SPT that would stand in the middle of an array of heliostats. This general arrangement would be used for each of the two 250-MW systems proposed for the HHSEGS project. The SRSG absorbs the radiation energy and converts it to conductive energy suitable for making steam. The steam drives a conventional turbine that drives an electric generator.

Sandy Valley Off-site Alternative

This off-site alternative is located approximately 20 miles southeast (as the crow flies) of the HHSEGS site and has a similar topography as the HHSEGS site. The available *solar insolation*[7] is essentially the same for the two sites. Therefore, the performance of the SPT's thermal power cycle at the Sandy Valley Off-site Alternative site would not change to any measureable degree. The power cycle efficiency, power plant reliability, and the solar array area displacement (i.e., the land area requirement for each of the two solar arrays) would not change.

SPT with Energy Storage Alternative

Enhancement of the power tower technology with several hours of thermal energy storage (TES) using molten salt would provide more flexibility for incorporating the facility into the power grid by extending generation beyond the hours of available sunlight. However, incorporating TES into the design of the project would require more land due both to an increased footprint for the heliostat field to accommodate additional heliostats for the thermal storage component and the additional acreage that would be required to incorporate the storage system and tanks in the power plant areas.

[7] Sunlight intensity at a site or area is measured in units of solar insolation, which is often expressed as kilowatt hours per square meter per day (kWh/m2-day).

Solar PV Alternative

PV cells convert solar radiation directly into electrical current. Photons of light excite electrons to a higher energy state, providing the potential to induce current. Direct current (DC) from the PV cells pass through an inverter, which converts DC to alternating current suitable for transmission to the electrical power grid. PV systems can be switched off and on but do not provide ramping capability.

Using average annual daily radiation as a benchmark, **Alternatives Table 9** shows the effectiveness of different types of solar collectors for the alternative renewable technologies evaluated in this staff assessment. The table lists the total daily values for the weather station nearest the project site, represented by monthly and average annual conditions and sorted by collector type. Data are shown for a double-axis flat-plate collector typical of a power tower heliostat; the daily insolation value is 9.4 kWh/m^2-day (Category 1.3). From **Alternatives Table 9**, the incident radiation for a flat-plate fixed-tilt PV panel is 6.6 kWh/m^2-day (Category 1.1) and 9.1 for a single-axis flat-plate collector typical of a tracking PV system (Category 1.2). Using comparative ratios, the flat-plate double-axis collectors associated with the SPT project perform 42 percent better than the fixed-tilt PV panels [(9.4-6.6)/6.6 = 0.42]. The performance factor between the single-axis tracking PV panels and the representative SPT heliostats is 3.0 percent [(9.4-9.1)/9.1 = 0.03]. To conclude, the SPT project heliostats function 42 percent better than the fixed-tilt PV panels, but the performance differential between the SPT heliostats and the single-axis tracking PV panels is insignificant[8].

[8] Since 3.0 percent is less than the plus or minus 9.0 percent uncertainty in the historical measurements, the collection effectiveness of the HHSEGS heliostats and a project using single-axis tracking flat plate PV collectors is virtually equal.

Alternatives Table 9 Average Daily Solar Radiation at Daggett, California (kilowatt hours per square meter [kWh/m^2])													
Tilt	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Category 1.1: Flat-Plate Collectors with Fixed-Tilt PV Modules													
34.9°	5.3	6.0	6.8	7.4	7.4	7.4	7.2	7.3	7.3	6.8	5.2	6.6	6.6
Category 1.2: Flat-Plate Collectors with Single-Axis Tracking, North-South Axis, Tracking PV Modules													
34.9°	6.5	7.5	9.0	10.3	10.9	11.2	10.7	10.6	10.1	8.8	7.2	6.3	9.1
Category 1.3: Flat-Plate Collectors with Double-Axis Tracking, SPT Heliostats													
34.9°	6.9	7.7	9.0	10.4	11.3	12.0	11.4	10.8	10.1	9.0	7.5	6.8	9.4
Category 1.4: Single-Axis Direct Beam Concentrating Collectors, Parabolic Trough													
34.9°	5.1	5.8	6.9	8.0	8.4	8.9	8.4	8.4	8.2	7.2	5.7	5.0	7.2
Source: Weather Bureau Army Navy (WBAN), excerpts from WBAN No. 23161 for Daggett, California, which is the closest measuring station to the proposed HHSEGS site.													

Parabolic Trough Alternative

A parabolic trough system is a CSP technology where heat transfer fluid (HTF) is pumped through a tube suspended at the focal point of a curve-shaped collector. This tube absorbs the radiation energy, heating the HTF to a temperature high enough to make steam in a boiler. In turn, the steam drives a turbine and generates electricity. This system gets its name from the shape of the collector where the cross section is curved and its length is straight, giving it its characteristic trough shape.

As shown in **Alternatives Table 9**, the value for incident radiation for parabolic trough collectors is 7.2 (Category 1.4). Using the values in the table as a basis for comparison, the SPT technology uses land more effectively and collects solar energy 30 percent more efficiently than the parabolic trough technology [(9.4-7.2)/7.2 = 0.30].

Note that the comparison of ideal collector performance (see **Alternatives Table 9**) is a very simple measurement using side-by-side comparisons of the different solar technologies. Various site limitations could affect the ability of a project site (e.g., the HHSEGS site) to be developed with an alternative renewable technology. The topography of an area could limit the development potential of a site and/or ground slope needed to receive maximum solar energy by the collectors. Requirements for the geometric orientation of a collector array could dictate the configuration of a project site. Variations in available solar insolation could affect actual system performance in a particular area.

Reduced Acreage Alternative

The Reduced Acreage Alternative would use the same solar thermal system as described for the proposed project. A total of approximately 85,000 sun-tracking, heliostats would focus and concentrate the sun's rays on a SRSG at the top of a 750-foot SPT that would stand in the middle of an array of heliostats. This general arrangement would be used for the 250-MW system shown in **Alternatives Figure 10**. This alternative would have a total energy capacity of approximately 250 MWs; the solar field and common area for this alternative would use a total of approximately 1,514 acres at the proposed HHSEGS site. The technology would be the same for the one 250-MW solar plant depicted as Solar Plant 2 under the proposed project. The power cycle efficiency, power plant reliability, and the solar array area displacement (i.e., the land area requirement for the one solar array) would not change compared to the proposed project.

Conclusion

The comparison of ideal collector performance shown in **Alternatives Table 9** is a simple measurement using side-by-side comparisons of the alternative solar technologies. Various site limitations would affect actual system performance.

The SPT system proposed for HHSEGS compares equally with the conditions where the facility is relocated or enhanced using TES. Although TES increases operational flexibility, it does not influence the performance of the heliostats for an SPT project with or without energy storage capabilities. The representative SPT project compares favorably to parabolic trough because of the tracking limitations of trough collectors. Lastly, the SPT heliostats perform better than the fixed-tilt PV system, and equally as well as the tracking PV system. Other PV performance limitations, including its "on-off" intermittency when utilized on the electric power grid, make SPT a more attractive technology from a project efficiency and reliability perspective.

TRANSMISSION SYSTEM ENGINEERING

Compared to the proposed HHSEGS project, the Sandy Valley Off-site Alternative site is closer to the existing Pahrump-Bob Tap 230-kV transmission line, which could be used to interconnect this alternative to the Valley Electric Association (VEA) system. Under this alternative, the required generator tie-line would be approximately 3 miles shorter than for the proposed HHSEGS project. A fewer number of transmission line poles would be required, which would reduce the total acreage of ground disturbance from construction of the generator tie-line and power poles.

As discussed under the subsection, "Transmission Line Safety and Nuisance," for the Sandy Valley Off-site Alternative, the potential alignment for the transmission line would exit the east side of the alternative site study area in California to generally parallel Quartz Avenue through Sandy Valley, Nevada, before turning northeast to parallel Kingston Road east of Sandy Valley. Staff observes that no studies have been done on the potential feasibility of constructing a 230-kV transmission line along the described route.

No significant impacts are identified related to transmission system engineering (TSE) under the proposed project. The downstream transmission system impacts under the Sandy Valley Off-site Alternative would be the **same as described for the proposed HHSEGS site**. This alternative would comply with applicable LORS pertaining to TSE. The same or similar conditions of certification identified in the TSE analysis for the proposed project would apply to this alternative.

None of the project alternatives using alternative technologies would cause greater impacts than those described for the proposed HHSEGS project. The Reduced Acreage Alternative could reduce potential impacts on the VEA system compared to the proposed project; this impact would be **slightly less than or similar to the proposed project**. The alternatives, including the alternative technologies, would generate electricity at the same power output and would interconnect to the same Crazy Eyes Tap substation. Power would be distributed to the same VEA transmission system. Therefore, the downstream transmission system impacts from the alternatives using alternative technologies would be **similar to the impacts of the proposed HHSEGS project**.

ENVIRONMENTALLY SUPERIOR ALTERNATIVE

The State CEQA Guidelines call for identification of an environmentally superior alternative and specify that "[i]f the environmentally superior alternative is the 'no project' alternative, the EIR shall also identify an environmentally superior alternative among the other alternatives" (Cal. Code Regs., tit. 14, § 15126.6[e][2]).

The project alternatives that are included in staff's analysis are those that could potentially attain most of the basic objectives of the project while avoiding or substantially lessening the significant impacts of the proposed project.

From the perspective of purely minimizing effects on the existing environment, the No-Project Alternative would be the superior alternative because it would result in no changes in the existing condition. However, the No-Project Alternative would not meet the key project objective of constructing and operating a renewable electrical generation facility resulting in sales of renewable energy consistent with the needs of California utility companies.

The continuation of existing conditions at the proposed HHSEGS site could result in varying degrees of changes to resource conditions for Biological Resources, Cultural Resources, Soil and Surface Water, and Water Supply; all changes to resource conditions under the No-Project Alternative would be less than those identified for the proposed project and are considered less than significant compared to the proposed project. Because no construction is proposed under the No-Project Alternative, no further analysis of these predicted changes to resource conditions is required. No significant differences between the project alternatives and the proposed project are identified for these environmental resources: Public Health, Socioeconomics, and Transmission Line Safety and Nuisance. For these resources, all impacts across all of the project alternatives could be reduced to less than significant with implementation of

mitigation measures that would be the same as or similar to the conditions of certification recommended for the proposed project.

Although a greater impact on Socioeconomic Resources is identified for the Sandy Valley Off-site Alternative due to the potential displacement of rural residences, acquisition of properties would include appropriate compensation to the landowners displaced by this alternative; therefore, this impact would be less than significant.

Staff identifies significant impacts on Land Use related to inconsistencies with adopted plans and policies for all project alternatives. For the Sandy Valley Off-site Alternative, staff identifies a significant impact on agricultural resources due to the conversion of several hundred acres of agricultural land to a non-agricultural use (discussed below); this impact would be reduced to less than significant with implementation of appropriate mitigation measures.

For potential impacts on Biological Resources, staff developed a qualitative comparison of the project alternatives to the proposed project that considers the severity of impacts, the extent to which impacts could be reduced with implementation of mitigation measures, and the nature of the affected resource. Some resources, such as threatened and endangered species, are more vulnerable to perturbation and recover more slowly; therefore, impacts on those resources are weighted more heavily than impacts on common wildlife. The discussions below include staff's conclusions for impacts on Biological Resources.

SUMMARY CONCLUSIONS FOR THE PROJECT ALTERNATIVES

SPT with Energy Storage Alternative

Of the project alternatives, the SPT with Energy Storage Alternative is most similar to the proposed project; and for most environmental resources, comparative impacts are described as, "same as," "similar to," or "somewhat greater than," the proposed project. For impacts that generally correlate to the extent of the site footprint, potentially greater impacts are identified for this alternative because of the possible need to expand the site boundary for the molten-salt storage tanks and additional heliostats. Staff concludes that potential impacts on groundwater resources could increase proportionally with increased water usage under this alternative, concluding that impacts related to groundwater depletion would be "somewhat greater than HHSEGS." Like the proposed project, mitigation measures would be required to reduce potential groundwater impacts to less than significant. Staff concludes that impacts on special-status plant species and desert tortoise and other special-status terrestrial species would be "similar to or somewhat greater than HHSEGS." Impacts on avian species would be "similar to or somewhat greater than HHSEGS," and no feasible mitigation measures could reduce this impact to less than significant.

No significant impact identified for the proposed project would be avoided or substantially lessened under the SPT with Energy Storage Alternative, and assuming that minimizing direct environmental effects is the priority for this alternatives analysis, staff concludes that this alternative would not be the environmentally superior alternative. As discussed above, the SPT with Energy Storage Alternative could

potentially attain most of the basic project objectives, although it is unknown how changing the proposed project to add thermal energy storage would affect project viability.

Sandy Valley Off-site Alternative

For many environmental resources, staff concludes that impacts for the Sandy Valley Off-site Alternative would be "similar to HHSEGS." Because several hundred acres at the Sandy Valley Off-site Alternative study area have been disturbed by historical agricultural uses, some of the impacts on Biological Resources would be "much less than HHSEGS." However, because the technology of this alternative would be the same, impacts on avian species from exposure to concentrated solar flux in the airspace over the heliostat field and potential collisions with the solar power towers and other project structures would be "similar to or somewhat greater than HHSEGS" and are considered significant and unavoidable.

Cultural Resources staff has preliminarily determined that potential impacts on significant on-site prehistoric and historical archaeological sites would be, "somewhat greater than HHSEGS," under this alternative. Further analysis of the Sandy Valley alternative site and study area would be needed to verify that conclusion. None of the cultural resources impacts identified for the proposed project could be avoided or substantially lessened under this alternative. Staff has determined that the potential for this alternative to visually degrade significant ethnographic resources would be "similar to HHSEGS," and no feasible mitigation measures would reduce these impacts to less than significant.

The Sandy Valley Off-site Alternative would convert approximately 750 acres of agricultural land to a non-agricultural use. This conversion of agricultural land would be a significant impact, and it is an impact that would not occur under the proposed project. Mitigation measures would be required to reduce the impact to less than significant. Staff identified the potential for uses of herbicides or pesticides to have contaminated soils at the Sandy Valley site and determined that the impact on human health and the environment would be "somewhat greater than HHSEGS." Implementation of remediation that could be required to address any soils contamination would reduce the impact to less than significant.

Under this alternative, impacts on special-status plants, habitats, waters of the U.S., and waters of the state would be "much less than at the proposed HHSEGS site." Like the proposed project, mitigation measures would be required to reduce these significant impacts to less than significant. No other environmental impacts would be substantially lessened with construction and operation of the Sandy Valley Off-site Alternative. Staff concludes that the Sandy Valley Off-site Alternative would not be the environmentally superior alternative.

The Sandy Valley Off-site Alternative could potentially satisfy many of the project objectives. The feasibility of obtaining site control and use within a reasonable period of time is unclear, and achieving this project objective would be critical to the viability of this alternative.

Parabolic Trough Alternative

For the environmental topics of Air Quality, Land Use, Noise and Vibration, Waste Management, and Water Supply, staff concludes that comparative impacts would be "similar to HHSEGS" or "same as HHSEGS" under the Parabolic Trough Alternative. In general, staff concludes that without the solar towers that would be constructed under the proposed project, some impacts on Visual Resources, Geology and Paleontology, Traffic and Transportation, and Cultural Resources would be less than HHSEGS, in varying degrees, under this alternative. Impacts on avian species from the effects of concentrated solar flux above the solar collector arrays would not occur under the Parabolic Trough Alternative. Staff concludes that impacts on special-status plants, waters of the state and waters of the U.S., and special-status wildlife species would be the "same as HHSEGS." For potentially significant impacts on avian species from collisions with the solar collectors and other equipment, staff concludes that the impacts would be "unknown" compared to HHSEGS even though the absence of the power towers under the Parabolic Trough Alternative would eliminate the potential for avian species to collide with those extremely tall structures.

Comparative impacts on Visual Resources under this alternative are described as "similar to" or "somewhat less than HHSEGS." Under this alternative, staff concludes that the impact addressing the project's potential to create a new source of substantial light or glare during project construction (considered "significant and unavoidable" under the proposed project) would be reduced to "potentially significant" under this alternative. This impact could potentially be reduced to less than significant with implementation of appropriate mitigation measures. Staff concludes that the net effect of this alternative on visual resources is considered "significant and unavoidable" due to the high reflectivity of the parabolic mirrors; no feasible mitigation measures could fully reduce the net effect to a less-than-significant level.

Given that this alternative would not include power towers topped by SRSGs, Traffic and Transportation staff concludes that the potential for glint and glare to cause a distinct visual distraction effect from an operator control perspective (i.e., vehicle motorists and aircraft pilots) would be "less than HHSEGS" under the Parabolic Trough Alternative. Like the proposed project, mitigation measures would be recommended to reduce the potential for glint and glare from the parabolic mirrors to create a distinct visual distraction effect to less than significant.

Staff concludes that the Parabolic Trough Alternative would be much less susceptible to the effects of strong seismic shaking due to the elimination of the SPTs. This technology would cause fewer potential impacts on paleontological resources, and staff concludes that the net effect of potential impacts on geological and paleontological resources would be "less than HHSEGS." Like the proposed project, significant or potentially significant impacts on these resources would be reduced to less than significant with implementation of appropriate mitigation measures.

Cultural Resources staff has determined that the Parabolic Trough Alternative would reduce impacts on historical resources compared to the proposed project and that the net effect of this alternative would be "much less than HHSEGS." Of the impacts

identified by staff, two impacts addressing resources *beyond* the site that are considered "significant and unavoidable" under the proposed project would be reduced to "potentially significant" under this alternative (see **Alternatives Table 7**); the resources are the *Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape* and the *Old Spanish Trail–Mormon Road Northern Corridor*. (Please see the **Cultural Resources** section of this staff assessment for discussions of these resources.) These two impacts could potentially be reduced to less than significant with implementation of appropriate compensatory mitigation measures, which would likely include delivery of programs that would address three broad objectives in relation to the affected historical resources: research, interpretation, and preservation. Preservation could refer to preserving particular places or portions of places on the ground, as well as material remains from such places or portions thereof. Preservation could also refer to retaining information that would provide the content needed to interpret the value of important resources.

For impacts on Soil and Surface Water, staff concludes that some impacts would be "greater than HHSEGS" while others would be "less than HHSEGS." Staff concludes that increased earth moving during project construction would cause a "much greater" soil erosion impact. Engineered storm water management would reduce potential impacts from on-site and off-site flooding compared to the proposed project; however, potential impacts on the diversion channels from storm damage would be "greater than HHSEGS." All impacts on soil and surface water resources would be reduced to less than significant with implementation of appropriate mitigation measures. The impact conclusions for potential impacts on soil and surface water resources would not change under this alternative, and staff concludes that the net effect of the Parabolic Trough Alternative on soil and surface water resources would be similar to the net effect of the proposed project.

Because the Parabolic Trough Alternative does not use solar power towers to collect solar radiation, this technology would not impact avian species from the effects of exposure to concentrated solar flux in the airspace over the solar collector array areas. Similar to the proposed project, potentially significant impacts on avian species could stem from the disruptive effects of glint and glare and potential collisions with project structures, including the parabolic mirrors. Without further data, staff has determined that the net effect of potential impacts on avian species related to glare and collisions with structures under this alternative cannot be reasonably compared to the proposed project. Like the proposed project, impacts related to habitat loss could be reduced to less than significant with implementation of appropriate mitigation measures. However, no evidence exists demonstrating that impacts on avian species from collisions with the solar collectors and other equipment associated with large-scale renewable energy facilities could be reduced to below a level of significance, and these impacts could remain significant and unavoidable.

Due to the use of combustible substances and the increased fire risk associated with the Parabolic Trough Alternative, staff concludes that impacts on fire protection services and facilities would be "much greater than HHSEGS." Hazardous materials impacts are

considered to be “somewhat greater than HHSEGS.” Implementation of appropriate mitigation measures would reduce these impacts to less than significant.

Staff concludes that the Parabolic Trough Alternative would not substantially lessen impacts on Water Supply or Visual Resources. Like the proposed project, impacts on Geology and Paleontology and Traffic and Transportation are “significant” or “potentially significant,” requiring mitigation measures to reduce the impacts to less than significant. Most of the impacts on Biological Resources would be the “same as HHSEGS.” This alternative would cause greater impacts related to Fire Protection and Hazardous Materials. The overall effect of this alternative on Cultural Resources would be “much less than HHSEGS,” and staff considers this to be the primary benefit of this alternative compared to the proposed project. If substantially reducing the two direct environmental effects on Cultural Resources is a critical factor, then the Parabolic Trough Alternative would be somewhat superior to the proposed project.

Although the Parabolic Trough Alternative could potentially attain many of the basic project objectives, it is unknown how changing the project technology would affect project viability.

Reduced Acreage Alternative

For most environmental resources, comparative impacts under this alternative are described as, “similar to,” “somewhat less than,” or “much less than HHSEGS.” Based on the distribution of particular species and habitats across the proposed project site, staff concludes that impacts on special-status plants, habitats, waters of the U.S., and waters of the state would be “much less than HHSEGS.” Staff concludes that impacts on avian species from potential collisions with project structures and exposure to solar flux would be reduced, and the comparative impact conclusion is “less than HHSEGS.” However, no feasible mitigation measures could reduce the impacts on avian species related to glint and glare and collisions with the solar tower to less than significant, and like the proposed project, this impact would remain significant and unavoidable. Other than reducing the potential extent of impacts on Biological Resources, no other environmental impacts would be substantially lessened with construction and operation of the Sandy Valley Off-site Alternative.

Reducing the project site and number of structures by approximately one-half would cause this alternative as a whole to be less susceptible to the effects of strong seismic shaking, and staff concludes that impacts on geological resources would be “much less than HHSEGS.” Like the proposed project, all significant or potentially significant impacts on geological and paleontological resources would be reduced to less than significant with implementation of appropriate mitigation measures.

Staff concludes that impacts on Visual Resources would be “similar to HHSEGS,” and no feasible mitigation measures could reduce these impacts to less than significant; like the proposed project, visual resources impacts would remain significant and unavoidable.

Comparative impacts on Cultural Resources under the Reduced Acreage Alternative are described as “somewhat less than HHSEGS.” Like the proposed project, no feasible

mitigation measures would reduce the impacts described as “significant and unavoidable” to less than significant.

The overall effect of the Reduced Acreage Alternative on Biological Resources would be “much less than HHSEGS,” and staff considers this to be the primary benefit of this alternative compared to the proposed project. Impacts on avian species from potential collisions with the power towers and exposure to solar flux would be reduced; however, these impacts would remain significant and unavoidable. If reducing the overall extent of impacts on special-status species, including avian species; habitats; waters of the U.S., and waters of the state is the critical factor, then the Reduced Acreage Alternative would be somewhat superior to the proposed project.

Although the Reduced Acreage Alternative could potentially attain many of the basic project objectives, it is unknown how eliminating the northern solar plant would affect project viability.

Solar PV Alternative

For the environmental topics of Visual Resources, Fire Protection, Geology and Paleontology, and Noise and Vibration, staff concludes that most comparative impacts would be “less than HHSEGS” or “much less than HHSEGS” under the Solar PV Alternative. Like the proposed project, most of the impact conclusions under these topics are identified as “significant” or “potentially significant,” requiring mitigation measures to reduce the impacts to less than significant.

Given the lower operational water use for the Solar PV Alternative (estimated up to approximately 12 afy compared to approximately 140 afy for the proposed project), potential impacts on Water Supply would be “somewhat less than HHSEGS.” Because the groundwater basin is already in overdraft, any additional water use, no matter how little, could result in a cumulatively significant impact on groundwater resources. Like the proposed project, impacts on Water Supply are considered “potentially significant” under this alternative. Mitigation measures similar to those recommended for the proposed project would be implemented to reduce the impact on Water Supply to less than significant, if such an impact occurred.

Use of fossil fuel-fired energy generation is not required under this alternative, and for potential impacts on Air Quality, staff concludes that operational impacts related to criteria pollutant emissions would be “less than HHSEGS.” Like the proposed project, construction and operations emissions would be reduced to less than significant with implementation of appropriate mitigation measures.

Impacts related to Hazardous Materials and Waste Management would be “similar to” or “somewhat greater than HHSEGS.” All associated impacts would be reduced to less than significant with implementation of mitigation measures to protect human health and the environment.

For impacts on Soil and Surface Water resources, staff concludes that some impacts would be less than HHSEGS, in varying degrees. In part because of the decrease in

frequency for washing of PV panels compared to what would be required to maintain the heliostats under the proposed project, this alternative would create less dust overall from washer vehicles driving on the dirt roads, and impacts related to soil erosion during project operations would be “less than HHSEGS.” Depending on the PV module technology, the potential impact on water quality from storm damage would be “somewhat greater than HHSEGS.” Implementation of appropriate mitigation measures would reduce the impact to less than significant. Staff concludes that other impacts on Soil and Surface Water resources, including the potential for on-site and off-site flooding, would be “similar to HHSEGS.” Staff concludes that the net effect of the Solar PV Alternative on soil and surface water resources would be similar to the net effect of the proposed project.

Staff concludes that the Solar PV Alternative would reduce impacts on Visual Resources compared to the proposed project, and that the effects of this alternative would be “less than HHSEGS” for construction-related impacts and “much less than HHSEGS” for project operations impacts. Impacts identified by staff as “significant and unavoidable” under the proposed project would be reduced to “significant” or “potentially significant” under this alternative (see **Alternatives Table 6**). These impacts would be reduced to less than significant with implementation of appropriate mitigation measures. Given that the Solar PV Alternative would not include power towers topped by SRSGs or highly reflective solar collectors, Traffic and Transportation staff concludes that the potential for glint and glare to cause a distinct visual distraction effect from an operator control perspective would be “much less than HHSEGS,” and the impact conclusion is less than significant.

Biological Resources staff concludes that significant impacts on special-status plants, wildlife, waters of the U.S. and waters of the state could be reduced to less than significant with implementation of appropriate mitigation measures. The real benefit of the Solar PV Alternative relates to the extent of identified significant impacts on avian species, the only biological resource for which no feasible mitigation measures exist to reduce the impacts by any known measure. Large-scale solar PV installations can cause impacts on avian species from potential collisions with the PV panels, and the reflection of the sky in the solar panels may mimic the appearance of water, thus serving as an attractant to birds. While the proposed HHSEGS project has the potential to impact birds from collisions with project structures, it would also increase the potential for significant impacts on avian species compared to the Solar PV Alternative; collisions with the 750-foot-tall towers and potentially fatal exposure to concentrated solar flux in the airspace over the heliostat field would not occur under this alternative. No feasible mitigation measures are available to reduce the extent or severity of these impacts on avian species.

A 2009 technical memorandum on a review of potential impacts of solar array developments on biological resources states that “non-reflective flat plate panels are preferred over reflective technologies, such as CSP, for sites with burrowing owls. It is recommended that the impact of solar panel reflective properties be part of the procurement selection criteria to minimize impacts on avian wildlife” (City of San Jose 2009). Staff concludes that the potential benefit to burrowing owls from the Solar PV

Alternative compared to the proposed project could benefit all bird species that would likely be impacted by the proposed project.

The reduced groundwater pumping that would be required under the Solar PV Alternative compared to the proposed project would lessen potential impacts on groundwater dependent vegetation and associated plants and wildlife. The infrequent washing of PV panels under this alternative would reduce on-site disturbance. With driving over the site reduced under this alternative, dust generation and potential impacts on wildlife at the site would decrease. Although conditions of certification are included in the **Air Quality** section requiring staff's approval of the dust suppression product that would be used at the proposed project site (**AQ-SC3** and **AQ-SC7**), the use of any such product would likely be reduced under the Solar PV Alternative, which would increase the benefit to wildlife to some extent. The reduced frequency of driving on the site under this alternative during project operations could also decrease the potential for weed growth at the site.

At the Ivanpah Solar Electric Generating System construction site, special-status species and/or fully protected species such as burrowing owl, kit fox, and desert tortoise continue to be discovered on the site, and move on and off the site, even though construction began in late 2010, and the site is enclosed by a perimeter fence (with desert tortoise exclusionary fencing attached). This would be expected at any large solar development, particularly where vegetation is allowed to remain on-site. Staff concludes that the potential for wildlife to be crushed, buried, or injured during maintenance work, including washing of solar collectors, would be reduced under the Solar PV Alternative.

For potential impacts on Cultural Resources, staff concludes that the Solar PV Alternative would pose far less of a visual intrusion on off-site historical resources compared to the project alternatives that would duplicate the vertical profile of the proposed HHSEGS project. The reduced vertical profile of the Solar PV Alternative and the relatively non-reflective PV panels would cause lesser impacts on the broad, landscape-scale resources that are of concern, and the PV arrays would be much less visually intrusive than the proposed power towers where the array was visible. Of the impacts identified by staff, two impacts addressing resources *beyond* the site that are considered "significant and unavoidable" under the proposed project would be reduced to "potentially significant" under the Solar PV Alternative, and these impacts would be reduced to a greater extent compared to the Parabolic Trough Alternative (see **Alternatives Tables 6 and 7**); the resources are the *Pahrump Metapatch Mesquite Woodland-Coppice Dune Archaeological Landscape* and the *Old Spanish Trail–Mormon Road Northern Corridor*. Cultural resources staff concludes that of all the project alternatives, the Solar PV Alternative would offer the potential to develop mitigation measures that would go furthest toward reducing impacts on historical resources compared to the proposed project.

The primary benefits of the Solar PV Alternative compared to the proposed project are greatly reduced impacts on Visual Resources, Biological Resources, and Cultural Resources. The Solar PV Alternative would go furthest toward minimizing and avoiding avian impacts; this conclusion is based on the possibility that the Solar PV Alternative

could cause somewhat less potential for collision impacts and would eliminate the potential for mortality and morbidity from exposure to concentrated solar flux. If substantially reducing the extent and severity of direct environmental effects is the priority, then the Solar PV Alternative would be environmentally superior to the proposed project.

Although the Solar PV Alternative could potentially attain many of the basic project objectives, it is unknown how changing the project technology would affect project viability.

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APPENDIX ALTERNATIVES-1: STAFF CONTRIBUTORS TO THE COMPARATIVE ANALYSIS OF ALTERNATIVES

This appendix lists staff responsible for specific technical analyses in the **Alternatives** section of this staff assessment. Staff names are listed with their area of technical expertise.

Technical Area	Staff
Air Quality	Jacquelyn Leyva
Biological Resources	Carol Watson Carolyn Chainey-Davis
Fire Protection	Geoff Lesh, P.E.
Geology and Paleontology	Casey W. Weaver, CEG
Hazardous Materials Management	Geoff Lesh, P.E.
Land Use	Christina Snow
Noise and Vibration	Shahab Khoshmashrab, P.E.
Power Plant Efficiency and Reliability	Ed Brady, P.E.
Public Health	Huei-An (Ann) Chu, Ph.D.
Socioeconomic Resources	Steven Kerr
Traffic and Transportation	Candace Hill
Transmission Line Safety and Nuisance	Obed Odoemelam, Ph.D.
Transmission System Engineering	Sudath Edirishuriya
Visual Resources	Melissa Mourkas, ASLA
Waste Management	Ellen Townsend-Hough
Soil and Surface Water	Marylou Taylor, P.E.
Water Supply	Mike Conway
Grid-Level Integration Issues	Michael R. Jaske, Ph.D. Mark Hesters

APPENDIX ALTERNATIVES-2: OTHER RENEWABLE ENERGY TECHNOLOGIES

INTRODUCTION

This appendix briefly discusses several renewable energy technologies that are not included in the review of potentially feasible alternatives to the proposed project in the **Alternatives** section of the staff assessment.

The renewable technologies discussed in this appendix include solar and non-solar technologies:

- Concentrated photovoltaic technology
- Dish/engine technology
- Linear Fresnel technology
- Solid Oxide Fuel Cells (e.g., Bloom's Energy Server™)
- Wind
- Geothermal
- Biomass
- Small hydroelectric
- Wave and tidal

These renewable energy technologies are not considered alternatives to the proposed project for several reasons; some of them represent different projects that could be proposed and implemented by various applicants, public utilities, or lead agencies in parts of the state or environments that are far removed from the location of the proposed project. New technologies such as those using solid oxide fuel cells are being deployed to serve on-site load but do not yet have the infrastructure and public policy support needed to begin serving load on the *utility-side of the meter* (also referred to as system-side generation).

A project proposed to use one of the technologies listed above could be required to comply with the California Environmental Quality Act (CEQA) and other applicable environmental laws and regulations, which could include preparation of an alternatives analysis pursuant to Section 15126.6 of the State CEQA Guidelines. Rather than being considered alternatives to the proposed project, specific projects proposed to use one of the technologies listed above could be subject to a full analysis of its potential environmental effects, in accordance with the requirements of CEQA. These other renewable technologies are further discussed below. Brief discussions are provided describing why the technologies were not evaluated as potentially feasible alternatives to the proposed project.

RENEWABLE SOLAR TECHNOLOGIES

In 2010, solar generation provided 3 percent of in-state renewable generation (0.4 percent of total in-state energy generation) (California Energy Commission 2010). Renewable solar technologies in California fall into two general categories—concentrating solar power (CSP) and photovoltaic (PV). CSP technologies are those that concentrate the sun's energy to produce heat. The heat drives either a steam turbine or an external heat engine to produce electricity. In PV technologies, the photons in sunlight are converted directly to electricity. Distributed energy resources include various fuels and technologies; the **Alternatives** section of this staff assessment includes a discussion and analysis of the distributed generation PV category of renewable energy.

CONCENTRATED PHOTOVOLTAIC TECHNOLOGY

Overview

Concentrated photovoltaic (CPV) systems have an optical component, which *concentrates* significant amounts of sunlight onto *multi-junction* solar cells (EnergyTrend 2011). These special cells have higher energy conversion efficiency, potentially greater than 40 percent, but are typically more expensive than high-efficiency silicon solar cells. The system's optical unit functions like a telescope, concentrating sunlight on solar modules mounted on a tracking system that automatically tracks the position of the sun from sunrise to sunset. Concentration allows for a decreased cell area for these special cells relative to conventional photovoltaic cells. CPV has the ability to ramp to gigawatts of production very rapidly (CPV Consortium 2012). While CPV systems have a much higher efficiency than traditional silicon-based PV, this is offset by their ability to only use direct sunlight because of their concentrating component. Clouds and overcast conditions create diffused light that essentially cannot be concentrated.

California Energy Commission (Energy Commission) staff researched the availability of CPV projects in the United States (U.S.) through the Solar Energy Industries Association (SEIA), a national trade organization of the U.S. solar energy industry, and the availability of CPV projects internationally through the various companies that manufacture and develop this technology. CPV technology front-runners are Amonix, Inc. (Amonix 7700 CPV Solar Power Generator); Soitec (Concentrix™); and SolFocus, Inc. (SF-1136SX Concentrator Photovoltaic System). Other manufacturers of CPV technology include SunPower Corporation (SunPower® C7 Tracker); Entech Solar, Inc. (SolarVolt™); and GreenVolts, Inc., a previous recipient of a grant from the Energy Commission's Public Interest Energy Research Program.

GreenVolts' CPV system has a total installed capacity of 0.5 megawatt (MW) at six locations in California and Arizona. Several sites are also in development with capacities ranging from 200 kilowatts (kWs) to 1 MW; Pacific Gas & Electric Company (PG&E) has a 2.5-MW power plant near Tracy, California, representing the first power purchase agreement to be signed by PG&E using this technology (Energy Commission 2011a). CPV projects in California, Arizona, Colorado, and New Mexico, both operational and under development, range from 1 MW, 5 megawatts (MWs), 30 MWs and peaking at 50 MWs.

Imperial Solar Energy Center West in Imperial County has been approved for development with a capacity of up to 150 MWs (Tenaska Solar Ventures 2012). This project has been approved with the flexibility of using either CPV or PV technology.

Companies with international development of CPV projects are SolFocus and Amonix. SolFocus has developed two pilot projects in Chile (8.8 kWs each), a pilot project in South Africa (8.4 kWs), two projects in Spain (200 kWs, 300 kWs), one project in Italy (8.4 kWs), a pilot project in Malta (8.4 kWs), a combined 1.28 MWs for multiple customers in Greece, one project in Saudi Arabia (132 kWs), one project in Malaysia (8.4 kWs), and one project in Australia (235 kWs) (SolFocus 2012). SolFocus announced on March 29, 2012, its plans to launch a 450-MW CPV plant in Baja California, Mexico, with construction proceeding in 50-MW sections. Construction is anticipated to begin in late 2012 and be operational by the end of 2013. Amonix has developed two projects in Spain (950 kWs and 7.8 MWs), both of which are operational (Amonix 2012).

With the exception of Tenaska Solar Venture's Imperial Solar Energy Center West, and the 450-MW plant in Mexico, each of these technology front-runners has small-scale CPV facilities but nothing at the utility scale (50 MWs or greater). Scaling technology to the utility-scale level involves the ability of the technology to function and generate energy at a larger scale, but it also includes other cost considerations. Developing CPV technology at the utility scale internationally may have different cost considerations from development in the U.S.

Decision to Eliminate the Technology from the Alternatives Analysis

Staff's decision to eliminate the technology from the alternatives analysis is generally based on the state of the technology. Based on staff's research, CPV technology is not yet proven at the utility scale. CPV has been proven at the small scale at some specific locations while projected technology development shows potential to make it a utility-scale solar technology. While CPV systems show promise, they have rarely been implemented at a larger scale (50 MWs or greater). Scaling up to utility scale presents different technical challenges and cost issues.

CONCENTRATING SOLAR POWER

Overview

According to the National Renewable Energy Laboratory (NREL) the three main types of CSP systems are linear concentrator, dish/engine, and power tower systems (NREL 2009). The proposed project uses solar power tower technology; therefore, the technology is not described in this appendix. Counties with the greatest potential for CSP facilities include Kern, San Bernardino, Riverside, and Imperial (Energy Commission 2011b).

Energy Commission staff researched the availability of dish/engine and linear Fresnel projects in the U.S. through SEIA, and internationally through the various companies that develop and manufacture this technology.

Dish/Engine Systems

A dish/engine system uses the surface of a mirrored dish to direct and concentrate sunlight onto a thermal receiver, which absorbs and collects the heat and transfers it to the engine generator (NREL 2009). The most common type of heat engine in dish/engine systems is known as the Stirling engine. This system uses the fluid heated by the receiver to move pistons and create mechanical power. The mechanical power is used to run a generator or alternator to produce electricity. Prior to September 2011, there were three dish/engine technology front-runners; Stirling Energy Systems, Wizard Power (Big Dish), and Infinia Corporation (PowerDish). In September 2011, Stirling Energy Systems filed for Chapter 7 bankruptcy. Research shows only a couple of dish/engine projects under development in the U.S., including a 10-MW project in Arizona and a 145-MW project in Colorado. At the international level, construction of Wizard Power's Big Dish 40-MW demonstration project in Australia is likely to begin in May 2013 and will be completed in about 30 months (CSP Today 2012). Infinia Corporation's largest deployment of its Power Dish technology is a 10-MW project in India, which is scheduled to be installed and commissioned by the end of 2012 (Recharge 2011).

Linear Fresnel Systems

The linear Fresnel system is one of two types of linear concentrator systems. The other is parabolic trough. The staff assessment for the proposed HHSEGS project includes an analysis of a parabolic trough alternative; therefore, the technology is not described in this appendix. The linear Fresnel system uses several mirrors to collect and focus the sun's energy on one receiver tube positioned above the mirrors (NREL 2009). The linear Fresnel system uses flat mirrors, allowing more reflectors to be placed in the same amount of space. Flat mirrors cost less than parabolic mirrors. The sunlight heats a fluid flowing through the tubes that is then used to boil water in a conventional steam-turbine generator to produce electricity. Novatec Solar, AREVA Solar (Ausra), and Solar Power Group are some of the developers of linear Fresnel technology. A 5-MW linear Fresnel power plant is operating in California. Novatec Solar has developed a 30-MW linear Fresnel power plant in Spain that began operating in January 2012. In spring 2010, a 1.4-MW plant began operating in Spain. A 9.3-MW (peak thermal output) plant in Liddell, Australia is planned for completion in mid-2012 (Cogeneration & On-Site Power Production 2012).

In October 2007, an Application for Certification (AFC) was submitted to the Energy Commission for the Carrizo Energy Solar Farm, a 177-MW solar thermal project on the Carrizo Plain that was proposed using approximately 195 compact linear Fresnel reflector (CLFR) solar concentrating lines (07-AFC-8). Each line was planned with ten rows of reflectors; the slightly curved linear solar reflectors would have concentrated the sun's energy on pipes in 56-foot-tall receiver structures. In the November 2008 preliminary staff assessment (PSA), staff identified impacts on multiple protected wildlife species and blockage or impairment of wildlife corridors. When the PSA was published, staff had not yet determined whether impacts on biological and visual resources could have been mitigated to less-than-significant levels. The cumulative impact analysis addressed the potential for the project to contribute to significant cumulative impacts on biological and visual resources. Impacts related to traffic and transportation were

determined to be significant, and no feasible mitigation measures were identified to reduce impacts to below a level of significance. Draft portions of the final staff assessment were published between June and August 2009. In November 2009, the applicant withdrew the AFC and the project was terminated.

Decision to Eliminate the Technology from the Alternatives Analysis

Staff's decision to eliminate the technology from the alternatives analysis is generally based on technological and practical limitations. Based on staff's research, the dish/engine technology is not yet successfully demonstrated at a large scale (50 MWs or greater). The linear Fresnel technology has not yet been proven at the utility scale.

NON-SOLAR RENEWABLE POWER GENERATION

SOLID OXIDE FUEL CELLS

Overview

A solid oxide fuel cell (SOFC) is an electrochemical conversion device that produces electricity directly from oxidizing a fuel. Fuel cells are characterized by their *electrolyte* material[1]; the SOFC has a solid oxide or ceramic electrolyte. Advantages of the SOFC include high efficiency, reliability, and durability. The largest disadvantage is the high operating temperature, which results in longer start-up times and mechanical and chemical compatibility issues (Wikipedia 2012, IEEE Spectrum Magazine 2012).

Bloom Energy is a company headquartered in Sunnyvale, California. Bloom's Energy Server™ is a new class of distributed power generation using SOFC technology to generate electricity through an electro-chemical process (Bloom Energy 2012). Bloom Energy's fuel cells can operate on natural gas or renewable fuels (e.g., biogas[2]). Each fuel cell can produce about 25 watts of power, and each energy server consists of thousands of fuel cells enabling each energy server to provide 200 kWs of power. Electricity is typically produced at the customer site. According to information on the Bloom Energy website, 200 kWs of power meets the baseload needs of 160 average homes or an office building, operates day and night, and requires approximately the area of a standard parking space. The systems are scalable and modular, allowing more power to be added with additional energy servers. Bloom Energy is installing Bloom's Energy Server™ technology at many sites, including The Coca Cola Company (500 kWs[3] in California), Google (400 kWs in California), Bank of America (500 kWs in California), FedEx Express (500 kWs in California), California Institute of Technology (2 MWs), eBay (500 kWs in California and 6 MWs in Utah), Washington Gas (200 kWs in Virginia), and Fireman's Fund (600 kWs in California) (Bloom Energy 2012). Almost all of Bloom Energy's installations in California are on the customer side of the meter.

[1] In basic terms, an electrolyte is a solution or molten substance that conducts electricity.
[2] Certain businesses produce organic waste that can be repurposed into a clean, renewable fuel source called biogas. When biogas is conditioned to pipeline-quality natural gas, it becomes biomethane. Businesses that tend to have their own supplies of the waste needed to make biomethane include dairies, food processing companies, and wastewater treatment plants.
[3] 500 kWs is equal to 0.5 MW.

The 6-MW Bloom Energy SOFC system at eBay will power an expanded data center in Utah and is described as the largest stationary fuel cell bank ever installed in a non-utility setting. Project completion is anticipated in 2013. According to a June 2012 energy and power blog post, this project marks the first time a data center has been designed to rely on fuel cells as its primary energy source with the grid serving as backup (IEEE Spectrum Magazine 2012). Data centers normally rely on electricity from the grid, with a backup system of some kind being available if the grid goes down. Most or all of the fuel for this project will be derived from biogas.

Delmarva Power in Delaware is installing a total of 30 MWs of Bloom Energy's fuel cell technology near two of its substations. When completed, this installation will represent the largest utility-scale deployment of fuel cell technology in the U.S. The Delmarva Power installations of the new technology will use natural gas fuel sources.

Energy Commission staff contacted Bloom Energy for information on the technology and its development status in California. A company representative states that the Bloom Energy power generation systems can be physically located throughout the state and scaled for varying levels of electrical power generation on either side of the meter (Grizard, pers. comm., 2012). The technology is not limited to applications that generate several hundred kWs to serve on-site load. There are grid benefits to locating the systems in areas with transmission and/or distribution line congestion (i.e., developed areas close to load centers), including mitigating voltage variances and increasing grid stability, but this is not a limiting factor, and fuel cell farms are also an option for centralized power production.

A fuel cell facility must use renewable fuel to be eligible for California's RPS program. Development of a Bloom's Energy Server™ system that runs on biogas requires access to the renewable fuel source. Currently there are scarce biogas resources for use under the state's RPS program, and this is proving to be a limiting factor for biogas projects of any type. A few bills in the California Legislature could facilitate delivery of biomethane from intrastate producers and development of future SOFC projects that are eligible for the RPS program. A description of fuel cell facilities and renewable fuels is available in the Energy Commission publication, "Renewables Portfolio Standard Eligibility" (Energy Commission 2012).

Online sources from May 2012 report on a new, small-scale SOFC system developed at the U.S. Department of Energy's (DOE) Pacific Northwest National Laboratory (PNNL) that could be used for household and neighborhood power generation (Gizmag 2012, ScienceDaily 2012). A paper published in the Journal of Power Sources (Powell et al. 2012) describes the work performed by the DOE PNNL team and how SOFCs are being developed for a variety of applications because of their high efficiency over a wide range of power levels. Applications for SOFCs include 1–2-kW residential combined heat and power applications, 100–250-kW systems for distributed generation and grid extension, and megawatt-scale power plants using coal (Powell et al. 2012). The system developed by the DOE PNNL team is a small-scale SOFC power system that operates on methane, which is the primary component of natural gas. The paper describes the team's demonstration of a highly efficient small-scale (approximately 2 kWs) SOFC system that can be readily scaled for a 100–250-kW natural gas-fueled distributed generation application (Powell et al. 2012).

Versa Power Systems is also developing SOFC technology, but it is in the demonstration phase of development and uses hydrogen combined with oxygen to produce electricity (Versa Power Systems 2012).

Decision to Eliminate the Technology from the Alternatives Analysis

Use of this new technology for utility-scale installations in California is not yet a viable alternative. Based on staff's research, SOFCs are primarily being developed and installed for on-site generation of electricity. The work conducted by the DOE PNNL team and described in the Journal of Power Sources indicates that a small-scale SOFC power system can be scaled for distributed generation applications.

Except for the Delmarva Power project, Bloom's Energy Server™ installations described above are primarily serving on-site load. Changes to California state policy is the critical factor needed to drive the utilities to invest in Bloom Energy's SOFC technology and incentivize development of the technology at the utility scale (Grizard, pers. comm., 2012). Because the technology is new, and state policy is not in place to drive the utilities to make the investment, future deployment of large-scale systems in the state cannot be presumed. Also, only development of SOFC technologies using a renewable fuel source would be eligible for the state's RPS program.

Continued development of SOFC technologies and evolving state energy policies may reduce the need for utility-scale projects such as the proposed HHSEGS project. However, the SOFC technology, including Bloom's Energy Server™, is not currently an alternative to a 500-MW utility scale energy generation project.

WIND ENERGY

Overview

Wind turbines, like windmills, are mounted on a tower to capture the most energy from the resource (NREL 2012a). Turbines catch the wind's energy with their propeller-like blades; usually two or three blades are mounted on a shaft to form a rotor. The wind's force against the blade causes the rotor to spin like a propeller, and the turning shaft spins a generator to make electricity. Wind turbines can be used as stand-alone applications (e.g., for water pumping or communications). Wind turbines can be combined with a PV system. For utility-scale applications, large numbers of wind turbines are built in various configurations in the same general area to form a wind power plant. Small wind systems have potential as distributed generation systems. Utility-scale turbines range from 50–750 kWs. Single small turbines generally have a capacity of less than 50 kWs.

The U.S. Bureau of Land Management (BLM) maintains a website with information on wind energy development. Wind energy resources are categorized by wind-power density classes that range from class 1 (the lowest) to class 7 (the highest). Good wind resources are class 3 and above and have average annual wind speeds of at least 13 miles per hour (BLM 2012). Wind speed is a critical feature of wind resources.

In October 2012, BLM issued its Record of Decision approving the Chokecherry and Sierra Madre Wind Energy site in Wyoming (Associated Press 2012). The 2,000–3,000

MW project is planned for construction across an area that includes private and federally-managed land. Roadwork and groundwork for the project could begin in 2013. After that, installation of up to 1,000 wind turbines will be accomplished over approximately 3 years. The project is expected to provide electricity to approximately one million homes.

Wind resources provide 21 percent of California's in-state renewable generation (3 percent of total in-state energy generation) (Energy Commission 2010, 2011b). Although wind is considered a mature technology, it continues to face challenges due to intermittency of the resource, lack of transmission access in remote areas, and environmental issues (Energy Commission 2011b). The majority of onshore wind development is concentrated in four regions of the state: Altamont Pass (east of San Francisco), Tehachapi (southeast of Bakersfield), Solano-Montezuma Hills (Solano County), and San Gorgonio (near Palm Springs, east of Los Angeles). Kern, San Joaquin, and Riverside counties also have large amounts of wind capacity, about 800 MWs, 600 MWs, and 500 MWs, respectively (Energy Commission 2011b).

Decision to Eliminate the Technology from the Alternatives Analysis

This technology has practical limitations. Based on staff's research, wind technology is limited to areas with wind resources where the wind-power density is class 3 and above (average annual wind speeds of at least 13 miles per hour). According to the NREL California 50 Meter Wind Resource Map[4], there are a scattering of small areas with superb (class 7) wind resource, mostly in western Inyo County, though most areas have marginal (class 2) to fair (class 3) wind resources. The proposed HHSEGS site is in an extensive area with poor (class 1) wind resources, making it an unsuitable location for a wind energy project.

GEOTHERMAL ENERGY

Overview

Geothermal energy is heat from inside the earth. Geothermal power plants use steam produced from reservoirs of hot water found a few miles or more below the earth's surface to produce electricity (NREL 2012b). The steam rotates a turbine that activates a generator, which produces electricity. There are three types of geothermal power plants: dry steam, flash steam, and binary cycle. Geothermal is a mature industry, and geothermal power plants provide steady and predictable baseload power (National Geothermal Collaborative 2004).

Geothermal energy is limited to areas with reservoirs of steam or hot water, known as hydrothermal resources, which are often associated with volcanic and seismically active regions. California has 25 known geothermal resource areas, including 14 resource areas with temperatures of 300 degrees Fahrenheit or greater. Forty-eight of the fifty-eight California counties have lower temperature resources for direct-use geothermal. The counties with high amounts of geothermal capacity include Sonoma County with

[4] Wind speed estimates at 50 meters (m) above the ground. The map depicts the resource that could be used for community-scale wind development using wind turbines at 50–60-m hub heights.

1,601 MWs of capacity (more than 60 percent of all geothermal capacity installed in California), Imperial County with 650 MWs, and Inyo County with 302 MWs (Energy Commission 2011b). Geothermal plants provide 42 percent of in-state renewable generation (6.2 percent of total in-state energy generation) (Energy Commission 2010, 2011b). The counties with the greatest geothermal resource potential include Sonoma and Imperial.

Because hot water and steam cannot be transported long distances economically, use of geothermal resources is restricted to locations where they are found and initially available (National Geothermal Collaborative 2004). Geothermal steam resources can be depleted over time, leading to a reduction in electricity generation (Energy Commission 2011b). Geothermal exploration is time-consuming because of the difficulty in establishing what, exactly, is in the subsurface.

In Santa Rosa, California, highly treated wastewater from the Laguna Treatment Plant is being pumped to The Geysers steam fields (a large complex of geothermal power plants in Sonoma and Lake counties) to recharge the aquifer. Evidence suggests that the injection of treated wastewater is preserving the geothermal resource and having an added benefit of disposing of treated wastewater.

Decision to Eliminate the Technology from the Alternatives Analysis

This technology has practical limitations. Geothermal technology is limited to areas with geothermal resources. There are two known resource areas in Inyo County, the Coso Hot Springs and Saline Valley, both northwest of the project site. Coso Hot Springs is inside the boundary of the China Lake Naval Air Weapons Station, near the Coso Mountains. Saline Valley is northwest of Death Valley and east of the Owens Valley. The proposed HHSEGS site is not a feasible location for a geothermal project.

BIOMASS ENERGY

Overview

Biomass energy or *bioenergy* is the energy from plants and plant-derived materials. Wood is currently the largest biomass energy resource. Other biomass energy resources include food crops, grassy and woody plants, residues from agriculture or forestry, oil-rich algae, and the organic component of municipal and industrial wastes (NREL 2012c). The main biomass feedstocks for power are paper mill residue, lumber mill scrap, and municipal waste. The most common feedstocks used today are corn grain (to make ethanol) and soybeans (to make biodiesel) (NREL 2012c). Biopower is the use of biomass to produce energy and technologies include direct-firing, cofiring, gasification, pyrolysis, and anaerobic digestion.

While biomass facilities can be located throughout California, due to the availability of fuel from forest and agricultural waste, most biomass development occurs in the northern part of the state (Energy Commission 2011b). The counties with the greatest biomass potential from all sources of feedstocks (forestry, agricultural and municipal waste) include Siskiyou, Humboldt, Shasta, Mendocino, Fresno, Tulare, Kern, San Bernardino, Los Angeles, Riverside and San Diego (Energy Commission 2011b). Biomass generation provides nearly 20 percent of in-state renewable generation (2.8

percent of total in-state energy generation) (Energy Commission 2010, 2011b). Additional potential may be limited due to cost, air quality issues, and regulatory barriers.

Decision to Eliminate the Technology from the Alternatives Analysis

This technology has practical limitations. Biomass technology is limited to areas with access to biomass feedstock. Inyo County is not a county with large quantities of biomass feedstock. The proposed HHSEGS site is not a feasible location for a biomass project.

SMALL HYDROELECTRIC

Overview

Hydropower is derived from the kinetic energy of flowing water as it moves downstream. Turbines and generators convert the energy into electricity, which is then fed into the electrical grid (U.S. Department of Energy 2011). Small hydroelectric power is defined as systems with a capacity of 30 MWs or less (Energy Commission 2011b). Less than 10 percent of the hydropower units in the state are 30 MW or smaller. Units located in natural waterways may be operated as run-of-the-river where the amount of energy produces at any one time is determined by the current flow in the river. The amount of energy generated from small hydroelectric systems depends largely on the amount of snow and rainfall received, and the amount of hydroelectricity produced varies significantly from year to year (Energy Commission 2011b). Hydropower is considered to be a mature technology, and hydro projects with storage capability have some of the best operating characteristics of any renewable technology.

The three types of hydroelectric facilities are impoundment, diversion, and pumped storage. Some hydropower plants use dams and some do not. Pumped storage systems do not depend solely on runoff and are typically used to provide power during peak demand periods on very short notice. Some power plants are located on rivers, streams, and canals, but for a reliable water supply, dams are needed (U.S. Bureau of Reclamation 2005). Hydropower is available in 52 of the 58 state counties, but the counties with the highest potential energy are in the mountain ranges north and east of the Central Valley. Small hydroelectric power represents 15 percent of in-state renewable generation (2.2 percent of total in-state energy generation) (Energy Commission 2010, 2011b). The counties with the greatest small hydroelectric potential include Siskiyou, Shasta, Plumas, Butte, Sierra, Amador, Calaveras, Stanislaus, Tuolumne, Madera, and Fresno (Energy Commission 2011b).

While there are a variety of equipment options and plant configurations that can accommodate nearly every site condition, the remote location of hydroelectric resources adds challenges to resource development due to the interconnection requirements and suitable market and permitting requirements (Energy Commission 2011b).

Decision to Eliminate the Technology from the Alternatives Analysis

This technology has practical limitations. Small hydroelectric technology is limited to areas where water is in motion. A sufficient quantity of falling water is needed for electricity generation, so hilly or mountainous areas are the best sites for hydroelectric

resources. The proposed HHSEGS site is not a feasible location for a small hydroelectric project.

WAVE AND TIDAL ENERGY

Overview

Ocean wave energy technologies rely on the up-and-down motion of ocean waves produced by wind to generate electricity (Ocean Energy Council 2012a). *Wave energy conversion* (WEC) devices can be sorted into several categories based on the type of wave motion from which the devices produce energy. For example, wave motions include the roll or vertical heave of a wave as it passes a device or the horizontal surge in nearer-shore conditions (City and County of San Francisco 2009). Categories of WEC devices include: (1) the attenuator (pitching motion), (2) point absorbers (heave and surge), (3) oscillating surge devices (surge), (4) oscillating water column device (air pressure), (5) overtopping device (breaking wave run-up), and (6) submerged pressure differential (pressure).

Tidal electricity generation has traditionally used a barrage (dam-like structure) across an estuary to block the incoming and outgoing tide (Ocean Energy Council 2012b). When there is adequate difference in the elevation on the different sides of the barrage, the gates are opened, releasing the water through the turbines to generate electricity. Newer technologies use in-stream tidal technology that harnesses offshore tidal streams using underwater devices similar to wind turbines. A tidal range of at least 7 meters (23 feet) is required for economical operation and sufficient head of water for the turbines. The size of the barrage required (length and height) and difference in height between high and low tide are the major factors in determining the cost effectiveness of a tidal power site.

Decision to Eliminate the Technology from the Alternatives Analysis

This technology has technological and practical limitations. Wave and tidal technology is not ready for commercial use (Energy Commission 2011b). Some technologies are closer to commercialization while others are emerging. Wave and tidal technology is limited to areas with water bodies with tidal or wave action. Inyo County does not have areas of wave and tidal resources.

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Alternatives Appendix-3
Summary Comparison of the Proposed Project's Impacts to the Project Alternatives and the No-Project Alternative
(Please see explanatory notes at the bottom of the table)

Environmental Effect	Proposed HHSEGS Project	No-Project Alternative	Sandy Valley Off-site Alternative	Solar Power Tower with Energy Storage Alternative	Solar Photovoltaic Alternative	Parabolic Trough Alternative	Reduced Acreage Alternative
Air Quality							
Construction-related emissions	SM	—	Similar to HHSEGS (SM)	Similar to HHSEGS (SM)	Similar to HHSEGS (SM)	Similar to HHSEGS (SM)	Similar to HHSEGS (SM)
Project operations emissions	SM	—	Similar to HHSEGS (SM)	Similar to HHSEGS (SM)	Less than HHSEGS (SM)	Similar to HHSEGS (SM)	Somewhat less than HHSEGS (SM)
Biological Resources							
Impacts on special-status plant species	SM	Much less than HHSEGS (LS)	Much less than HHSEGS (SM)	Similar to or somewhat greater than HHSEGS (SM)	Same as HHSEGS (SM)	Same as HHSEGS (SM)	Much less than HHSEGS (SM)
Impacts on waters of the U.S. and waters of the state	SM	Much less than HHSEGS (LS)	Much less than HHSEGS (SM)	Similar to or somewhat greater than HHSEGS (SM)	Same as HHSEGS (SM)	Same as HHSEGS (SM)	Much less than HHSEGS (SM)
Impacts on desert tortoise	SM	Much less than HHSEGS (LS)	Much less than HHSEGS (SM)	Similar to or somewhat greater than HHSEGS (SM)	Same as HHSEGS (SM)	Same as HHSEGS (SM)	Much less than HHSEGS (SM)
Impacts on special-status terrestrial wildlife species (other than desert tortoise)	SM	Much less than HHSEGS (LS)	Much less than HHSEGS (SM)	Similar to or somewhat greater than HHSEGS (SM)	Same as HHSEGS (SM)	Same as HHSEGS (SM)	Much less than HHSEGS (SM)
Impacts on avian species from collisions with project features (see biological resources note)	PSU	—	Similar to or somewhat greater than HHSEGS (PSU)	Similar to or somewhat greater than HHSEGS (PSU)	Unknown (PSU)	Unknown (PSU)	Less than HHSEGS (PSU)
Impacts on avian species from exposure to concentrated solar flux	PSU	—	Similar to or somewhat greater than HHSEGS (PSU)	Similar to or somewhat greater than HHSEGS (PSU)	—	—	Less than HHSEGS (PSU)
Potential impacts on groundwater dependent ecosystems	PSM	Somewhat less than HHSEGS (LS)	Somewhat less than HHSEGS (PSM)	Somewhat greater than HHSEGS (PSM)	Somewhat less than HHSEGS (PSM)	Similar to HHSEGS (PSM)	Somewhat less than HHSEGS (PSM)

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Alternatives Appendix-3
Summary Comparison of the Proposed Project's Impacts to the Project Alternatives and the No-Project Alternative
(Please see explanatory notes at the bottom of the table)

Environmental Effect	Proposed HHSEGS Project	No-Project Alternative	Sandy Valley Off-site Alternative	Solar Power Tower with Energy Storage Alternative	Solar Photovoltaic Alternative	Parabolic Trough Alternative	Reduced Acreage Alternative
Biological resources note: For the Sandy Valley Off-site Alternative and the SPT with Energy Storage Alternative, avian collision impacts could be secondary to exposure to solar flux. For the Parabolic Trough Alternative, collisions could be secondary to retinal damage from glint or glare.							
Cultural Resources							
Potential to disturb, destroy, or visually degrade significant prehistoric and historical archaeological sites *on* the site (see note 1 on cultural resources)	LS	Much less than HHSEGS (LS)	Somewhat greater than HHSEGS (PSM)	Similar to HHSEGS (LS)	Similar to HHSEGS (LS)	Similar to HHSEGS (LS)	Somewhat less than HHSEGS (LS)
Potential to disturb, destroy, or visually degrade significant prehistoric and historical archaeological sites *beyond* the site	SU	Much less than HHSEGS (LS)	Similar to HHSEGS (PSU)	Similar to HHSEGS (SU)	Much less than HHSEGS (PSM)	Much less than HHSEGS (PSM)	Somewhat less than HHSEGS (SU)
Potential impacts on significant built-environment cultural resources *on* the site (see note 2 on cultural resources)	SM	Much less than HHSEGS (LS)	Similar to HHSEGS (PSM)	Similar to HHSEGS (SM)	Similar to HHSEGS (SM)	Similar to HHSEGS (SM)	Somewhat less than HHSEGS (SM)
Potential impacts on significant built-environment cultural resources *beyond* the site (see note 2 on cultural resources)	SU	Much less than HHSEGS (LS)	Similar to HHSEGS (PSU)	Similar to HHSEGS (SU)	Much less than HHSEGS (PSM)	Somewhat less than HHSEGS (PSM)	Somewhat less than HHSEGS (SU)
Potential to disturb, destroy, or visually degrade significant ethnographic resources *on* the site	SU	Much less than HHSEGS (LS)	Similar to HHSEGS (SU)	Similar to HHSEGS (SU)	Similar to HHSEGS (PSU)	Similar to HHSEGS (PSU)	Somewhat less than HHSEGS (SU)
Potential to disturb, destroy, or visually degrade significant ethnographic resources *beyond* the site	SU	Much less than HHSEGS (LS)	Similar to HHSEGS (SU)	Similar to HHSEGS (SU)	Somewhat less than HHSEGS (PSU)	Somewhat less than HHSEGS (PSU)	Somewhat less than HHSEGS (SU)
Note 1 on cultural resources: "Site" means the facility site proper and does not include linear or ancillary infrastructure away from the facility site. Note 2 on cultural resources: Except for the Sandy Valley Off-site Alternative, the built-environment cultural resource is the Old Spanish Trail – Mormon Road Northern Corridor.							
Fire Protection							
Potential impacts on local fire protection resources	PSM	—	Similar to HHSEGS (PSM)	Similar to HHSEGS (PSM)	Less than HHSEGS (PSM)	Much greater than HHSEGS (SM)	Somewhat less than HHSEGS (PSM)
Potential impacts on emergency response services	PSM	—	Similar to HHSEGS (PSM)	Similar to HHSEGS (PSM)	Less than HHSEGS (PSM)	Much greater than HHSEGS (SM)	Somewhat less than HHSEGS (PSM)
Geology and Paleontology							
Potential impacts from strong seismic shaking	SM	—	Similar to HHSEGS (PSM)	Same as HHSEGS (SM)	Much less than HHSEGS (PSM)	Much less than HHSEGS (PSM)	Much less than HHSEGS (PSM)

Alternatives Appendix-3
Summary Comparison of the Proposed Project's Impacts to the Project Alternatives and the No-Project Alternative
(Please see explanatory notes at the bottom of the table)

Environmental Effect	Proposed HHSEGS Project	No-Project Alternative	Sandy Valley Off-site Alternative	Solar Power Tower with Energy Storage Alternative	Solar Photovoltaic Alternative	Parabolic Trough Alternative	Reduced Acreage Alternative
Potential impacts from soil failure caused by liquefaction, hydrocollapse, formation of soil fissures, and/or dynamic compaction	SM	—	Similar to HHSEGS (PSM)	Same as HHSEGS (SM)	Much less than HHSEGS (PSM)	Much less than HHSEGS (PSM)	Much less than HHSEGS (PSM)
Potential impacts on paleontological resources	SM	—	Similar to HHSEGS (PSM)	Same as HHSEGS (SM)	Less than HHSEGS (PSM)	Less than HHSEGS (PSM)	Much less than HHSEGS (PSM)
Potential impacts on geological or mineralogical resources	LS	—	Similar to HHSEGS (LS)	Same as HHSEGS (LS)	Same as HHSEGS (LS)	Same as HHSEGS (LS)	Same as HHSEGS (LS)
Hazardous Materials							
Potential for release of hazardous materials to occur on-site	SM	—	Similar to HHSEGS (PSM)	Similar to HHSEGS (SM)	Similar to HHSEGS (SM)	Somewhat greater than HHSEGS (SM)	Similar to HHSEGS (PSM)
Potential for release of hazardous materials to occur off-site	SM	—	Similar to HHSEGS (PSM)	Similar to HHSEGS (SM)	Similar to HHSEGS (SM)	Somewhat greater than HHSEGS (SM)	Similar to HHSEGS (PSM)
Land Use							
Conflicts or inconsistencies with general plan land use designations and zoning	SU	—	Similar to HHSEGS (SU)	Same as HHSEGS (SU)	Same as HHSEGS (SU)	Same as HHSEGS (SU)	Same as HHSEGS (SU)
Conversion of agricultural land	—	—	Much greater than HHSEGS (SM)	—	—	—	—
Noise and Vibration							
Potential for noise to impact noise-sensitive receptors	PSM	—	Somewhat greater than HHSEGS (PSM)	Somewhat greater than HHSEGS (PSM)	Much less than HHSEGS (PSM)	Similar to HHSEGS (PSM)	Similar to HHSEGS (PSM)
Public Health							
Potential for project construction to cause air toxics-related impacts that could affect public health	LS	—	Similar to HHSEGS (LS)	Similar to HHSEGS (LS)	Similar to HHSEGS (LS)	Similar to HHSEGS (LS)	Similar to HHSEGS (LS)
Potential for project operations to cause air toxics-related impacts that could affect public health	LS	—	Similar to HHSEGS (LS)	Similar to HHSEGS (LS)	Less than HHSEGS (LS)	Similar to HHSEGS (LS)	Less than HHSEGS (LS)
Socioeconomic Resources							

Alternatives Appendix-3
Summary Comparison of the Proposed Project's Impacts to the Project Alternatives and the No-Project Alternative
(Please see explanatory notes at the bottom of the table)

Environmental Effect	Proposed HHSEGS Project	No-Project Alternative	Sandy Valley Off-site Alternative	Solar Power Tower with Energy Storage Alternative	Solar Photovoltaic Alternative	Parabolic Trough Alternative	Reduced Acreage Alternative
Construction employment and increased taxes and fees	B	—	Similar to HHSEGS (B)	Similar to HHSEGS (B)	Similar to HHSEGS (B)	Similar to HHSEGS (B)	Similar to HHSEGS (B)
Displacement of existing rural residences	—	—	Greater than HHSEGS (LS)	—	—	—	—
Potential impacts on emergency medical and law enforcement services	PSM	—	Similar to HHSEGS (PSM)	Similar to HHSEGS (PSM)	Similar to HHSEGS (PSM)	Similar to HHSEGS (PSM)	Similar to HHSEGS (PSM)
Traffic and Transportation							
Potential impacts on roadway infrastructure	SM	—	Similar to HHSEGS (SM)	Same as HHSEGS (SM)	Same as HHSEGS (SM)	Same as HHSEGS (SM)	Same as HHSEGS (SM)
Potential for glint and glare to cause safety hazards or a distinct visual distraction effect from an operator control perspective (i.e., vehicle drivers and aircraft pilots)	PSM	—	Similar to HHSEGS (PSM)	Same as HHSEGS (PSM)	Much less than HHSEGS (LS)	Less than HHSEGS (PSM)	Similar to HHSEGS (PSM)
Potential for construction equipment and/or permanent structures to exceed 200 feet in height above ground level	SM	—	Similar to HHSEGS (SM)	Same as HHSEGS (SM)	—	—	Same as HHSEGS (SM)
Transmission Line Safety and Nuisance							
Potential for impacts related to aviation safety, hazardous shocks, nuisance shocks, and electric and magnetic field exposure	SM	—	Similar to HHSEGS (SM)	Similar to HHSEGS (SM)	Similar to HHSEGS (SM)	Similar to HHSEGS (SM)	Similar to HHSEGS (SM)
Visual Resources							
Construction-Related Impacts							
Potential to substantially degrade the existing visual character or quality of the site and its surroundings	SU	—	Similar to HHSEGS (SU)	Similar to HHSEGS (SU)	Less than HHSEGS (SM)	Similar to HHSEGS (SU)	Similar to HHSEGS (SU)
Potential to create a new source of substantial light or glare which would adversely affect day or nighttime views in the area	SU	—	Similar to HHSEGS (SU)	Similar to HHSEGS (SU)	Less than HHSEGS (SM)	Similar to HHSEGS (PSM)	Similar to HHSEGS (SU)
Project Operations Impacts							
Potential to substantially degrade the existing visual character or quality of the site and its surroundings	SU	—	Similar to HHSEGS (SU)	Same as HHSEGS (SU)	Much less than HHSEGS (PSM)	Somewhat less than HHSEGS (SU)	Similar to HHSEGS (SU)

Alternatives Appendix-3 Summary Comparison of the Proposed Project's Impacts to the Project Alternatives and the No-Project Alternative (Please see explanatory notes at the bottom of the table)							
Environmental Effect	Proposed HHSEGS Project	No-Project Alternative	Sandy Valley Off-site Alternative	Solar Power Tower with Energy Storage Alternative	Solar Photovoltaic Alternative	Parabolic Trough Alternative	Reduced Acreage Alternative
Potential to create a new source of substantial light or glare which would adversely affect day or nighttime views in the area	SU	—	Similar to HHSEGS (SU)	Same as HHSEGS (SU)	Much less than HHSEGS (PSM)	Somewhat less than HHSEGS (SU)	Similar to HHSEGS (SU)
Waste Management							
Potential for disposal or diversion of project materials to cause impacts on existing waste disposal or diversion facilities	SM	—	Similar to HHSEGS (PSM)	Similar to HHSEGS (PSM)	Similar to HHSEGS (PSM)	Similar to HHSEGS (PSM)	Similar to HHSEGS (PSM)
Potential for impacts on human health and the environment related to past or present soil or water contamination	PSM	—	Somewhat greater than HHSEGS (PSM)	Similar to HHSEGS (PSM)	Somewhat greater than HHSEGS (PSM)	Similar to HHSEGS (PSM)	Similar to HHSEGS (PSM)
Soil and Surface Water							
Soil erosion by wind and water during project construction	SM	—	Similar to HHSEGS (SM)	Greater than HHSEGS (SM)	Somewhat less than HHSEGS (SM)	Much greater than HHSEGS (SM)	Less than HHSEGS (SM)
Soil erosion by wind and water during project operations	PSM	Much less than HHSEGS (LS)	Similar to HHSEGS (PSM)	Somewhat greater than HHSEGS (PSM)	Less than HHSEGS (PSM)	Less than HHSEGS (PSM)	Less than HHSEGS (PSM)
Water quality impacts from contaminated storm water runoff	SM	Much less than HHSEGS (LS)	Same as HHSEGS (SM)	Somewhat greater than HHSEGS (SM)	Much less than HHSEGS (LS)	Somewhat greater than HHSEGS (SM)	Less than HHSEGS (SM)
Water quality impacts from storm damage	PSM	—	Similar to HHSEGS (PSM)	Similar to HHSEGS (PSM)	Somewhat greater than HHSEGS (PSM)	Greater than HHSEGS (PSM)	Somewhat less than HHSEGS (PSM)
Water quality impacts from power plant operations	SM	—	Same as HHSEGS (SM)	Somewhat greater than HHSEGS (SM)	Much less than HHSEGS (LS)	Similar to HHSEGS (SM)	Less than HHSEGS (SM)
Water quality impacts from sanitary waste	SM	—	Same as HHSEGS (SM)	Same as HHSEGS (SM)	Similar to HHSEGS (SM)	Similar to HHSEGS (SM)	Somewhat less than HHSEGS (SM)
Potential impacts from on-site and off-site flooding	SM	—	Similar to HHSEGS (SM)	Similar to HHSEGS (SM)	Similar to HHSEGS (SM)	Much less than HHSEGS (SM)	Similar to HHSEGS (SM)
Potential to impede or redirect 100-year flood flows, as shown on Federal Emergency	LS	—	Similar to HHSEGS (LS)	Similar to HHSEGS (LS)	Similar to HHSEGS (LS)	Similar to HHSEGS (LS)	Similar to HHSEGS (LS)

Alternatives Appendix-3
Summary Comparison of the Proposed Project's Impacts to the Project Alternatives and the No-Project Alternative
(Please see explanatory notes at the bottom of the table)

Environmental Effect	Proposed HHSEGS Project	No-Project Alternative	Sandy Valley Off-site Alternative	Solar Power Tower with Energy Storage Alternative	Solar Photovoltaic Alternative	Parabolic Trough Alternative	Reduced Acreage Alternative
Management Agency maps							
Water Supply							
Potential impacts on local wells	PSM	Somewhat less than HHSEGS (LS)	Similar to HHSEGS (PSM)	Somewhat greater than HHSEGS (PSM)	Somewhat less than HHSEGS (PSM)	Similar to HHSEGS (PSM)	Somewhat less than HHSEGS (PSM)
Potential impacts on groundwater basin balance	PSM	Somewhat less than HHSEGS (LS)	Similar to HHSEGS (PSM)	Somewhat greater than HHSEGS (PSM)	Somewhat less than HHSEGS (PSM)	Similar to HHSEGS (PSM)	Somewhat less than HHSEGS (PSM)

Notes: The comparison of impacts to the proposed project is conveyed, for most impacts, using these terms in a graded scale:

- Much less than HHSEGS
- Less than HHSEGS
- Somewhat less than HHSEGS
- Similar to HHSEGS
- Same as HHSEGS
- Somewhat greater than HHSEGS
- Greater than HHSEGS
- Much greater than HHSEGS

Notes: Impact conclusions for the proposed project and the comparative impacts for the alternatives are shown using these abbreviations:

— = no impact
B = beneficial impact
LS = less-than-significant impact, no mitigation required
SM or PSM = significant or potentially significant impact that can be mitigated to less than significant
SU or PSU = significant and unavoidable or potentially significant and unavoidable impact that cannot be mitigated to less than significant

ALTERNATIVES

List of Comment Letters

		Alternatives Comments?
1	Inyo County	
2	Bureau of Land Management	
3	National Park Service	
4	The Nature Conservancy	
5	Amargosa Conservancy	X
6	Basin & Range Watch	X
7	Pahrump Paiute Tribe	
8	Richard Arnold, Pahrump Piahute Tribe	
9	Big Pine Tribe of Owens Valley	X
10	Intervenor Cindy MacDonald	X
11	Intervenor Center for Biological Diversity	X
12	Intervenor, Old Spanish Trail Association	
13	Applicant, BrightSource Energy, Inc.	X

Comment #	DATE	COMMENT TOPIC	RESPONSE
5	July 21, 2012	The Amargosa Conservancy	
5.5		Request to analyze alternative sources of water for the project. Request to examine alternative locations such as Sandy Valley and alternative technologies such as solar PV and distributed generation.	Staff has not identified any viable alternative sources of water for the project. See the full analyses of the Sandy Valley Off-site Alternative and the Solar PV Alternative in the final staff assessment under the subsection, "Alternatives Evaluated in Detail." See also the discussion and analysis under the subsection, "Distributed Generation," of staff's alternatives analysis.
5.10		Same comment as 5.5.	See response to comment 5.5.

Comment #	DATE	COMMENT TOPIC	RESPONSE
6	July 23, 2012	**Basin and Range Watch**	
6.1		Staff assessment does not consider private lands outside of the area.	See the full analysis under the subsection of staff's alternatives analysis, "Sandy Valley Off-site Alternative," which is mostly on private lands. See also the analysis of the potential feasibility of an alternative site on private land in the West Mojave under the subsection, "Barstow Preliminary Renewable Energy Study Area."
6.2		Staff assessment does not consider an off-site alternative on disturbed or degraded lands.	See response to comment 6.1.
6.3		Staff assessment does not evaluate a distributed generation (DG) alternative. States that the Energy Commission reviewed the DG alternative for other projects, including Ivanpah and Genesis.	See a full discussion of the DG category of renewable energy under the subsection of staff's alternatives analysis, “Distributed Generation." The alternatives analyses for the Palen Solar Power Project (PSPP), Ivanpah Solar Electric Generating System (ISEGS), and Genesis Solar Energy Project (GSEP) evaluated DG. For PSPP, staff eliminated DG from consideration and concluded that it was unknown whether the 500 MW of power generation could be achieved to replace the generating capacity of PSPP. For ISEGS, staff eliminated DG from the analysis and concluded that concentrating solar power (CSP) projects cannot be replaced by DG installations and that CSP projects are also needed to achieve the state’s renewables portfolio standard goals. For GSEP, staff eliminated the technology from detailed consideration and concluded that installlation of 250 MW of DG capacity could not be guaranteed to be accomplished in the timeframe for the project.

6.4		Distributed generation should be given a much more full analysis, as it is a completely viable alternative.	See the discussion and analysis of the DG category of renewable energy under the subsection of staff's alternatives analysis, "Distributed Generation." See also the discussion under the subsection, "Decision to Eliminate this Category of Renewable Energy Generation from Detailed Consideration."
6.5		Alternatives should be evaluated that are in load centers. The entire state should be considered.	See staff's analysis of the potential feasibility of an alternative site in the West Mojave, which is closer to a load center than the proposed project; see the subsection in staff's alternatives analysis, "Barstow Preliminary Renewable Energy Study Area." Staff's alternatives analysis was prepared in accordance with the California Environmental Quality Act (CEQA) regulations and guidelines. See the full discussion of those requirements under the subsections of staff's alternatives analysis, "CEQA Requirements," and, "Alternatives Screening." CEQA does not require an alternatives analysis to evaluate vast regional areas across the state to identify a different site for the proposed project.
6.6		A master comprehensive plan should exist to determine recreational and biodiversity resources on public lands, assumptions for integrating various fuels mixes and technologies into the utilities' plans, a state plan, and a national plan. Loads should be carefully analyzed to determine whether additional capacity is needed. The plan might recommend building smaller units in cities.	See response to comment 6.5. Staff observes that planning efforts at the state and federal level are occurring to analyze and identify areas for development of renewable energy projects. See a brief description of the Desert Renewable Energy Conservation Plan (DRECP) under the subsection of staff's alternatives analysis, "Barstow Preliminary Renewable Energy Study Area." More information on the DRECP is at: <http://www.drecp.org>. See also the extensive resources on renewable energy planning and development on the California Energy Commission and California Public Utilities Commission (CPUC) websites. See also the online information center for the Solar Energy Development Programmatic EIS at: <http://solareis.anl.gov/>.

6.7		Renewables should be distributed generation in load centers. DG is a known technology that is proven in Germany. Environmental impacts of the proposed project could be avoided with a DG alternative.	See responses to comments 6.3 and 6.4. The subsection of staff's alternatives analysis, "Distributed Generation," describes incentive programs for customer-side of the meter and utility-side of the meter DG. CPUC regulates DG policies and programs in California. See the CPUC website for more information: <http://www.cpuc.ca.gov/PUC/energy/DistGen/>. See also information on the California Solar Initiative, the solar rebate program for the state's customers of Pacific Gas & Electric, Southern California Edison, and San Diego Gas & Electric: <http://www.gosolarcalifornia.org/about/csi.php>. The Energy Commission, along with other state agencies, work to support the state's renewables portfolio standard program goals, including goals for implementing DG. The Energy Commission publishes the Integrated Energy Policy Report (IEPR); the IEPR process features workshops and proceedings for public participation. The February 2012 IEPR addresses strategies to encourage demand for self-generation technologies, including PV systems. See the citation and reference in staff's alternatives analysis for the IEPR: Energy Commission 2012b. See also the Energy Commission's website for details on research and development, programs, incentives, permitting, etc., on the state's distributed energy resources: <http://www.energy.ca.gov/distgen/>.
6.8		Energy Commission staff rejected an alternative with a smaller footprint.	This comment refers to the discussion under the subsection of staff's alternatives analysis, "Alternatives Considered in the Application for Certification." This subsection of staff's analysis explains why the Applicant (not Energy Commission staff) rejected a smaller project alternative. The final staff assessment includes a full analysis of an alternative with a smaller site footprint. See the subsection in staff's alternatives analysis, "Reduced Acreage Alternative."

6.9		Energy Commission staff rejected an alternative with a smaller footprint for the benefit of BrightSource Energy.	See response to comment 6.8.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
9	**July 21, 2012**	**Big Pine Tribe of Owens Valley**	
9.4		Recommends inclusion of a DG alternative in staff's alternatives analysis	See the discussion and analysis of the DG category of renewable energy under the subsection of staff's alternatives analysis, "Distributed Generation." See also responses to comments 6.3, 6.4, and 6.7 in the comment letter from Basin and Range Watch.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
10	**July 21, 2012**	**Intervenor Cindy MacDonald -- Alternatives, p. 4-1**	
10.1	**p. 4-2, #1**	Requests details on information provided by the Applicant to Energy Commission staff on the Bloom's Energy Server™ distributed power generator.	Susan Strachan provided information on Bloom's Energy Server™ in an e-mail to staff on March 14, 2012. The information was provided on behalf of the Applicant and included: the Bloom Energy Corporation product data sheet on the ES-5700 energy server; and the company brochure, company overview, and Bloom Electrons℠ overview.
10.2	**p. 4-2, #2**	Requests evidence that the Applicant contacted Bloom Energy Corporation regarding the site-specific feasiblity and viability of using the technology at the proposed project site.	Energy Commission staff contacted Bloom Energy in August 2012 and received detailed information on the company's technology and its development status in California. Please see the revised and expanded discussion in the appendix to staff's alternatives analysis, "Appendix Alternatives-1: Other Renewable Energy Technologies," under the subsection, "Solid Oxide Fuel Cells."

10.3	**p. 4-3, #1**	Requests information on the Applicant's statement that Bloom's Energy Server™ performs poorly in the heat, and inquires whether a climate-controlled building could resolve that issue.	See response to comment 10.2.
10.4	**p. 4-3, #2**	Requests information on the Applicant's statement that an alternative using Bloom's Energy Server™ would not qualify for the state's renewables portfolio standard (RPS) program requirements, and asks why this is important.	See the subsection in staff's alternatives analysis, "Alternatives Screening," which includes a brief discussion of the state's RPS program; this subsection of the analysis also describes the importance of achieving the state's RPS program goals and identifies a project objective to develop a renewable energy facility that will help publicly owned electric utilities satisfy those goals. Details on the state's RPS program is on the Energy Commission and CPUC websites. See the revised discussion of solid oxide fuel cells (SOFCs) in Alternatives Appendix-1, "Other Renewable Energy Technologies." As described in Alternatives Appendix-1, SOFCs (e.g., Bloom's Energy Server™) are being installed primarily to serve on-site load. See also the Energy Commission's, "Renewables Portfolio Standard Eligibility," Fifth Edition, May 2012 (publication number CEC-300-2012-002-CMF), which discusses fuel cell facilities using renewable fuel and their eligibility for the state's RPS program. Fuel cell facilities using natural gas are not eligible.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
11	**July 23, 2012**	**Intervenor Center for Biological Diversity (CBD)**	

11.1		Refers to the California Environmental Quality Act (CEQA) Statute and Guidelines, describing sections that address feasible alternatives and conditions under which an alternative may not be approved.	Staff observes that the comment misinterprets the State CEQA Statute and Guidelines. Section 15021 of the State CEQA Guidelines describes the duty of public agencies to avoid or minimize environmental damage and balance competing public objectives. The comment from CBD does not acknowledge Section 15021(b), which allows a public agency to consider specific economic, environmental, legal, social, and technological factors in deciding whether changes in a project are feasible. Section 15126.6(c) of the Guidelines addresses selection of a range of potential alternatives, which "shall include those that could feasibly accomplish most of the basic objectives of the project and could avoid or substantially lessen one or more of the significant effects." No statement is made in Section 15126.6 addressing a requirement to reject the project.
11.2		States that environmental review documents must consider a range of alternatives, including alternative sites. States that the alternatives analysis for the proposed project is too limited and should explore other alternatives.	The Sandy Valley Off-site Alternative site was fully analyzed and compared to the proposed project in staff's alternatives analysis. The alternative site is in an area with relatively disturbed habitat. Several hundred acres are in agricultural use, and on-site habitat values have been compromised as a result. See the subsection in the alternatives analysis, "Sandy Valley Off-site Alternative." Staff also evaluated the potential feasibility of an alternative site on private land in the West Mojave; see the subsection in staff's alternatives analysis, "Barstow Preliminary Renewable Energy Study Area". Please also see the discussion and analysis of the "No-Project Alternative," which allows decision makers to compare the impacts of approving the proposed HHSEGS project with the impacts of not approving the proposed project, in accordance with the State CEQA Guidelines (Cal. Code Regs., tit. 14, § 15126.6[e]).

11.3		States that staff's alternatives analysis has not adequately explored alternative sites, and that only one off-site alternative was evaluated in any detail. States that looking at one alternative site does not fulfill the Energy Commission's duty under CEQA.	In describing the purpose of an alternatives analysis, the State CEQA Guidelines state that "the discussion of alternatives shall focus on alternatives to the project *or* its location which are capable of avoiding or substantially lessening any siginificant effects of the project...(Cal. Code Regs., tit. 14, § 15126.6[b]). CEQA requires consideration of a "reasonable range of potentially feasible alternatives that will foster informed decision making and public participation" (Cal Code Regs., tit. 14, § 15126.6[a]). See also response to comment 11.2. Nowhere is it stated in the alternatives analysis that there are no other sites in California where the project objectives could be accomplished. As stated in response to comment 6.5 in the comment letter from Basin and Range Watch, CEQA does not require an alternatives analysis to evaluate vast regions to identify a different site for the proposed project. Staff's alternatives analysis complies with the requirements of CEQA.
11.4		States that it is unclear if Sandy Valley refers to a currently proposed project called Sandy Valley SEGS.	BrightSource Energy has submitted a Plan of Development to the U.S. Bureau of Land Management (BLM) for its "Sandy Valley" project, a 750-MW solar power tower (SPT) project in Nevada a few miles southeast of the proposed HHSEGS site. BrightSource Energy's Sandy Valley project in Nevada is in the list of cumulative projects in the **EXECUTIVE SUMMARY** of the staff assessment. The Sandy Valley Off-site Alternative site that is evaluated in staff's alternatives analysis is in the Mesquite Valley in California in Inyo and San Bernardino counties. The alternative site is adjacent to the community of Sandy Valley, Nevada, and it is unrelated to BrightSource Energy's 750-MW SPT project named Sandy Valley.

11.5		The comment summarizes the potential environmental impacts of the Solar Photovoltaic Alternative compared to the proposed HHSEGS project.	Staff acknowledges the comments on the Solar PV Alternative.
11.6		States that the alternative technology alternatives in staff's analysis appear to have been eliminated because of their "effectiveness." The comment references a page in the subsection of the alternatives analysis, "Power Plant Efficiency and Reliability."	Staff's alternatives analysis fully evaluates three alternative technologies, including the Solar Power Tower with Energy Storage Alternative, Solar Photovoltaic Alternative, and Parabolic Trough Alternative. None of these alternatives were eliminated from staff's analysis. The subsection in staff's alternatives analysis, "Engineering Assessment of the Alternatives," compares the effectiveness of the different solar collectors for each alternative. The engineering assessment of the solar collectors provides information that is applicable to a comparative analysis of alternatives. Staff's alternatives analysis also evaluates and compares environmental impacts of the proposed project to the same or similar impacts of the project alternatives.
11.7		States that staff's alternatives analysis is deficient and refers to a CEQA court case in which the environmental impact report was rejected for not meeting the information requirements of CEQA. The comment suggests that the alternatives analysis for the proposed project relies too heavily on the Applicant's objectives and did not consider a smaller alternative that would have been environmentally superior.	See response to comment 6.8 in the comment letter from Basin and Range Watch.

11.8 Prt 1		States that staff's alternatives analysis unreasonably narrows the project objectives and includes timing of the environmental reivew as a basic objective of the project.	Staff did not indicate that timing of the environmental review is a basic objective of the project. The objective states: "Obtain site control and use within a reasonable time frame." The project objective addressed in this comment actually broadens the original project objective provided by the Applicant, which addresses "the potential of achieving a commercial on-line date as soon as possible, targeted for the first/second quarter of 2015."
11.8 Prt 2		States that staff's analysis fails to address whether the proposed project will result in sales of competitively priced renewable energy.	Pricing of renewable energy is not addressed in staff's alternatives analysis. As stated in staff's alternatives analysis (see the discussion of feasibility issues for the SPT with Energy Storage Alternative), the power generated by the proposed HHSEGS project would be sold to PG&E under two power purchase agreements (PPAs) approved by CPUC in 2010. The PPAs are approved, signifying that CPUC considers the energy to be reasonably priced (i.e., to reflect a competitive price).
11.8a		States that the timing of the environmental review cannot be used as a basic objective of the project to limit the analysis of alternatives that would avoid significant impacts to the environment, and biological resources in particular. A comprehensive exploration of a range of alternative sites will avoid significant impacts of the proposed project.	See response to comment 11.8. Staff evaluated the potential feasibility of eight off-site alternatives to the proposed project. See the subsection in staff's alternatives analysis, "Review of Off-site Alternatives." Of those eight sites, the Sandy Valley alternative site was fully analyzed and compared to the proposed project in staff's analysis. See the subsection, "Sandy Valley Off-site Alternative." As stated above, staff also evaluated the potential feasibility of an alternative site on private land in the West Mojave.
11.9		States that staff's alternatives analysis should evaluate re-use of disturbed sites as an alternative to the proposed project.	See response to comment 6.5 in the comment letter from Basin and Range Watch. See also response to comment 11.2.

11.10		States that staff's alternatives analysis should explore the use of a distributed generation alternative.	See responses to comments 6.3, 6.4, and 6.7 in the comment letter from Basin and Range Watch. See also response to comment 9.4 in the comment letter from Big Pine Tribe of Owens Valley.
Comment #	**DATE**	**COMMENT TOPIC**	**RESPONSE**
13	**July 23, 2012**	**Applicant, BrightSource Energy, Inc. -- Alternatives p. 18**	
13.14	**p. 18, #1**	Replace references to "BrightSource" with HHSEGS or the Applicant.	Staff changed all citations and references pertaining to the proposed project to Hidden Hills Solar I, LLC; Hidden Hills Solar II, LLC.
13.15	**p. 18, #2**	The alternatives analysis in the staff assessment should be based on the Applicant's project objectives.	Staff's alternatives analysis is substantially based on the Applicant's original project objectives. The issue was addressed by the Hidden Hills Committee in the "ORDER RE: APPLICANT'S MOTION IN LIMINE" dated and posted October 2, 2012 (Docket tn: 67435 CEC 2012ff).
13.16	**p. 20, #3**	States that the underlying purpose of the project is to construct the Applicant's proposed project by a specific date.	The subsection in staff's alternatives analysis, "Alternatives Screening," clearly describes CEQA requirements for a statement of objectives and the underlying purpose of the project. Staff's alternatives analysis complies with the requirements of CEQA.

13.17	**p. 21, #4**	The project objecives in the staff assessment are not the objectives of the Applicant. States that the Commission has no authority to transform the project objectives into generic policy objectives.	Staff's alternatives analysis did not consider the project objectives from the application for certification (AFC) that specifically address using BrightSource's proprietary technology and complying with provisions of the power sales agreements with a commercial on-line date targeted for the first/second quarter of 2015. These two project objectives specifically address implementation of the Applicant's proposed project. Nothing in CEQA supports such a narrowing of an alternatives analysis that would result from including such objectives. Using the Applicant's two referenced project objectives in a comparison of project alternatives would overly influence the alternatives analysis. Relying on project objectives that directly target approval and construction of the proposed project is inconsistent with the purpose of CEQA for an alternatives analysis.
13.18	**p. 21, #5**	Staff's alternatives analysis arbitrarily eliminates the Applicant's project objectives. A table should be included comparing the project objectives from the AFC to those in the alternatives analysis of the staff assessment.	The subsection of staff's alternatives analysis, "Alternatives Screening," references the Applicant's original project objectives in the "Executive Summary" of the AFC for the project. The AFC is available to all interested parties in the Applicant's documents for the project proceeding on the Energy Commission's website. It is not necessary to list them in staff's alternatives analysis.
13.19	**p. 21, #6**	States that two off-site alternatives, Calvada South and Trona, were presented in the AFC but eliminated from the staff assessment. Also states that these alternatives are within the reasonable range of alternatives to the project because they satisfy most of the project objectives.	The subsection in staff's alternatives analysis, "Review of Off-site Alternatives," evaluates in detail the potential feasibility of the Calvada South and Trona off-site alternatives. Based on staff's analysis, neither of these alternative sites could avoid or lessen any significant effects of the project. Staff concluded, based on a careful screening analysis, that the significant effects of either off-site alternative would be greater than those identified for the proposed project. Staff's analysis complies with the requirements of CEQA.

13.20	**p. 21, #7**	Suggests that staff's alternatives analysis includes alternative locations that would not avoid or substantially lessen a significant effect of the project. Suggests that the project objectives in the alternatives analysis fit staff's preferred outcome. States that the staff assessment should describe how the alternative locations avoid or substantally lessen a significant effect of the project.	Staff evaluated the potential feasibility of the same eight off-site alternatives to the proposed project that are discussed in the AFC. Staff determined that the AFC presented insufficient information to eliminate the Sandy Valley Off-site Alternative from detailed consideration in the alternatives analysis; therefore, staff's analysis evaluates and compares the off-site alternative to the proposed project. The complete analysis is in the subsection of staff's alternatives analysis, "Sandy Valley Off-site Alternative." Staff's analysis objectively compares the potential environmental effects of the project alternatives to the proposed project. Staff's analysis complies with the requirements of CEQA.
13.21	**p. 22, #8**	The staff assessment must address whether the alternatives examined themselves cause one or more significant effects.	Staff's alternatives analysis evaluates and compares the environmental impacts of the proposed project to the same or similar impacts that would occur under each of the project alternatives. See the subsection in staff's alternatives analysis, "Alternatives Evaluated in Detail."
13.22	**p. 22, #9**	States that development of 170 parcels with single-family residences at the HHSEGS site is reasonably foreseeable under the No-Project Alternative. States that the No-Project Alternative should be revised to evaluate the potential environmental impacts from development of 170 homes sites, wells, and related infrastructure.	An EIR was prepared in 1974 by the Inyo County Planning Department for a project to subdivide and develop several thousand acres in Pahrump Valley, an area that includes the present site for the proposed project. It has been close to 40 years since the area was approved for development, and no residences or other occupied structures were ever constructed at the proposed HHSEGS site. See the complete discussion and analysis under the subsection in staff's alternatives analysis, "No-Project Alternative."
13.23	**p. 23, #10**	States that Alternatives Appendix-2 should be revised to reflect development under the No-Project Alternative of 170 single-family residences and related infrastructure.	See response to comment 13.22, above.

13.24	**p. 23, #11**	Replace references to "BrightSource Energy" with HHSEGS or the project companies' names.	See response to comment 13.14, above.
13.25	**p. 23, #12**	Requests citations and quotations in the staff assessment for sections of the State CEQA Guidelines that address feasibility.	The definition of feasibility in Section 15364 of the State CEQA Guidelines is in the subsection of staff's alternatives analysis, "Alternatives Evaluated in Detail." A description of what is meant by a range of reasonable alternatives is near the beginning of staff's alternatives analysis, under the subsection, "CEQA Requirements," and the citation is included.
13.26	**p. 24, #13**	Quotes Section 15126.6(e)(3)(B) of the State CEQA Guidelines and suggests that the No-Project Alternative would result in "predictable actions by others" (i.e., development of single-family residences on 170 parcels at the site).	See response to comment 13.22, above.
13.27	**p. 24, #14**	States that the site is partially developed by graded roads, distribution lines, and existing wells.	Staff responded to this comment in the alternatives analysis under the subsection, "No-Project Alternative." Staff confirms that the proposed project site is undeveloped and vacant.
13.28	**p. 24, #15**	States that the proposed project site is not Inyo County's land. States that no development plan is needed for future use of the site. States that development of up to 170 parcels for agricultural or residential use can occur without further discretionary approvals or environmental review. States that sale and development of up to 170 lots would occur if the proposed project was not approved.	Inyo County is the local agency with jurisdiction over the unincorporated area of the county. See response to comment 13.22, above.
13.29	**p. 25, #16**	Requests removal of the sentence from the alternatives analysis, "[t]he lack of a water source will continue to restrain development in the Charleston View area."	As requested, staff removed the sentence from the analysis. See the revised discussion and analysis under the subsection of staff's alternatives analysis, "No-Project Alternative."

13.30	**p. 25, #17**	Describes issuance of well permits by Inyo County and describes how the County has a legal duty to issue a permit that meets the ministerial criteria of the permit. The Applicant states that "[t]he No Project Alternative is characterized by the existing land use entitlement to develop 170 parcels and to assume the entitlement does not exist or would not be exercised is speculative and not supported by substantial evidence." States that the landowners and Inyo County want to see this land developed, even if the proposed project is not approved.	Staff has revised the alternatives analysis under the subsection, "No-Project Alternative," including removing the statement that it is "unknown whether the County would issue a well permit for a new residence." The "no project" analysis is required to discuss, "what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services" (Cal Code Regs., tit. 14, § 15126.6[e][2]). The Applicant's opinion on the probability of a significant level of development occurring at the project site under the No-Project Alternative is extremely speculative. See also response to comment 13.22. The mere existence of subdivided property does not make development of the area reasonably foreseeable. It is the Applicant's opinion that the landowners and Inyo County "want to see this land developed." Staff confirms that the No-Project Alternative is characterized by the continuation of existing conditions at the HHSEGS site.
13.31	**p. 26, #18**	States that the proposed project would not have a cone of depression impact beyond the project site boundary. States that the conclusion in the alternatives analysis for impacts on groundwater dependent plants and wildlife under the No-Project Alternative is incorrect; refers to the "Biological Resources" section and discussions of the current signs of stress on existing groundwater-dependent vegetation.	See the **WATER SUPPLY** section in the final staff assessment for a full analysis of potential impacts of the proposed project on groundwater resources. It is unsubstantiated opinion that the No-Project Alternative would result in development of 170 parcels. See response to comment 13.22.
13.32	**p. 26, #19**	States that the discussion of impacts on cultural resources must be revised to consider residential or agricultural development on 170 parcels.	It is unsubstantiated opinion that the No-Project Alternative would result in development of 170 parcels. See response to comment 13.22.

13.33	**p. 26, #20**	States that the discussion of impacts on soil and surface water resources must be revised to consider residential or agricultural development on 170 parcels. States that because of the low-impact design and sheet flow drainage that would minimize impact on soil and surface water resources, staff's conclusion that impacts under the No-Project Alternative would be "much less than HHSEGS" is an exaggeration.	It is unsubstantiated opinion that the No-Project Alternative would result in development of 170 parcels. Although the proposed project's low-impact design and sheet flow would lessen impacts to soil and surface water, those impacts are not reduced to the level that is "similar to" or "somewhat less" than a site that is not developed. The proposed project includes the grading of roughly 440 acres during construction and about 850 acres of impervious area during operations. A portion of the west perimeter road would be elevated for the purpose of flooding about 125 acres and water would overtop this road after 20 percent of the storm events. Best Management Practices and conditions of certification would be implemented to protect soil and water resources, but the No-Project Alternative comparison is with continuation of existing conditions, which also accounts for the possibility of minor land use changes occurring at the site. Staff's determination that impacts would be much less than HHSEGS is not an exaggeration. See also response to comment 13.22.
13.34	**p. 26, #21**	States that the discussion of impacts on water supply must be revised to consider residential or agricultural development on 170 parcels.	It is unsubstantiated opinion that the No-Project Alternative would result in development of 170 parcels. See response to comment 13.22.
13.35	**p. 26, #22**	Refers to the conclusion for water supply under the No-Project Alternative, which states that "impacts from potential drawdown of local wells and impacts on groundwater basin balance would be much less than HHSEGS." The Applicant states that there are no facts or analysis to support the conclusion.	See the **WATER SUPPLY** section of the final staff assessment for a full analysis of potential impacts of the proposed project on groundwater resources. Under the No-Project Alternative, no uses are proposed at the site that would require groundwater pumping.

13.36	**p. 27, #23**	The applicant states that, "the law is very clear that an alternatives analysis should consider [of] a reasonable range of alternatives that will meet the Applicant's project objectives and it is inappropriate to substitute the Lead Agency's policy objectives for the Applicant's project objectives, merely to facilitate consideration of an alternative that may be favored by the agency." Provided edited text for a sentence in staff's analysis about the applicant's project objectives.	The Applicant's statements are false. Staff's alternatives analysis is substantially based on the Applicant's project objectives; staff eliminated the project objectives that specifically address implementing the Applicant's proposed project. It is not correct that staff's alternatives analysis must only use the project objectives provided by the Applicant in the AFC. There is no such requirement. See also responses to comments 13.15, 13.16, 13.17, and 13.18, above. Staff edited this sentence in the alternatives analysis, which now reads: "The alternatives analysis cannot be guided by project objectives that specifically target implementation of the project as proposed; this approach would lead the analysis toward a conclusion that no alternative is as valid as the applicant's proposal, which would be inconsistent with CEQA's purpose for an alternatives analysis."
13.37	**p. 27, #24**	States that the Applicant's project objectives permit consideration of a reasonable range of alternatives.	See responses to comments 13.15, 13.16, 13.17, 13.18, and 13.36, above.
13.38	**p. 27, #25**	Refers to impacts on groundwater dependent species for the Sandy Valley Off-site Alternative and questions the conclusion that impacts under this alternative would be "somewhat less than HHSEGS."	Because the Sandy Valley Off-site Alternative is located in an area with greater overall ground disturbance compared to the proposed project, the effect of declining groundwater levels on groundwater dependent species is somewhat less than HHSEGS under this alternative.

13.39	**p. 27, #26**	Refers to impacts on groundwater dependent species (e.g., mesquite bosques) for the Sandy Valley Off-site Alternative. States that there are no mesquite bosques near the HHSEGS site.	The importance of mesquite habitats—in all forms—is a matter of empirical fact, supported by the literature, and by resource agency policy and practice. All mesquite in southern Nevada, and particularly the mesquite in Pahrump Valley and Stump Springs, are recognized conservation priorities in the BLM-sponsored "Mesquite-Acacia Conservation Management Strategy" (Crampton et al. 2006), adopted for the Clark County Multiple Species Habitat Conservation Plan. Staff notes that the California Natural Diversity Database (data date January 3, 2012) nomenclature of “mesquite bosque” is reflected in the FSA alternatives analysis, and shows mesquite bosques at less than 3.0 miles from the Sandy Valley alternative site. Mesquite-dominated habitat at Stump Springs is approximately 5.0 miles from the proposed project site.
13.40	**p. 27, #27**	Refers to the introductory statement of impacts on cultural resources for the Sandy Valley Off-site Alternative. Questions the conclusion that impacts on cultural resources for the alternative site would be "somewhat greater than those of the proposed HHSEGS project." Questions what the conclusion means.	The cited statement introduces the analysis of impacts on cultural resources. See staff's full analysis pertaining to this alternative on the several pages that follow the introductory statement.
13.41	**p. 28, #28**	Refers to the potential land use impact for the Sandy Valley Off-site Alternative related to potential conflicts with applicable plans. Questions the conclusion that the impact would be "similar to HHSEGS." States that "HHSEGS has applied for a general plan amendment overlay and zoning overlay."	Although the Applicant has applied for a general plan amendment and zoning overlay, Inyo County has deemed the application incomplete due to the lack of the appropriate land owner signatures on the proposed HHSEGS project site. As of the date of the final staff assessment, the project is inconsistent with the general plan and zoning code.

13.42	**p. 28, #29**	Questions whether the Sandy Valley Off-site Alternative would comply with the Northern and Eastern Mojave Desert Management Plan (NEMO Plan).	Staff dispensed with this sentence from the alternatives analysis: "Compliance of this alternative with the NEMO Plan would be required." Other than the possible requirement to coordinate with BLM and file Standard Form SF-299, no compliance issue is identified by staff. No further analysis is required because no impact on land use would occur. See the additional text discussion of the applicability of the NEMO Plan under the subsection of staff's alternatives analysis, "Northern and Eastern Mojave Desert Management Plan."
13.43	**p. 28, #30**	Refers to the comparison of impacts on traffic and transportation between the proposed project and the Sandy Valley Off-site Alternative. Describes what would be a more difficult project construction access route to the off-site alternative site, and implies that the impact would not be similar to HHSEGS.	Staff agrees that access to the proposed project site is along a fairly straight, flat roadway from state route 160. However, the “fairly straight, flat roadway” being referred to, the Old Spanish Trail Highway (aka "Tecopa Road"), is not designed to withstand frequent and heavy construction traffic. The addition of 4,000 daily trips would have a significant impact on the structural integrity of the Old Spanish Trail Highway due to the current and potential future conditions of the roadway pavement. Similarly, potential transportation route(s) for the Sandy Valley Off-site Alternative are probably not designed to withstand frequent and heavy construction traffic. Conditions of certification that are similar to those identified for the proposed project in the **TRAFFIC AND TRANSPORTATION** section of the final staff assessment would be required for the Sandy Valley Off-site Alternative to reduce impacts on the roadway infrastructure.
13.44	**p. 28, #31**	Same comment as 13.43.	See response to comment 13.43, above.

13.45	**p. 28, #32**	Refers to the Solar Power Tower (SPT) with Energy Storage Alternative. Questions if it is properly considered an alternative to the project as a whole, or an alternative to a part of the project.	The SPT with Energy Storage Alternative is an alternative to the proposed project. The Applicant's AFC includes a Central Tower with Integral Thermal Storage using molten salt as the heat transfer fluid. It is described as an alternative technology. The SPT with Energy Storage Alternative in staff's alternatives analysis is appropriately reviewed as an alternative to the proposed project. Changing the technology to include energy storage is not an ancillary facet of the proposed project.
13.46	**p. 28, #33**	Refers to staff's analysis of the SPT with Energy Storage Alternative for impacts on avian species related to solar flux. Asks what the basis is for the assertion that impact on avian species are significant. Proposes edits to staff's analysis for impacts on avian species under this alternative to remove text stating that the Applicant has identified no means of mitigating or minimizing impacts on avian species at the HHSEGS site.	Staff disagrees with the Applicant's statement that documentation submitted by the Applicant demonstrates that no significant impacts on avian species could be caused by the proposed project. Furthermore, the zone of concentrated flux considered to pose a danger to avian species extends over 300 meters around each tower, in the shape of a ring (in top down view). To refer to this as “close proximity” is not accurate. See the **BIOLOGICAL RESOURCES** section of this FSA for more details. No change to staff's analysis is necessary in response to this comment.
13.47	**p. 29, #34**	States that no basis exists for a conclusion that impacts on avian species are significant (referring to the text that was deleted by the Applicant under comment 13.46).	See the revised analysis of impacts on biological resources in staff's alternatives analysis for the SPT with Energy Storage Alternative.
13.48	**p. 29, #35**	Asks if the Desert Sunlight Solar Farm PV Project is single axis or fixed tilt.	The Desert Sunlight Solar Farm PV Project will use all fixed-tilt panels, approximately 9 million panels total.
13.49	**p. 29, #36**	Same comment as 13.48.	See response to comment 13.48, above.

13.5O Prt 1	**p. 29, #37**	States that a PV alternative does not provide flexible generation, which brings into question its suitability for large scale generation.	Each of the four utility-scale PV projects described in staff's alternatives analysis has agreements for the sale of electricity to a California utility company or companies. (California Valley Solar Ranch has a contract with Pacific Gas & Electric Company [PG&E]; Desert Sunlight Solar Farm has contracts with Southern California Edison and PG&E; Topaz Solar Farm Project has a contract with PG&E; and AV Solar Ranch One has a contract with PG&E). These PV projects are approved, under construction, and with agreements in place for the sale of electricity, which indicates their suitability for large-scale generation of renewable energy.
13.5O Prt 2	**p. 30, #37**	Describes the operational characteristics of the proposed project.	Staff acknowledges the applicant's summary of the operational characteristics of the proposed project.

13.5O Prt 3	**p. 30, #37**	States that a generic PV alternative would not obtain site control and use for a 500-MW facility in a reasonable period of time. States that the HHSEGS site is too small to support a PV alternative. Concludes that "to produce the same quantity of power to the grid using single-axis or fixed-tilt PV would require 4,950 acres of land, or 51 percent more land than using Applicant's technology."	Staff obtained information on annual energy generation for the four PV projects described in staff's alternatives analysis. See the subsection, “Solar Photovoltaic (PV) Alternative,” of staff's analysis for the additional data and discussion. The two largest PV projects that will have generating capacities closest to the proposed project each have capacities of 550 MW; land use efficiency for the two projects is slightly below 7.0 acres per MW, which is comparable to the proposed project. The average land use efficiency for the four PV projects is approximately 7.0 acres per MW. See also the new text in the alternatives analysis on the April 2012 DRECP Stakeholder Committee Meeting, which included a review of the updated renewable energy calculator developed by Energy Commission staff. A modified land use efficiency ratio of 7.0 acres per MW was determined to be plausible and reasonable for all central station solar projects, including solar thermal and PV project types. Based on the sample 500-MW PV project described by the applicant in its comment, such a project would require 4,950 acres, which represents a land use efficiency ratio of almost 10.0 acres per MW of electricity.
13.5O Prt 4	**p. 30, #37**	Questions the ability of the Solar PV Alternative to satisfy the project objectives addressing construction and operation of a renewable electrical energy facility leading to sales of competitively priced renewable energy consistent with the procurement obligations of California's utilities.	Staff has modified the discussion on the potential for the PV Alternative to attain the first two project objectives. See the revised text on this alternative under the subsection, “Potential to Attain Project Objectives.” Construction and operation of the Solar PV Alternative would require CPUC's approval of amendments to the power purchase agreements for the proposed project.
13.51	**p. 30, #38**	For the Solar PV Alternative, requests editing of text in staff's alternatives analysis to indicate that it is not known whether PG&E would agree to amend the PPAs to allow the project to continue to be feasible.	Staff's analysis of potential feasibility issues for the Solar PV Alternative is sufficient as written. No change was made to staff's analysis in response to this comment.

13.52	**p. 31, #39**	Disagrees with staff's conclusion that potential impacts on biological resources for the Solar PV Alternative would be "similar to HHSEGS." States that impacts on biological resources would be greater than HHSEGS based on the Applicant's assumption that the PV Alternative would require far more acreage and substantial grading and leveling of the site.	See response to comment 13.50 Prt 3 for a discussion of land use requirements for central station renewable energy projects, including solar thermal and PV project types. Staff's analysis of the potential impacts on biological resources for the Solar PV Alternative states that impacts could be slightly more or less if a change to the project boundary was needed to install PV arrays under this alternative. The environmental compliance documents for the utllity-scale PV projects reviewed by staff discuss site preparation techniques to minimize site grading. See the additional text discussion on site grading and disturbance under the subsection of staff's alternatives analysis, "Overview," for the Solar PV Alternative.
13.53	**p. 31, #40**	For the Solar PV Alternative, states that staff's analysis of potential impacts on biological resources should address the impact of increasing the project boundaries to accommodate a 500-MW PV project.	See responses to comments 13.50 Prt 3 and 13.52, above.
13.54	**p. 31, #41**	Edits staff's alternatives analysis describing the potential impacts of the Solar PV Alternative on groundwater dependent biological resources and avian species. Changes the conclusion for potential impacts on avian species under this alternative to be the "same as" or "greater than HHSEGS." States again that the PV Alternative would require substantial grading and leveling of the site.	Staff has determined that the impact on the groundwater basin under the Solar PV Alternative would be much less than HHSEGS. Therefore, the related effect of groundwater pumping on phreatophytic vegetation in the vicinity of the project site would also be much less than the proposed project. See also response to comment 13.52.

13.55	**p. 32, #42**	For the Solar PV Alternative, states that staff's analysis of potential impacts on cultural resources should address the greater impact on subsurface cultural resources from increasing the site footprint and grading the entire site.	The applicant's statement that construction of the proposed project would leave subsurface archaeological deposits intact is incorrect. Archaeological deposits that could be present on the ground surface and to a depth of about 1.0 foot below the surface would be partially disturbed or destroyed due to repeated traffic of construction equipment such as truck-mounted augers, backhoes, and road graders. Archaeological deposits further below the surface could be disturbed during emplacement of approximately 170,000 heliostat pedestals. The effects of this alternative over the western half of the site, on the floor of the bolson, are comparable to the proposed project; the likelihood of buried archaeological resources being located there are low. The analysis of the visual effects of this alternative compared to the proposed project is accurate and appropriate given staff's knowledge and expertise on the topic. See staff's responses to comments in the **CULTURAL RESOURCES** analysis, comments 13.1, 13.1 (1), 13.7, 13.52, and 13.59. See also responses to comments 13.50 Prt 3 and 13.52, above.
13.56	**p. 32, #43**	For the Solar PV Alternative, states that staff's analysis of potential impacts related to geological and paleontological resources should address the greater impacts on those resources from increasing the site footprint and grading the entire site. Also disagrees with staff's analysis and states that the heliostats associated with the proposed project would require no foundations.	The heliostats would be supported by a foundational element referred to by the applicant as pedestals. These pedestals would be inserted to a depth of at least 10 feet below the ground surface to support the weight and wind loading of the heliostats. See also responses to comments 13.50 Prt 3 and 13.52, above.

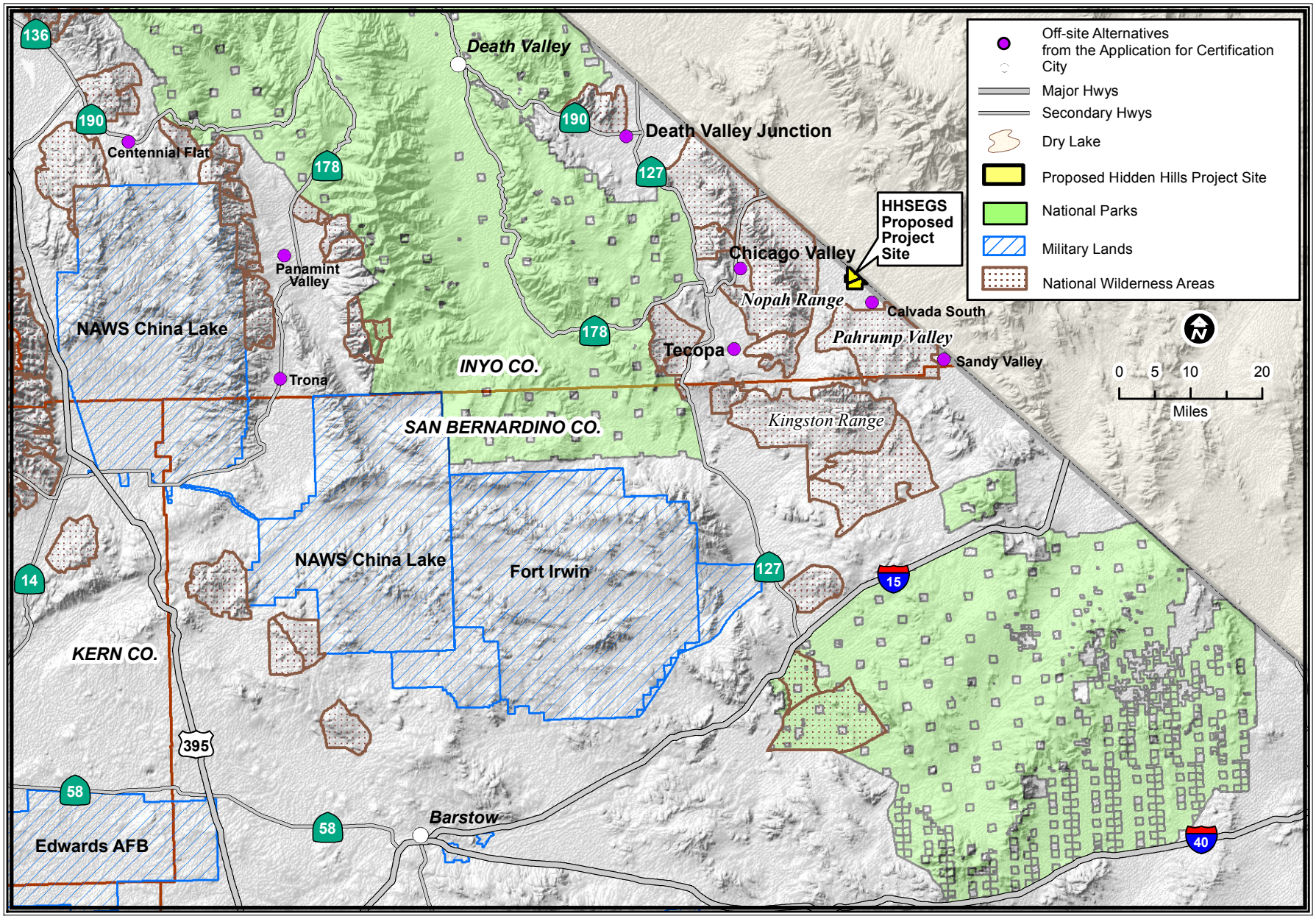
13.57	**p. 32, #44**	For the Solar PV Alternative, states that staff's analysis of potential impacts related to noise would be the "same as HHSEGS" rather than "much less than HHSEGS." The Applicant states that if the noise impacts of the proposed project are reduced to less than significant with implementation of conditions of certification, the impact conclusion should be the same for the PV Alternative.	A PV alternative with the same generating capacity (500 MW) would likely create less noise impacts than HHSEGS, prior to employing mitigation measures. However, with implementation of the conditions of certification (mitigation measures) for impacts related to noise, both the proposed project and the Solar PV Alternative would create less than significant impacts.
13.58	**p. 32, #45**	For the Solar PV Alternative, asks for an explanation of staff's statement that the infrequent washings of PV panels would result in reduced toxic air emissions compared to the proposed project.	See the additional text discussion on the potential use of diesel-fueled water trucks for infrequent washings of PV panels under the subsection of staff's alternatives analysis, "Public Health," for the Solar PV Alternative.
13.59	**p. 33, #46**	For the Solar PV Alternative, disagrees with staff's conclusion that the beneficial impact related to construction employment and increased taxes and fees would be the "same as HHSEGS." The Applicant states that the beneficial impact would be "less than HHSEGS" under this alternative.	See staff's revised conclusion under "Socioeconomic Resources" for the Solar PV Alternative in staff's alternatives analysis. Staff concludes that the beneficial impact related to construction employment and increased taxes and fees would be similar to HHSEGS. Given the similar size and scale of this alternative compared to the proposed project (an approximately 500 MW renewable energy project), staff has determined that the socioeconomic benefits would be similar.
13.60	**p. 33. #47**	For the Solar PV Alternative, states that the impacts of glint and glare, if any, can be mitigated to less than significant for the proposed project and the PV Alternative.	The Solar PV Alternative would have a much lower profile overall, and impacts of glint and glare would be reduced to less than significant.

13.61	**p. 33, #48**	For the Solar PV Alternative, states that impacts on visual resources would be greater than HHSEGS based on the Applicant's assumption that a 500-MW PV Alternative would require far more acreage. States that the Applicant disagrees with the conclusions that impacts on visual resources under the proposed project are significant.	See responses to comments 13.50 Prt 3 and 13.52, above. See also responses to comments in the **VISUAL RESOURCES** analysis.
13.62	**p. 33, #49**	For the Solar PV Alternative, refers to staff's statement in the alternatives analysis that land requirements for utility-scale PV power plants have been stated in the range of about 9.0 acres per MW. The Applicant states that this ratio should be recognized in other sections of staff's alternatives analysis.	See response to comment 13.50 Prt 3 for a discussion of land use requirements for central station renewable energy projects, including solar thermal and PV project types. See the additional text discussion on the estimated acreage requirements for utility-scale PV projects under the subsection of staff's alternatives analysis, "Overview," for the Solar PV Alternative.
13.63	**p. 33, #50**	For the Solar PV Alternative, refers to staff's analysis of impacts related to soil disturbance. The Applicant disagrees with staff's conclusion that the PV Alternative would result in less soil disturbance for construction laydown and temporaray parking impacts. States that the California Valley Solar Ranch Project required a total of 37, 1.0-acre construction laydown areas.	Staff acknowledges that PV facilities require laydown areas and temporary parking for construction activities, which are similar to HHSEGS. However, the proposed project requires the added construction activities of building two power blocks, which includes operating a temporary concrete batch plant and on-site assembly of heliostats, which includes an assembly building and its associated activities. Additionally, staff has found that the PV Alternative could require an average of about 12 percent more land per MW of capacity compared to the proposed HHSEGS project. Based on this estimate, staff concludes that erosion during construction for the PV Alternative is “somewhat greater than HHSEGS.”

13.64	**p. 33, #51**	For the Parabolic Trough Alternative, questions staff's conclusion for the potential for avian species to collide with project structures (i.e., the solar power tower under the proposed project) to be "much less" for the Parabolic Trough Alternative. The Applicant asks "much less than what?"	See the revised analysis of impacts on biological resources in staff's alternatives analysis for the Parabolic Trough Alternative. Staff acknowledges the degree of uncertainty in predicting or estimating the likelihood of impacts on avian species from collisions with project structures.
13.65	**p. 34, #52**	For the Parabolic Trough Alternative, states that the "low-impact design of the HHSEGS" would "reduce ground disturbance" and result in less impacts on cultural resources.	Staff confirms that increased ground disturbance under this alternative would have a somewhat greater potential to disturb or destroy archaeological deposits compared to the proposed project. See the revised text on the effects of the Parabolic Trough Alternative under the subsection, “Cultural Resources,” in staff's alternatives analysis. However, the net effect—the profound reduction of this alternative's visual effects would result in a much lower overall effect on cultural resources compared to the proposed project.
13.66	**p. 34, #53**	States that the No-Project Alternative would result in residential development of up to 170 parcels on the project site, and that compared to the proposed project, the HHSEGS project would be environmentally superior.	See responses to comments 13.22 and 13.30, above.

ALTERNATIVES - FIGURE 1

Hidden Hills Solar Electric Generating System (HHSEGS) - Off-site Alternatives Evaluated in the Application for Certification



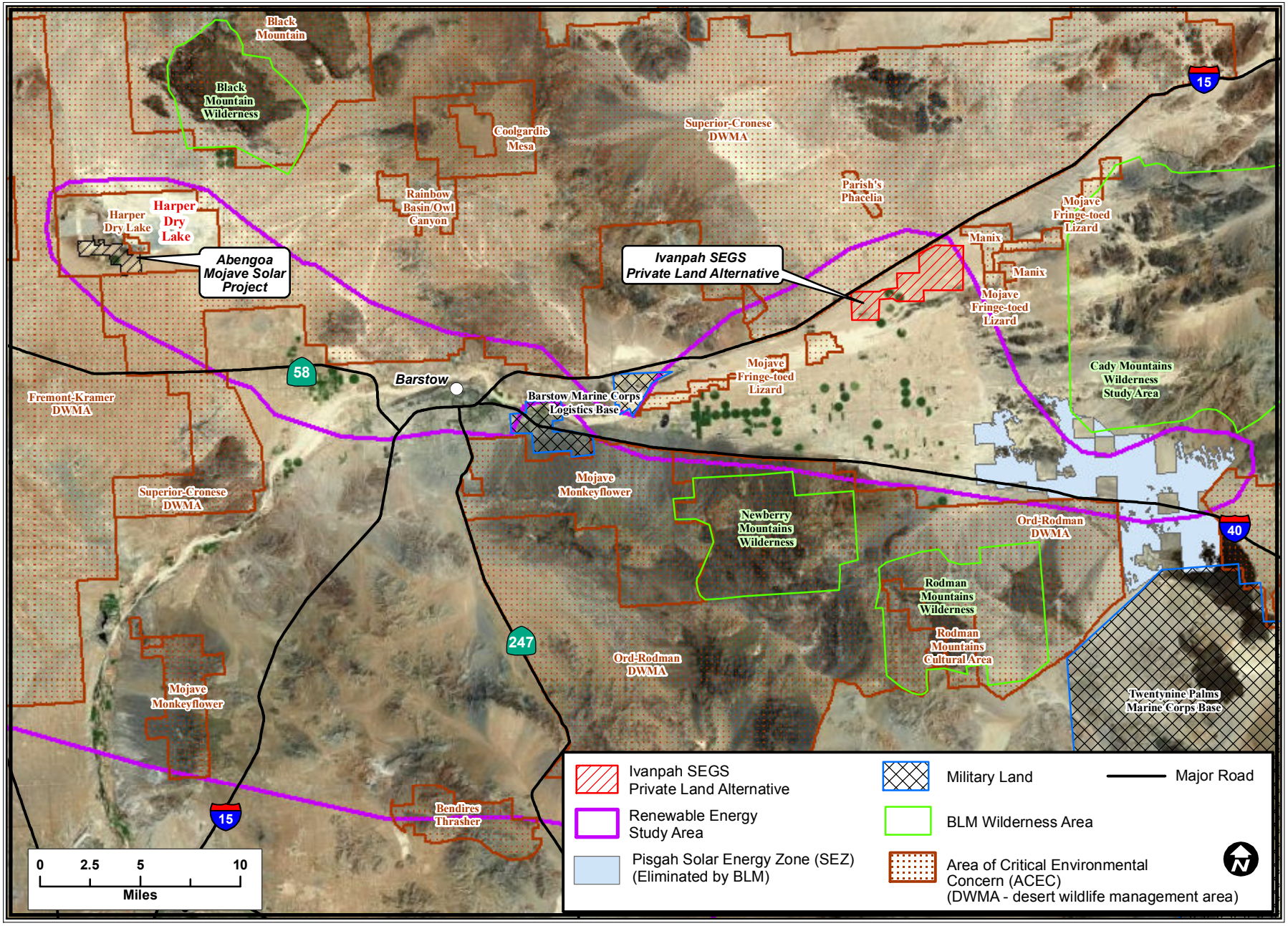
CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Adapted from Hidden Hills Solar I, LLC; Hidden Hills Solar II, LLC 2011a

ALTERNATIVES

ALTERNATIVES - FIGURE 2

Hidden Hills Solar Electric Generating System (HHSEGS) - Barstow Renewable Energy Study Area



ALTERNATIVES

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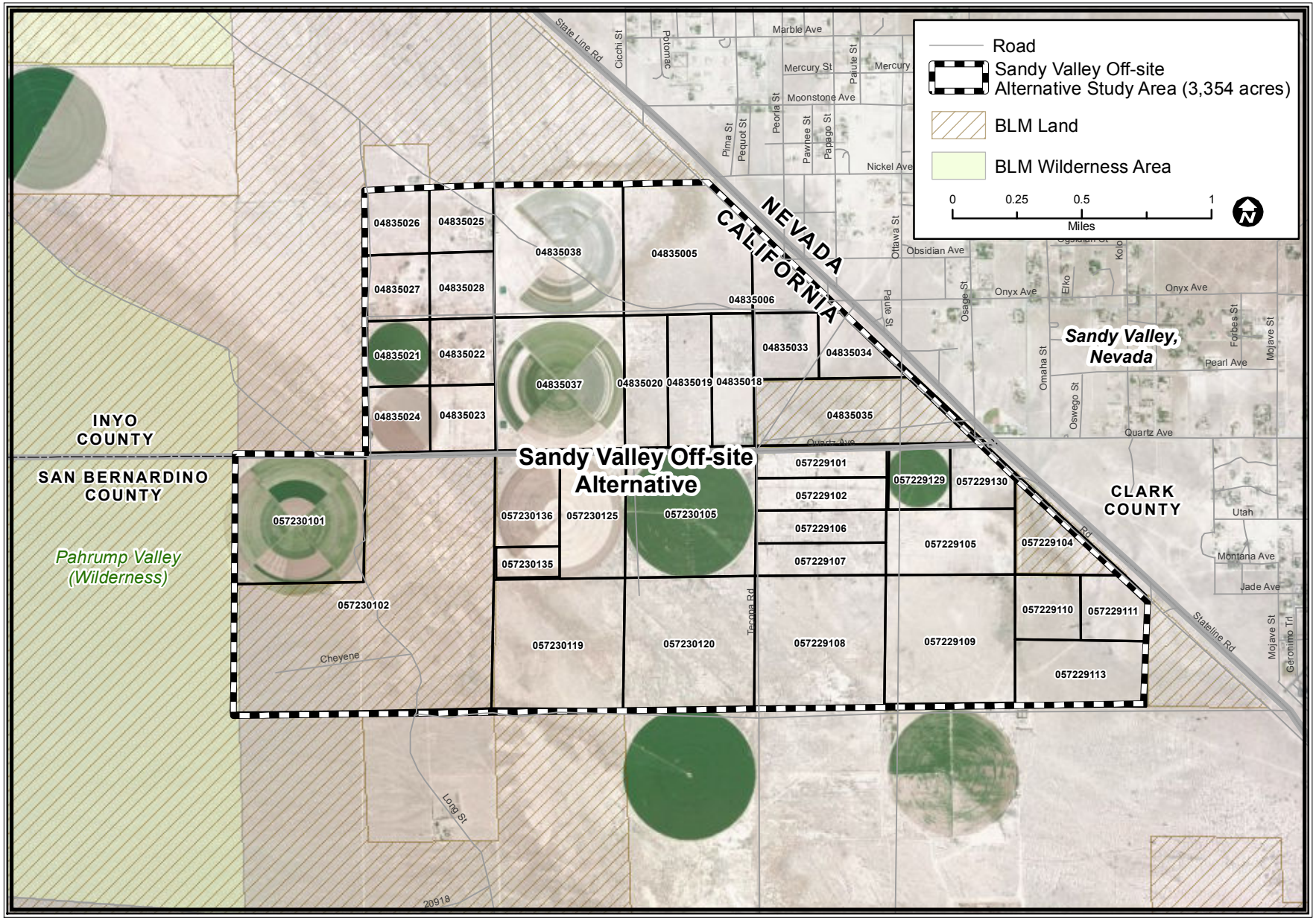
SOURCE: California Energy Commission - Tele Atlas Data - BLM - Bing Aerial Image; Energy Commission 2011a

ALTERNATIVES - FIGURE 3

Hidden Hills Solar Electric Generating System (HHSEGS) - Sandy Valley Off-site Alternative Study Area



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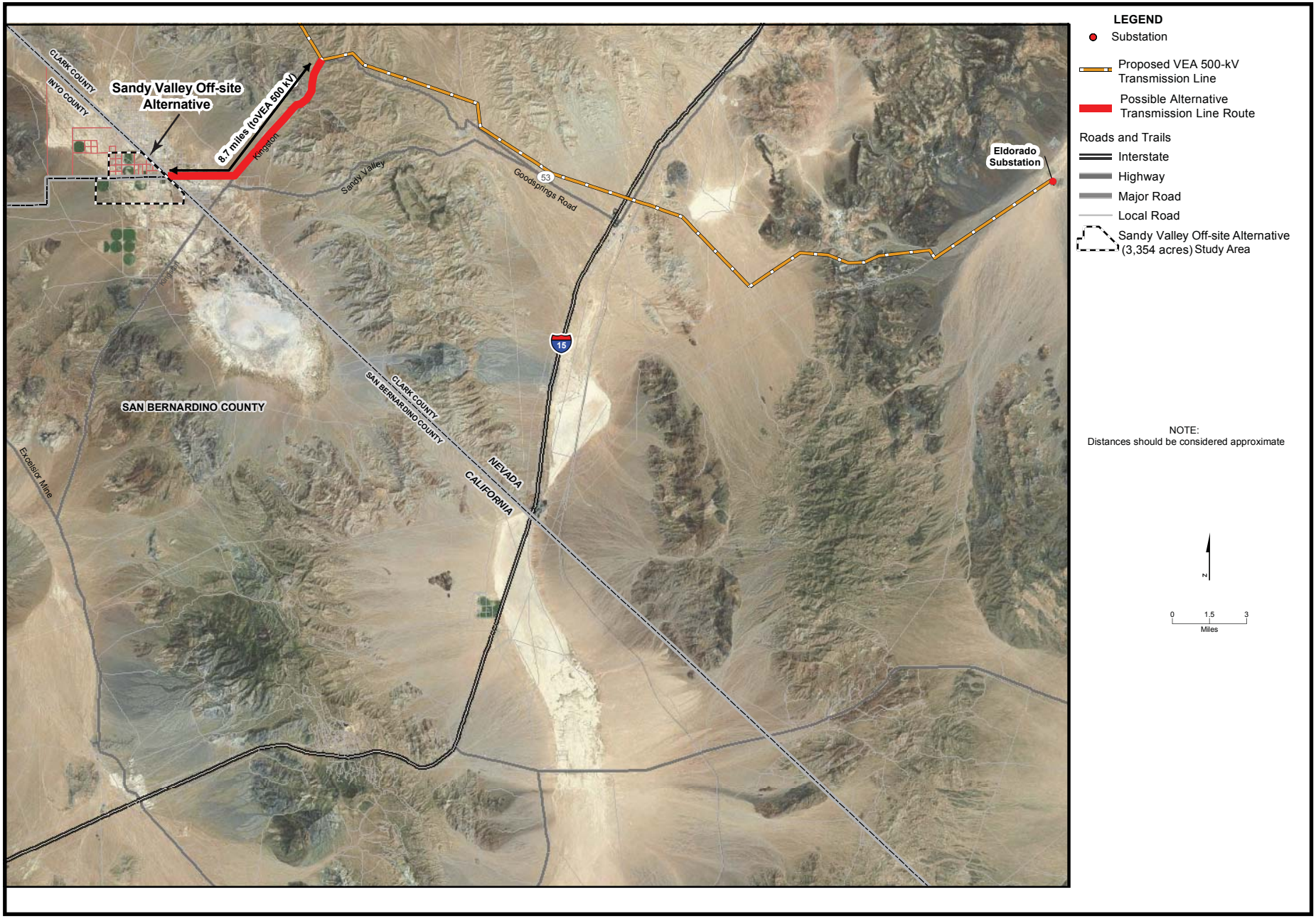
SOURCE: Energy Commission Staff

ALTERNATIVES - FIGURE 4

Hidden Hills Solar Electric Generating System (HHSEGS) - Potential Transmission Line Alignment for the Sandy Valley Off-site Alternative



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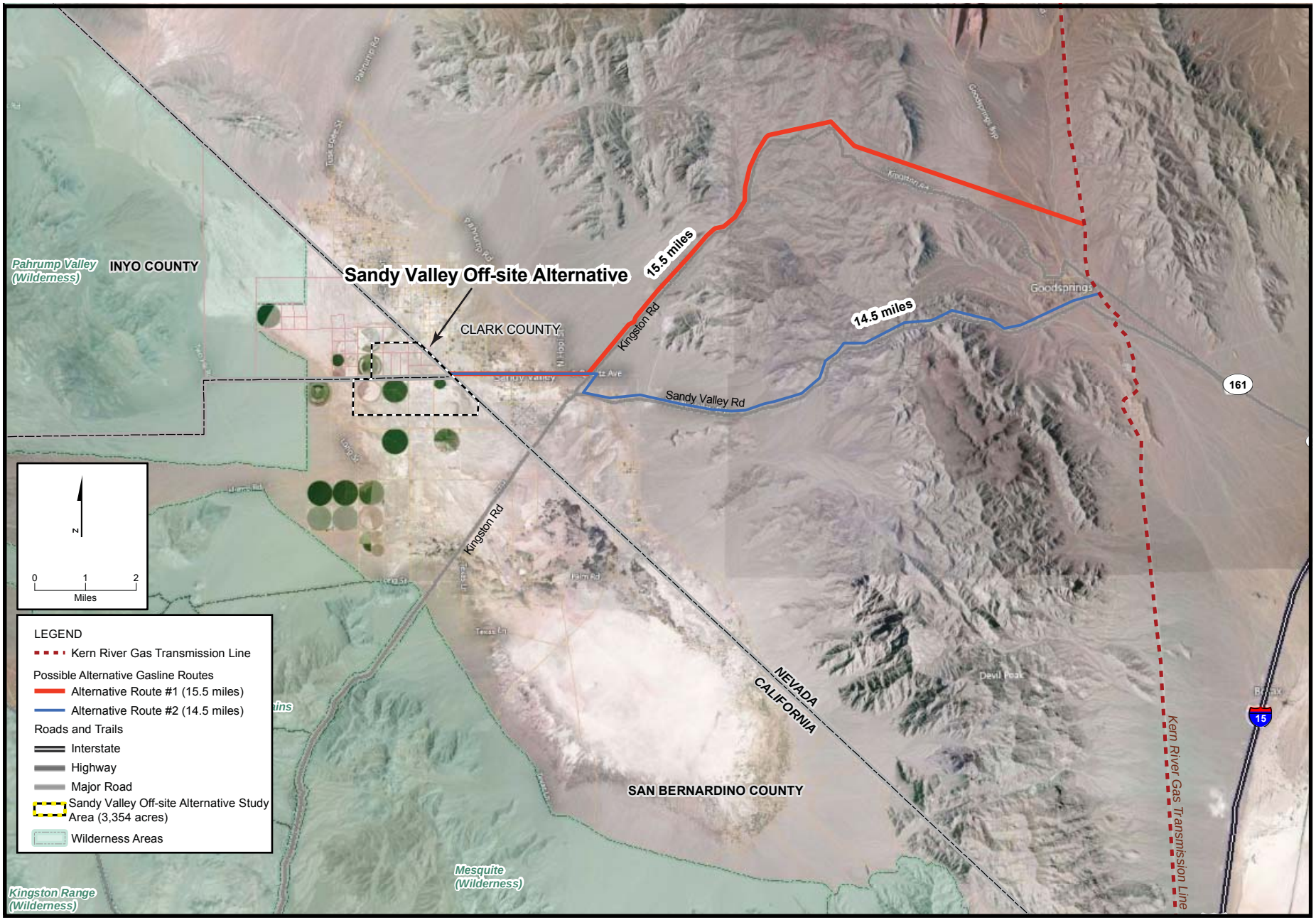
SOURCE: Adapted from Hidden Hills Solar I, LLC; Hidden Hills Solar II, LLC 2012b

ALTERNATIVES - FIGURE 5

Hidden Hills Solar Electric Generating System (HHSEGS) - Potential Natural Gas Pipeline Alignments for the Sandy Valley Off-site Alternative



ALTERNATIVES

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SOURCE: Adapted from Hidden Hills Solar I, LLC; Hidden Hills Solar II, LLC 2012b

ALTERNATIVES - FIGURE 6a, 6b

Hidden Hills Solar Electric Generating System (HHSEGS) - Photographs of the Sandy Valley Off-site Alternative Study Area

View toward the Sandy Valley study area from Sandy Valley, NV

View of the Sandy Valley study area looking toward the Pahrump Valley Wilderness and Kingston Range

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Energy Commission Staff

ALTERNATIVES - FIGURE 6c

Hidden Hills Solar Electric Generating System (HHSEGS) - Photographs of the Sandy Valley Off-site Alternative Study Area

View from the Sandy Valley study area toward Sandy Valley, NV

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Energy Commission Staff

ALTERNATIVES - FIGURE 7

Hidden Hills Solar Electric Generating System (HHSEGS) - Solar Power Tower with Energy Storage Alternative

Solar Power Tower with Molten-Salt Energy Storage

Source: BrightSource Energy

Completed 540-foot Solar Power Tower for the Crescent Dunes Solar Energy Project in Tonopah, NV

Source: SolarReserve

Copper Mountain Solar 1 in Boulder City, NV, about 40 miles southeast of Las Vegas

Source: Discovery News

First Solar's Thin Film Solar Photovoltaic Field

Source: Susan Lee

ALTERNATIVES - FIGURE 8c

Hidden Hills Solar Electric Generating System (HHSEGS) - Solar Photovoltaic Alternative

Horizontal Single-Axis Trackers (Ray Tracker) Solar Installation near Winters, California

Source: Wikipedia

ALTERNATIVES - FIGURE 9a

Hidden Hills Solar Electric Generating System (HHSEGS) - Parabolic Trough Alternative

Parabolic troughs like those orginally proposed to be used at the Blythe Solar Power Project in California

Source: Energy Commission

ALTERNATIVES - FIGURE 9b, 9c

Hidden Hills Solar Electric Generating System (HHSEGS) - Parabolic Trough Alternative

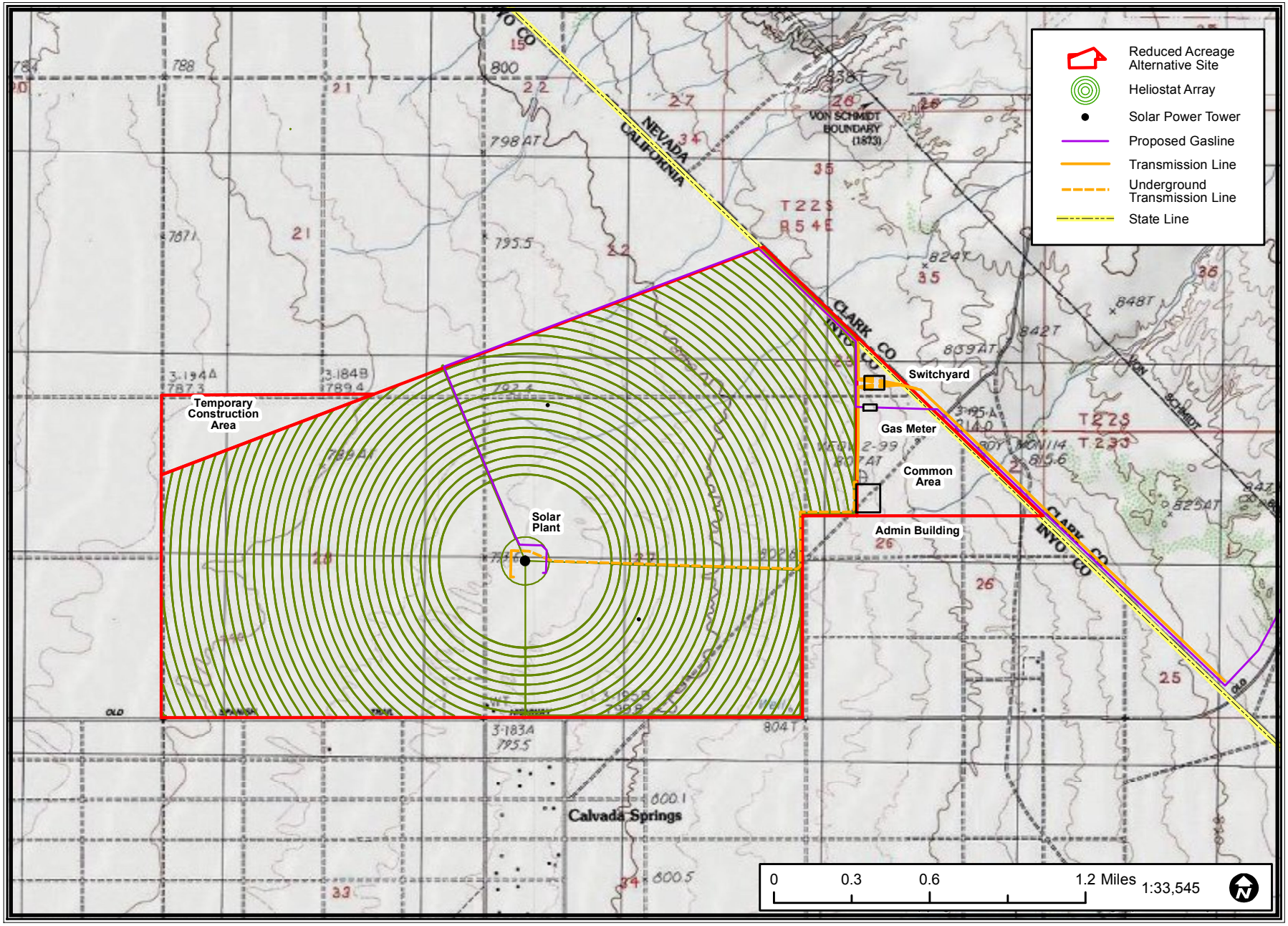
Two views of the Solar Electric Generating Systems Projects at Kramer Junction

SOURCE: Michael Clayton & Associates

SOURCE: Michael Clayton & Associates

ALTERNATIVES - FIGURE 10

Hidden Hills Solar Electric Generating System (HHSEGS) - Reduced Acreage Alternative



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Adapted from Figure 2.1-2, CH2MHILL, USGS Topographic

GENERAL CONDITIONS
INCLUDING
COMPLIANCE MONITORING AND CLOSURE PLAN

Testimony of Joseph Douglas

INTRODUCTION

The project's General Compliance Conditions of Certification, including Compliance Monitoring and Closure Plan (Compliance Plan) have been established as required by Public Resources Code section 25532. The plan provides a means for assuring that the facility is constructed, operated, and closed in compliance with public health and safety, environmental, and other applicable regulations, guidelines, and conditions adopted or established by the California Energy Commission and specified in the written Final Decision on the Application for Certification (AFC) or otherwise required by law.

The Compliance Plan is composed of elements that:

- set forth the duties and responsibilities of the Compliance Project Manager (CPM), the project owner, delegate agencies, and others;
- set forth the requirements for handling confidential records and maintaining the compliance record;
- state procedures for settling disputes and making post-certification changes;
- state the requirements for periodic compliance reports and other administrative procedures that are necessary to verify the compliance status for all Energy Commission approved conditions of certification;
- establish requirements for facility closure plans; and
- specify conditions of certification for each technical area containing the measures required to mitigate potentially adverse project impacts associated with construction, operation, and closure below a level of significance. Each specific condition of certification also includes a verification provision that describes the method of assuring that the condition has been satisfied.

KEY PROJECT EVENT DEFINITIONS

The following terms and definitions help determine when many of the Conditions of Certification are implemented.

Project Certification

Project certification occurs on the day the Energy Commission dockets its final Decision after having adopted it at a publically noticed Business Meeting or Hearing. At that time, all Energy Commission conditions of certification become binding on the project owner and the proposed facility.

Regulatory definitions of ground disturbance or site mobilization vary. To ensure adequate compliance with all conditions of certification and applicable LORS the following definitions apply.

Site Assessment and Preconstruction Activities

Site Assessment and preconstruction activities include the following, but only to the extent the activities are minimally disruptive to soil and vegetation and will not affect listed or special-status species or other sensitive resources:

1. the installation of environmental monitoring equipment;

2. a minimally invasive soil or geological investigation;

3. a topographical survey;

4. any other study or investigation to determine the environmental acceptability or feasibility of the use of the site for any particular facility;

5. any minimally invasive work to provide safe access to the site for any of the purposes specified in 1-4 above.

Many of the Energy Commission's conditions of certification require compliance submittals prior to the start of construction, hence the term "preconstruction". When technical staff and the CPM have approved all preconstruction conditions and the project has been certified, then site assessment and preconstruction activities can occur.

Site Mobilization and Construction

For compliance monitoring purposes, the definition of site mobilization and construction includes both a calendar date and the activities necessary to provide site access for construction mobilization and facility installation activities including both temporary and permanent equipment and structures. Site Mobilization and construction activities include, but are not limited to,

1. ground disturbance activities like grading, boring, trenching, leveling, mechanical clearing, grubbing, and scraping;

2. site preparation activities such as access roads, temporary fencing, construction trailer and utility installation, construction equipment installation and storage, equipment and supply laydown areas, borrow and fill sites, temporary parking facilities, chemical spraying, and controlled burns;

3. permanent installation activities for all facility and linear structures including access roads, fencing, utilities, parking facilities, equipment storage, mitigation and landscaping activities, and other installations as applicable.

Commissioning

Commissioning activities include testing the functional adequacy of the installed components and systems to ensure the plant operates safely and reliably. Commissioning provides a multistage, integrated approach to testing, calibrating and proving all systems, software, and networks within the project boundary. For compliance monitoring purposes examples of commissioning activities include interface connection and utility pre-testing, “cold” and “hot” electrical testing, system pressurization and optimization tests, grid synchronization, and combustion turbine “first fire”.

Start of Commercial Operation and Maintenance

For compliance monitoring purposes, “commercial operation” begins once commissioning activities are complete, the certificate of occupancy has been issued, and the power plant has reached reliable steady-state electrical production. At the start of commercial operation, plant control is usually transferred from the construction manager to the plant operations manager. Operation activities can include a steady state of electrical production or for “peaker plants” a seasonal or on-demand operational regime to meet peak load demands. Maintenance can include activities initiated while the facility remains online or when a facility is taken offline for a specified timeframe, usually not to exceed ninety (90) days, to facilitate optimization activities, in-situ repair or in-kind replacement of plant equipment or infrastructure only.

Facility Closures

Facility closures can be temporary or permanent in nature, encompassing either part of (partial closure) or the entire facility (full closure). Temporary closure is defined as a shutdown for a period exceeding the time required for normal maintenance and includes closure for overhaul or replacement of facility equipment. Other causes for temporary closure can include supply or transmission disruptions, unforeseen circumstances resulting in facility damage, or profitability considerations. Permanent closure is the shutdown of operations with no intent to restart the facility. Permanent closures occur for a variety of factors including, but not limited to, the functional or economic obsolescence of the facility, or irreparable damage.

ROLES AND RESPONSIBILITIES

Provided below is a generalized description of the compliance roles and responsibilities for Energy Commission Staff and the Project Owner for the construction and operation of the HHSEGS

COMPLIANCE PROJECT MANAGER RESPONSIBILITIES

The Compliance Project Manager’s (CPM) compliance monitoring and project oversight responsibilities include:

1. ensuring that the design, construction, operation, and closure of the project facilities are in compliance with the terms and conditions of the Energy Commission Final Decision;

2. resolving complaints;

3. processing post-certification project amendments for changes to the project description, conditions of certification, and ownership or operational control and requests for extension to the deadline for the start of construction (See **COM-13** for instructions on filing a petition to amend or extension request);

4. documenting and tracking compliance filings; and

5. ensuring that compliance files are maintained and accessible.

The CPM is the primary contact person for the Energy Commission during project preconstruction, construction, operation, and closure. The CPM will consult with the appropriate responsible parties when handling compliance issues, disputes, complaints, and amendments.

All project compliance submittals are submitted to the CPM for processing. Where a submittal requires CPM approval, the approval will involve appropriate Energy Commission technical staff and management. All submittals must include searchable electronic versions (pdf, MS Word or equivalent files).

Preconstruction and Pre-Operation Compliance Meeting

The CPM usually schedules pre-construction and pre-operation compliance meetings prior to the projected start-dates of construction, plant operation, or both. The purpose of these meetings is to assemble both the Energy Commission's and project owner's technical staff to review the status of all preconstruction or pre-operation requirements contained in the Energy Commission's conditions of certification. This is to confirm that all applicable conditions of certification have been met, or if they have not been met, to ensure that the proper action is taken. In addition, these meetings ensure, to the extent possible, that the Energy Commission's conditions of certification will not delay the construction and operation of the plant due to a compliance oversight, and to prevent last-minute unforeseen issues. Preconstruction meetings held during the certification process must be publicly noticed unless they are confined to administrative issues and processes.

Energy Commission Record

The Energy Commission maintains the following documents and information as a public record, in either the Compliance files or Dockets files, for the life of the project (or other period as required):

1. all documents demonstrating compliance with any legal requirements relating to the construction and operation of the facility;

2. all monthly and annual compliance reports filed by the project owner;

3. all project related complaints of alleged noncompliance filed with the Energy Commission; and

4. all petitions for project or condition of certification changes and the resulting staff or Energy Commission action.

CBO DELEGATION AND AGENCY COOPERATION

In performing project construction and operation monitoring, Energy Commission staff acts as, and has the authority of, the Chief Building Official (CBO). Energy Commission staff may delegate CBO responsibility to either an independent third party contractor or the local building official. Energy Commission staff retains CBO authority when selecting a delegate CBO, including enforcing and interpreting state and local codes, and in the use of discretion, as necessary, in implementing the various codes and standards.

Energy Commission staff may also seek the cooperation of state, regional, and local agencies that have an interest in public/worker safety and environmental protection when conducting project monitoring.

PROJECT OWNER RESPONSIBILITIES

The project owner or operator (hereinafter the project owner) is responsible for ensuring that the compliance conditions of certification and all other conditions of certification that appear in the Energy Commission Final Decision are satisfied. The compliance conditions regarding post-certification changes specify measures that the project owner must take when requesting changes in the project design, conditions of certification, or ownership. Failure to comply with any of the conditions of certification or the compliance conditions may result in reopening the case and revocation of Energy Commission certification, an administrative fine, or other corrective action as appropriate. A summary of the Compliance Conditions of Certification is included as **Compliance Table 1** at the conclusion of this section.

COMPLIANCE ENFORCEMENT

The Energy Commission's legal authority to enforce the terms and conditions of its Final Decision are specified in Public Resources Code sections 25534 and 25900. The Energy Commission may amend or revoke a project certification, and may impose a civil penalty for any significant failure to comply with the terms or conditions of the Final Decision. The Energy Commission's actions and fine assessments would take into account the specific circumstances of the incident(s).

COMPLIANCE REPORTING CONDITIONS

There are two different periodic compliance reports that the project owner must submit to assist the CPM in tracking activities and monitoring compliance with the terms and conditions of the Energy Commission Final Decision. During construction, the project owner or authorized agent will submit Monthly Compliance Reports. During operation, an Annual Compliance Report must be submitted. These reports, and the requirement for an accompanying compliance matrix, are described below. The majority of the conditions of certification require that compliance submittals be submitted to the CPM in the monthly or annual compliance reports.

INCIDENT REPORTING AND CONTINGENCY PLANNING

To protect public and environmental health and safety, the Energy Commission staff and its will delegates monitor the ongoing compliance of a facility during all phases of construction, operation, emergency response and closure. The compliance conditions of

certification include an integrated on-site contingency plan and incident reporting policy, not only to ensure compliance with the various health and safety practices required, but also to assist the Energy Commission staff during on-site facility monitoring and inspections. The on-site contingency plan helps ensure that all necessary steps are taken in a timely manner to avoid, limit, or mitigate potential impacts posed by any form of temporary closure. Part of the Contingency Plan includes an incident reporting process. All incidents requiring any emergency response, including but not limited to, a response from fire, hazardous materials, medical, or police emergency services (i.e. personal injury, hazardous materials spill, flood, fire, or explosion, etc.) must be reported and documented for the CPM in the manner provided by the technical and general conditions.

NONCOMPLIANCE COMPLAINT PROCEDURES

Any person or agency may file a complaint with the Energy Commission alleging noncompliance with the conditions of certification. Such a complaint will be subject to review by the Energy Commission pursuant to Title 20, California Code of Regulations, section 1237. An informal and a formal complaint procedure, as provided in current State law and regulations, are described below. They shall be followed unless superseded by future law or regulations. On-line access to the California Code of Regulations is at http://www.oal.ca.gov/.

Informal Dispute Resolution Process

In many instances, complaints can be resolved through the informal dispute resolution process, which is designed to resolve code and compliance interpretation disputes stemming from the project's conditions of certifications and other LORS. The project owner, the Energy Commission, or any other party, including members of the public, may initiate an informal dispute resolution process. Disputes may pertain to actions or decisions made by any party, including the Energy Commission's delegate agents.

This process may precede the more formal complaint and investigation procedure specified in Title 20, California Code of Regulations, section 1237, but is not intended to be a prerequisite or substitute for it. This informal procedure may not be used to change the conditions of certification as approved by the Energy Commission, although the agreed-upon resolution may result in a project owner proposing an amendment. This dispute resolution process encourages all parties involved to openly discuss the conflict and reach a mutually agreeable solution. If a dispute cannot be resolved by means of the informal dispute resolution process, then the matter must be brought before the full Energy Commission for consideration via the complaint and investigation procedure specified in Title 20, California Code of Regulations, section 1237.

Request for Informal Investigation

Any individual, group, or agency may request the Energy Commission to conduct an informal investigation of alleged noncompliance with the Energy Commission's conditions of certification. All requests for informal investigations shall be made to the designated CPM.

Upon receipt of an informal investigation request, the CPM will promptly provide both verbal and written notification to the project owner of the allegation(s). All known and

relevant information of the alleged noncompliance shall be provided to the project owner and to Energy Commission staff. The CPM will evaluate the request and the information to determine if further investigation is necessary. If further investigation is warranted, the project owner will be asked to promptly conduct a formal inquiry into the matter and within seven (7) days, provide a written report to the CPM of the investigation results, including corrective measures proposed or undertaken. Depending on the urgency of the alleged noncompliance matter, the CPM may conduct a site visit and/or request the project owner to provide an initial verbal report within forty-eight (48) hours.

Request for Informal Meeting

In the event that either the requesting party or Energy Commission staff is not satisfied with the project owner's report, investigation of the event, or corrective measures proposed or undertaken, either party may submit a written request to the CPM for a meeting with the project owner. The request shall be made within fourteen (14) days of the project owner's written report filing. Upon receipt of such a request, the CPM shall:

1. immediately schedule a meeting with the requesting party and the project owner, to be held at a mutually convenient time and place;

2. secure the attendance of appropriate Energy Commission staff and staff of any other agencies with expertise in the subject area of concern, as necessary;

3. conduct such meeting in an informal and objective manner so as to encourage the voluntary settlement of the dispute in a fair and equitable manner; and

4. after the meeting's conclusion, promptly prepare and distribute copies to all parties, and to the project file, a summary memorandum that fairly and accurately identifies the positions of all parties and any understandings reached. If an agreement is not reached, the CPM shall inform the complainant of the formal complaint process and requirements provided under Title 20, California Code of Regulations, section 1237.

Formal Dispute Resolution Procedure

Any person may file a complaint with the Energy Commission's Dockets Unit alleging noncompliance with an Energy Commission Final Decision adopted pursuant to Public Resources Code section 25500. Requirements for complaint filings and a description of how complaints are processed are provided in Title 20, California Code of Regulations, section 1237.

POST-CERTIFICATION CHANGES TO THE ENERGY COMMISSION FINAL DECISION

The project owner must petition the Energy Commission pursuant to Title 20, California Code of Regulations, section 1769, in order to modify the design, operation or performance requirements of the project or linear facilities, or to transfer ownership or operational control of the facility. **It is the responsibility of the project owner to contact the CPM to determine if a proposed project change should be considered a project modification pursuant to section 1769.** Implementation of a project modification without first securing Energy Commission, or Energy Commission staff approval may result in an enforcement action including civil penalties in accordance with Public Resources Code section 25534.

The criteria for determining approval type and the process that applies are explained below. They reflect the provisions of Title 20, California Code of Regulations, section 1769 at the time this condition was drafted. If the Energy Commission modifies this regulation, the language in effect at the time the change is requested shall apply.

Amendment

The project owner shall petition the Energy Commission, pursuant to Title 20, California Code of Regulations, section 1769(a), when proposing modifications to the project design, operation, or performance requirements (including linear facilities). If a proposed modification results in a changed or deleted condition of certification, or makes changes causing noncompliance with any applicable laws, ordinances, regulations, or standards, the petition will be processed as a formal amendment to the Final Decision, requiring public notice, public review of the Energy Commission's staff analysis and approval by the full Commission. Upon request, the CPM will provide a sample petition to use as a template.

Change of Ownership

Change of ownership or operational control also requires that the project owner file a petition pursuant to section 1769(b). This process requires public notice and approval by the full Commission. Upon request, the CPM will provide a sample petition to use as a template.

Staff-Approved Project Modification

Modifications that do not result in deletions or changes to conditions of certification, that are compliant with Laws, Ordinances, Regulations and Standards (LORS), and will not have significant environmental impacts may be authorized by the CPM as a staff-approved project modification pursuant to section 1769(a)(2). Once the CPM files a Notice of Determination of the proposed project modifications, any person may file an objection to the CPM's determination within fourteen (14) days of service on the grounds that the modification does not meet the criteria of section 1769(a)(2). If a person objects to the CPM's determination, the petition must be processed as a formal amendment to the Energy Commission's Final Decision and must be approved by the full Commission at a publically noticed business meeting or hearing.

Verification Change

A condition of certification verification may be modified by the CPM without requesting an amendment to the Final Decision if the change does not conflict with the attendant condition of certification and provides an effective alternate means of verification.

FACILITY CLOSURE

Although the HHSEGS project setting does not presently appear to pose any special or unusual closure issues, the Energy Commission cannot reasonably foresee all potential situations in existence when a project's operations temporarily or permanently cease. Therefore, closure provisions must provide flexibility to deal with the specific situation and project setting that exists at that time. Existing LORS pertaining to facility closure are identified in the various technical area sections. The general compliance conditions

of certification build upon these technical requirements to facilitate a comprehensive approach to facility closure. Facility closure procedures will be consistent with the Energy Commission's conditions of certification and the LORS in effect at the time of implementation.

Temporary closure status typically occurs when a project owner anticipates that a facility will remain offline for more than ninety (90) days or for activities that include, but are not limited to, equipment or infrastructure upgrades or repair. Under these circumstances, the project owner must follow the temporary facility closure activities delineated in the Closure Plan (COM-14, below), and, upon CPM review, may be required to initiate a formal amendment procedure. Should a temporary closure continue for more than twelve (12) months (or other timeframe subject to CPM approval) a subsequent submittal of a Final Closure Plan would be required.

Reasons for planned permanent closures include, but are not limited to, the end of a facility's economic or mechanical life or gradual obsolescence. Both temporary and permanent closure planning guidelines are detailed below. Should the project owner essentially abandon a facility, the owner will remain liable for all costs associated with the subsequent contingency planning and permanent closure activities. Although the owner of a temporarily closed facility may have every intention of resuming operations, if the closure continues for longer than three (3) years, unless the project owner can present reasonable evidence of a plan to resume operations, the Energy Commission can assume permanent closure and ask the project owner to begin the closure and restoration process, or access the performance bond funds (COM-15, below) and begin the process itself.

PROJECT COMPLIANCE CONDITIONS OF CERTIFICATION

COM-1: UNRESTRICTED ACCESS

The CPM, responsible Energy Commission Staff, and delegated agencies or consultants are guaranteed and granted unrestricted access to the power plant site, related facilities, project-related staff, and the records maintained on-site to facilitate audits, surveys, inspections, or general site visits. Although the CPM will normally schedule site visits on dates and times agreeable to the project owner, the CPM reserves the right to make unannounced visits at any time.

COM-2: COMPLIANCE RECORD

The project owner shall maintain project files on-site or at an alternative site approved by the CPM for the life of the project, unless a lesser period of time is specified by the conditions of certification. The files shall contain copies of all "as-built" drawings, documents submitted as verification for conditions, and other project-related documents.

Energy Commission staff and delegate agencies shall, upon request to the project owner, be given unrestricted access to the files maintained pursuant to this condition.

COM-3: COMPLIANCE VERIFICATION SUBMITTALS

Each condition of certification is followed by a means of verification. The verification describes the Energy Commission's procedure(s) to ensure post-certification compliance with adopted conditions. The verification procedures, unlike the conditions, may be modified as necessary by the CPM.

Verification lead times associated with start of construction may require the project owner to file submittals during the certification process, particularly if construction is planned to commence shortly after certification.

A cover letter from the project owner or authorized agent is required for all compliance submittals and correspondence pertaining to compliance matters. **The cover letter subject line shall identify the project by AFC number, the appropriate condition(s) of certification number(s), and a brief description of the subject of the submittal**. When submitting supplementary or corrected information, the project owner shall reference the date of the previous submittal and the condition(s) of certification applicable. The project owner shall also identify those submittals **not** required by a condition of certification with a statement such as: "This submittal is for information only and is not required by a specific condition of certification."

The project owner is responsible for the delivery and content of all verification submittals to the CPM, whether such condition was satisfied by work performed by the project owner or an agent of the project owner. All submittals shall be accompanied by a searchable electronic copy, on an electronic storage medium or by e-mail, as agreed upon by the CPM

All hardcopy submittals shall be addressed as follows:

Compliance Project Manager
(11-AFC-2C)
California Energy Commission
1516 Ninth Street (MS-2000)
Sacramento, CA 95814

COM-4: PRE-CONSTRUCTION MATRIX AND TASKS PRIOR TO START OF CONSTRUCTION

Prior to start of construction, a compliance matrix addressing only those conditions that must be fulfilled before the start of construction shall be submitted by the project owner to the CPM. This matrix shall be included with the project owner's first compliance submittal or prior to the first pre-construction meeting, whichever comes first and shall be submitted in the same format as the compliance matrix described below.

Construction shall not start until all the following have occurred: submittal of the pre-construction matrix and compliance verifications pertaining to all pre-construction conditions of certification, and the CPM has issued an Authority to Construct letter to the project owner. The lead times for submitting various compliance verifications to the CPM are established to allow sufficient staff time to review and comment and, if necessary, allow the project owner to revise the submittal in

a timely manner. This will help ensure that project construction proceeds according to schedule. Failure to submit compliance documents within the specified lead-time may result in delayed authorizations to commence various stages of the project.

If the project owner anticipates site mobilization immediately following project certification, it may be necessary for the project owner to file compliance submittals prior to project certification. In these instances, compliance verifications can be submitted in advance of the required lead-times and the anticipated authorizations to commence. The project owner must understand that submitting compliance verifications prior to these authorizations is at the owner's own risk. Any approval by Energy Commission staff prior to project certification is subject to change, based upon the Commission Final Decision.

COM-5: COMPLIANCE MATRIX

A compliance matrix shall be submitted by the project owner to the CPM along with each monthly and annual compliance report. The compliance matrix is intended to provide the CPM with the current status of all conditions of certification in a spreadsheet format. The compliance matrix must identify:

1. the technical area (e.g., biological resources, facility design, etc.);

2. the condition number;

3. a brief description of the verification action or submittal required by the condition;

4. the date the submittal is required (e.g., sixty (60) days prior to construction, after final inspection, etc.);

5. the expected or actual submittal date;

6. the date a submittal or action was approved by the Chief Building Official (CBO), CPM, or delegate agency, if applicable;

7. the compliance status of each condition (e.g., "not started," "in progress" or "completed" (include the date)); and

8. if the condition was amended, include the updated language and the date the amendment was proposed or approved.

COM-6: MONTHLY COMPLIANCE REPORT/KEY EVENT LIST

The first Monthly Compliance Report is due thirty (30) days following the docketing of the Energy Commission's Final Decision unless otherwise agreed to by the CPM. The first Monthly Compliance Report shall include the AFC number and an initial list of dates for each of the events identified on the **Key Events List. The Key Events List** form is found at the end of these **General Conditions**.

During preconstruction and construction of the project, the project owner or authorized agent shall submit an electronic searchable version of the Monthly Compliance Report within ten (10) days after the end of each reporting month. Monthly Compliance Reports shall be clearly identified for the month being reported. The searchable electronic copy

may be filed on an electronic storage medium or by e-mail, subject to CPM approval. The reports shall contain, at a minimum:

1. a table of contents clearly identifying by title and page number of each section, table, graphic, exhibit or addendum;

2. a summary of the current project construction status, a revised/updated schedule if there are significant delays, and an explanation of any significant changes to the schedule;

3. documents required by specific conditions to be submitted along with the Monthly Compliance Report. Each of these items must be identified in the transmittal letter, as well as the conditions they satisfy, and submitted as attachments to the Monthly Compliance Report;

4. an initial, and thereafter updated, compliance matrix showing the status of all conditions of certification;

5. a list of conditions that have been satisfied during the reporting period, and a description or reference to the actions that satisfied the condition;

6. a list of any submittal deadlines that were missed, accompanied by an explanation and an estimate of when the information will be provided;

7. a cumulative listing of any approved changes to the conditions of certification;

8. a listing of any filings submitted to, or permits issued by, other governmental agencies during the month;

9. a projection of project compliance activities scheduled during the next two months. The project owner shall notify the CPM as soon as any changes are made to the project construction schedule that would affect compliance with conditions of certification;

10. a listing of the month's additions to the on-site compliance file; and

11. a listing of complaints, notices of violation, official warnings, and citations received during the month, a description of the actions taken to date to resolve the issue, and the status of any unresolved actions.

COM-7: ANNUAL COMPLIANCE REPORT

After construction is complete, the project owner shall submit searchable electronic Annual Compliance Reports instead of Monthly Compliance Reports. The reports are for each year of commercial operation and are due to the CPM each year at a date agreed to by the CPM. Annual Compliance Reports shall be submitted over the life of the project, unless otherwise specified by the CPM. The searchable electronic copy may be filed on an electronic storage medium or by e-mail, subject to CPM approval. Each Annual Compliance Report shall include the AFC number, identify the reporting period, and shall contain the following:

1. a table of contents clearly identifying by title and page number each section, table, graphic, exhibit or addendum;

2. an updated compliance matrix showing the status of all conditions of certification (fully satisfied conditions do not need to be included in the matrix after they have been reported as completed);

3. a summary of the current project operating status and an explanation of any significant changes to facility operations during the year;

4. documents required by specific conditions to be submitted along with the Annual Compliance Report. Each of these items must be identified in the transmittal letter with the condition it satisfies, and submitted as attachments to the Annual Compliance Report;

5. a cumulative listing of all post-certification changes approved by the Energy Commission or the CPM;

6. an explanation for any submittal deadlines that were missed, accompanied by an estimate of when the information will be provided;

7. a listing of filings submitted to, or permits issued by, other governmental agencies during the year;

8. a projection of project compliance activities scheduled during the next year;

9. a listing of the year's additions to the on-site compliance file;

10. an evaluation of the on-site contingency plan for unplanned facility closure, including any suggestions necessary for bringing the plan up to date (see Compliance Conditions for Facility Closure addressed later in this section); and

11. a listing of complaints, notices of violation, official warnings, and citations received during the year, a description of how the issues were resolved, and the status of any unresolved matters.

COM-8: CONFIDENTIAL INFORMATION

Any information that the project owner designates as confidential shall be submitted to the Energy Commission's Executive Director with an application for confidentiality pursuant to Title 20, California Code of Regulations, section 2505(a). Any information deemed confidential pursuant to the Regulations will remain undisclosed as provided for in Title 20, California Code of Regulations, section 2501.

COM-9: ANNUAL ENERGY FACILITY COMPLIANCE FEE

Pursuant to the provisions of Section 25806(b) of the Public Resources Code, the project owner is required to pay an annual compliance fee, which is adjusted annually. Current Compliance fee information is available on the Energy Commission's website http://www.energy.ca.gov/siting/filing_fees.html. The project owner may also contact the CPM for the current fee information. The initial payment is due on the date that the

Energy Commission's Final Decision is docketed. All subsequent payments are due by the first (1st) of July of each year in which the facility retains its certification.

COM-10: SITE CONTINGENCY PLANS

The project owner shall submit a site contingency plan for CPM review and approval. The plan shall be submitted no less than sixty (60) days prior to start of commercial operation (or other timeframe subject to CPM approval). The approved plan must be in place prior to the start of commercial operation and must be kept onsite at all times.

The purpose of the site contingency plan is to ensure that an integrated facility response system exists. Many of the contingency plan's elements will likely draw from the other plans and protocols required by the various technical sections. Plan elements include, but are not limited to:

1. A facility description and corresponding detailed map (with compass heading, bar scale, and key), including licensed activities, on-site and near-site structures with descriptive labels, roads and parking lots on-site and main roads and highways near the site, and site boundaries, including fences and gates;
2. A site description of areas near the site and corresponding map (with compass heading, bar scale, and key), including locations of population centers and sensitive receptors (schools, arenas, stadiums, prisons, care facilities), and emergency response facilities (fire, police, hospitals, clinics, etc.);
3. A description and corresponding detailed map (with compass heading, bar scale, and key) of emergency equipment and critical safety controls including fire suppression, first aid and decontamination/extreme exposure equipment, protective gear, automatic external defibrillators, on-site emergency alert and communication systems, ventilation, shut-off and safety controls, interior and exterior evacuation routes, on- and off-site assembly areas, and traffic control equipment, as applicable;
4. An organizational chart including the name, contact information, photo-identification, certification types(s), and renewal dates for all on-site personnel trained in first response and first aid;
5. A description of reasonably foreseeable hypothetical incidents and accident sequences (on- and off-site), including response procedures and protocols and site security measures to maintain twenty-four (24) hours site security;
6. The nature, extent and status of insurance coverage(s) and major equipment warranties for the facility; and
7. Procedures for maintaining contingency response capabilities including plan review and update schedule, periodic drills and training schedule, critiques and auditing procedures, incident reporting requirements, and inventory and maintenance of contingency plan supplies.

The CPM may require revisions to the site contingency plan over the life of the project. Site contingency review/updates (updated organizational chart, personnel training logs, independent audits, and periodic drill reports, etc.) shall be provided for CPM review and approval in each annual compliance report.

In the event of an unexpected incident requiring emergency response, the project owner shall notify the CPM or the Compliance Office Manager (COM) directly, as well as other responsible agencies, by telephone, fax, or e-mail, within one (1) hour and shall take all necessary steps to implement the contingency plan response scenarios.

For incidents that require facility shut down for more than ninety (90) days, (or other timeframe subject to CPM approval), the site contingency plan shall provide for removal of hazardous materials and hazardous wastes, draining of all chemicals from storage tanks and other equipment, and the safe shutdown of all equipment. (Also, see specific conditions of certification for the technical areas of **Hazardous Materials Management** and **Waste Management** sections of this **FSA**).

COM-11: UNEXPECTED INCIDENT REPORTING REQUIREMENTS

In the event of any incident requiring any emergency response, including but not limited to, a response from fire, hazardous materials, medical, or police emergency services (as a result, for example, of personal injury, hazardous materials spill, flood, fire, or explosion, etc), the project owner shall:

A. Notify the CPM or COM directly within one (1) hour by phone of the circumstances, current status, and expected duration of all accidents, emergencies, and other abnormal incidents at the facility or appurtenant facilities, that have resulted or could result in any of the following situations:

   1. Reduction in the facility's ability to respond to dispatch (excluding forced outages caused by protective equipment or other typically encountered shut down events);

   2. Health and safety impacts on the surrounding population;

   3. Property damage off-site;

   4. Response by off-site emergency response agencies;

   5. Serious on-site injury;

   6. Significant environmental damage;

   7. Filing of bankruptcy by the owner or operator of the facility; and/or

   8. Emergency reporting to any federal, state, or local agency.

B. Submit to the CPM a detailed report describing the incident and any impacts as described in ***section A*** within thirty (30) days that shall include, as appropriate to the incident, the following information:

   1. A brief description of the incident including its date, time and location;

   2. A description of cause of the incident, or likely causes if it is still under investigation;

3. The location of any off-site impacts;

4. A description of emergency response actions associated with the incident;

5. Identification of responding agencies;

6. Identification of emergency notifications made to other federal, state, and/or local agencies;

7. Identification of any hazardous materials released and an estimate of the quantity released;

8. A description of any injuries, fatalities, or property damage that occurred as a result of the incident;

9. Fines or violations assessed or being processed by other agencies;

10. Name, phone number, and email address of the appropriate facility contact person having knowledge of the event; and

11. Corrective actions or repairs necessary, a proposed schedule, and potential cost to restore the facility to acceptable performance and availability.

C. Maintain records of the ***incident*** report(s) described in ***sections A and B*** for the life of the project. Additionally, the project owner shall submit to the CPM copies of these project reports within twenty-four (24) hours of an email, phone, mail, or in person request.

COM-12: REPORTING OF COMPLAINTS, NOTICES, AND CITATIONS

Prior to the start of construction, the project owner must send a letter to property owners living within one (1) mile of the project notifying them of a telephone number to contact project representatives with questions, complaints, or concerns. If the telephone is not staffed twenty-four (24) hours per day, it shall include automatic answering with a date and time stamp recording. All recorded complaints shall be responded to within twenty-four (24) hours. The telephone number shall be posted at the project site and made easily visible to passersby during construction and operation. The telephone number shall be provided to the CPM who will post it on the Energy Commission's web page at. http://www.energy.ca.gov/sitingcases/<project name>/.

Any changes to the telephone number shall be submitted immediately to the CPM, who will update the web page.

In addition to the monthly and annual compliance reporting requirements described above, the project owner shall report and provide copies to the CPM of all complaint forms, including noise and lighting complaints, notices of violation, notices of fines, official warnings, and citations within ten (10) days of receipt. Complaints shall be logged and numbered. Noise complaints shall be recorded on the form provided in the **Noise and Vibration** conditions of certification. All other complaints shall be recorded on the complaint form (Attachment A).

COM-13: AMENDMENTS, OWNERSHIP CHANGES, STAFF-APPROVED PROJECT MODIFICATIONS AND VERIFICATION CHANGES

The project owner must petition the Energy Commission pursuant to Title 20, California Code of Regulations, section 1769, in order to modify the design, operation or performance requirements of the project or linear facilities, or to transfer ownership or operational control of the facility. The CPM will determine whether staff approval will be sufficient or whether Commission approval will be necessary based upon whether or not the proposed amendment(s) result in a changed or deleted condition of certification or the changes cause noncompliance with any applicable LORS. Section 1769 details the required content of a petition to amend. Only a request to change the verification method of a condition of certification can be submitted in a letter format to the CPM. **It is the responsibility of the project owner to contact the CPM to determine if a proposed project change triggers the requirements of section 1769.** Implementation of a project modification without first securing Energy Commission, or Energy Commission staff approval, may result in an enforcement action including civil penalties in accordance with section 25534 of the Public Resources Code. If the Energy Commission's rules regarding amendments are amended, the rules in effect at the time the change is requested shall apply.

COM-14: FACILITY CLOSURE PLAN

To ensure that a facility does not become a risk to public or environmental health or safety when a temporary or permanent closure occurs, the project owner shall establish a closure process that demonstrates to the Energy Commission that closure activities and costs are being considered and planned for early in the life of the facility and complies with all applicable COCs and LORS.

For extended, but temporary, closures (exceeding ninety (90) days), the project owner shall submit a Temporary Closure Plan to the CPM for review and approval. The Closure Plan shall be submitted at least sixty (60) days prior to commencing expected closure activities and no later than one-hundred-twenty (120) days after an unplanned closure (or other timeframe, subject to CPM approval). The Temporary Closure Plan shall contain information as specified in Plan Elements 1–9, below, and as specified in additional guidance referenced within this and all other pertinent COCs, as applicable.

In preparation for the eventual permanent closure of the plant, the project owner shall submit for CPM review and approval a preliminary Closure Plan with the first annual compliance report. The Closure Plan shall identify steps necessary to perform partial or final closure of the facility at any point during its active life and to perform final closure at the end of its active life. The Closure Plan shall be updated and submitted for CPM review every five (5) years, or at the time of an unplanned closure event. A searchable electronic copy of the Closure Plan shall be filed on an electronic storage medium or by e-mail, as agreed to by the CPM.

At least two (2) years prior to commencing permanent closure activities (or other timeframe agreed upon by the CPM), the project owner shall submit a proposed final Closure Plan to the CPM for review and approval.

Closure Plan Elements include, but are not limited to:

1.) A searchable table of contents clearly identifying by title and page number each section, table, graphic, exhibit, or addendum;

2.) The identification of technical experts, including resumes, and detailed descriptions of relevant previous power plant closure experience;

3.) A comprehensive scope of work for the temporary or permanent plant closure, detailing all phases of the closure process, including applicable LORS compliance strategies, methodologies to be used, and team members responsible for executing the work;

4.) A cost estimate for the various closure phases, including but not limited to, technical expertise, compliance and remediation planning, environmental analysis and permitting, demolition, site clean-up and mitigation and monitoring, and contingencies, as applicable;

5.) All relevant existing plans, drawings, inventories, schedules, assessments, and status and compliance reports for the project;

6.) A complete historical and existing infrastructure inventory and inspection, a physical site and baseline characterization, an independent review of a final building and under building surveys, and a chemical characterization and process analysis, as well as all site and risk assessments, as applicable;

7.) Identification and discussion of any potential impacts and mitigation strategies to address significant adverse impacts associated with the plant closure and conformance with all applicable LORS, conditions of certification, and local/regional plans presently existing. The Closure Plan shall include an integrated schedule of temporary or permanent closure activities for the power plant site, transmission line corridor, and all other appurtenant facilities constructed as part of the project. Additional closure specifications, drawings, and planning considerations shall include, but are not limited to, demolition, salvage, stormwater, waste management, spill prevention, transit and transportation, public health, worker safety, and site security plans, as applicable;

8.) A description of the password-protected filing systems and information repositories, both electronic (on-line) and hard copy (on-site), approved by the CPM to allow for streamlined compliance submittals, monitoring, and auditing; and

9.) A site disposition plan including refurbishment or redevelopment options, future land-use planning alternatives, stakeholder involvement process, and restoration plan and permitting timelines, as applicable, including the identification and justification for any facilities or equipment remaining on-site after permanent closure.

Two (2) years prior to submittal of the proposed draft Final Closure Plan, a meeting shall be held between the project owner and the CPM to discuss the specific contents and timing of the Closure Plan. Not less than one (1) year prior to facility closure the project owner must send a letter to all interested parties, including the post-certification

mailing list and property owners living within one (1) mile of the facility, notifying them of the intent to close the facility permanently.

In the event there are significant issues associated with the Closure Plan's approval, the CPM will hold one or more workshops, and the Energy Commission may hold public hearings as part of its approval procedure.

As necessary, prior to or during the closure planning process, the project owner shall take appropriate steps to eliminate any immediate threats to public and environmental health and safety, but shall not commence any other closure activities until CPM approval of the facility Closure Plan. For either a temporary or permanent plant closure, the project owner shall comply with the approved Closure Plan and any conditions of closure established by the Energy Commission as a result of the Closure Plan approval process.

COM-15: FINANCIAL ASSURANCE FOR CLOSURE

To ensure that the project owner closes the facility according to the CPM-approved Closure Plan, the project owner shall obtain a surety bond as financial assurance guaranteeing satisfactory performance of all closure and long-term site maintenance activities.

Within one-hundred-twenty (120) days following CPM approval of the preliminary Closure Plan, and periodically updated every five (5) years thereafter, (in conjunction with Closure Plan and Cost Estimate update(s) or at the time of an unplanned closure event), the project owner shall submit, for CPM review and approval, financial assurance in the form of a surety bond guaranteeing performance of closure as specified in the then-current Closure Plan. To ensure the accuracy of the most recent Cost Estimate, to be used in the surety bond, the CPM may require an independent, third-party review of said Estimate. The surety bond shall contain the following language and terms:

PERFORMANCE BOND

Date bond executed:

Effective date:

Principal: [legal name and business address of owner]

Type of organization: [insert "individual," "joint venture," "partnership," or "corporation"]

State of incorporation:

Surety(ies): [name(s) and business address(es)]

Facility name, address:

Total penal sum of bond: Closure Cost Estimate

Surety's bond number:

KNOW ALL PERSONS BY THESE PRESENTS, THAT WE, the Principal and Surety(ies) hereto are firmly bound to the California State Energy Resources Conservation and Development Commission (hereinafter called the Energy Commission), in the above penal sum for the payment of which we bind ourselves, our heirs, executors, administrators, successors, and assigns jointly and severally; provided that, where the Surety(ies) are corporations acting as co-sureties, we, the Sureties, bind ourselves in such sum “jointly and severally” only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each Surety binds itself, jointly and severally with the Principal, for the payment of such sum only as is set forth opposite the name of such Surety, but if no limit of liability is indicated, the limit of liability shall be the full amount of the penal sum.

WHEREAS said Principal is required, under state regulations, to have an Energy Commission license in order to own and operate the facility identified above, and

WHEREAS said Principal is required to provide financial assurance for closure of the facility, and

WHEREAS said Principal shall establish a standby trust fund, with the Energy Commission as its Beneficiary, as is required when a surety bond is used to provide such financial assurance;

NOW, THEREFORE the conditions of this obligation are such that if the Principal shall faithfully perform closure, whenever required to do so, of the facility for which this bond guarantees closure, in accordance with the closure plan and other requirements of the license as such plan and license may be amended, pursuant to all applicable laws, statutes, rules, and regulations, as such laws, statutes, rules, and regulations may be amended,

OR, if the Principal shall provide alternate financial assurance and obtain written approval from the Energy Commission of such assurance, within ninety (90) days after the date notice of cancellation is received by both the Principal and the Executive Director of the Energy Commission, or designee, from the Surety(ies), then this obligation shall be null and void, otherwise it is to remain in full force and effect.

The surety(ies) shall become liable on this bond obligation only when the Principal has failed to fulfill the conditions described above.

Upon notification by the Energy Commission that the Principal has been found in violation of applicable closure requirements for which this bond guarantees performance of closure, the Surety(ies) shall either perform closure in accordance with the closure plan and other permit requirements or place the closure amount guaranteed for the facility into the standby trust fund as directed by the Energy Commission.

Upon notification by the Energy Commission that the Principal has failed to provide alternate financial assurance and obtain written approval of such assurance from the Energy Commission during the ninety (90) days following receipt by both the Principal and the Energy Commission of a notice of cancellation of the bond, the Surety(ies) shall place funds in the amount guaranteed for the facility into the standby trust fund as directed by the Energy Commission.

The Surety(ies) hereby waive(s) notification of amendments to closure plans, permits, applicable laws, statutes, rules, and regulations and agrees that no such amendment shall in any way alleviate its (their) obligation on this bond.

The liability of the Surety(ies) shall not be discharged by any payment or succession of payments hereunder, unless and until such payment or payments shall amount in the aggregate to the penal sum of the bond, but in no event shall the obligation of the Surety(ies) hereunder exceed the amount of said penal sum.

The Surety(ies) may cancel the bond by sending notice of cancellation by certified mail to the owner and to the Energy Commission provided, however, that cancellation shall not occur during the one-hundred-twenty (120) days beginning on the date of receipt of the notice of cancellation by both the Principal and the Energy Commission, as evidenced by the return receipts.

The Principal may terminate this bond by sending written notice to the Surety(ies), provided, however, that no such notice shall become effective until the Surety(ies) receive(s) written authorization for termination of the bond by the Energy Commission.

Principal and Surety(ies) hereby agree to adjust the penal sum of the bond when the Principal updates its closure Cost Estimate, as required by the Energy Commission, so that it guarantees a new closure amount, provided that the penal sum does not increase by more than 20 percent in any one year, and no decrease in the penal sum takes place without the written permission of the Energy Commission.

IN WITNESS WHEREOF, the Principal and Surety(ies) have executed this Performance Bond and have affixed their seals on the date set forth above.The persons whose signatures appear below hereby certify that they are authorized to execute this surety bond on behalf of the Principal and Surety(ies).

Principal - [Signature(s)]
[Name(s)]
[Title(s)]
[Corporate seal]

Corporate Surety(ies)
[Name and address]
State of incorporation:

Liability limit:

[Signature(s)]
[Name(s) and title(s)]
[Corporate seal]
[For every co-surety, provide signature(s), corporate seal, and other information in the same manner as for Surety above.]

Bond premium:

KEY EVENTS LIST

PROJECT: _____

DOCKET #: _____

COMPLIANCE PROJECT MANAGER: _____

EVENT DESCRIPTION	DATE
Certification Date	
Obtain Site Control	
Online Date	
POWER PLANT SITE ACTIVITIES	
Start Site Assessment/Preconstruction	
Start Site Mobilization/Construction	
Begin Pouring Major Foundation Concrete	
Begin Installation of Major Equipment	
Completion of Installation of Major Equipment	
First Combustion of Gas Turbine	
Obtain Building Occupation Permit	
Start Commercial Operation	
Complete All Construction	
TRANSMISSION LINE ACTIVITIES	
Start T/L Construction	
Synchronization with Grid and Interconnection	
Complete T/L Construction	
FUEL SUPPLY LINE ACTIVITIES	
Start Gas Pipeline Construction and Interconnection	
Complete Gas Pipeline Construction	
WATER SUPPLY LINE ACTIVITIES	
Start Water Supply Line Construction	
Complete Water Supply Line Construction	

COMPLIANCE TABLE 1:
SUMMARY of COMPLIANCE CONDITIONS OF CERTIFICATION

CONDITION NUMBER	SUBJECT	DESCRIPTION
COM-1	Unrestricted Access	The project owner shall grant Energy Commission staff and delegate agencies or consultants unrestricted access to the power plant site.
COM-2	Compliance Record	The project owner shall maintain project files on-site. Energy Commission staff and delegate agencies shall be given unrestricted access to the files.
COM-3	Compliance Verification Submittals	The project owner is responsible for the delivery and content of all verification submittals to the CPM, whether such condition was satisfied by work performed or the project owner or his agent.
COM-4	Pre-construction Matrix and Tasks Prior to Start of Construction	Construction shall not commence until the all of the following activities/submittals have been completed: • Notify property owners • Submit pre-construction matrix identifying conditions to be fulfilled before the start of construction • Completed all pre-construction conditions • CPM has issued a letter to the project owner authorizing construction
COM-5	Compliance Matrix	The project owner shall submit a compliance matrix (in a spreadsheet format) with each monthly and annual compliance report, which includes the status of all compliance conditions of certification.
COM-6	Monthly Compliance Report / Key Events List	During construction, the project owner shall submit Monthly Compliance Reports (MCRs) which include specific information. The first MCR is due the month following the Energy Commission business meeting date on which the project was approved and shall include an initial list of dates for each of the events identified on the Key Events List.
COM-7	Annual Compliance Reports	After construction ends and throughout the life of the project, the project owner shall submit Annual Compliance Reports instead of Monthly Compliance Reports.
COM-8	Confidential Information	Any information the project owner deems confidential shall be submitted to the Energy Commission's Executive Director with a request for confidentiality.
COM-9	Annual fees	Payment of Annual Energy Facility Compliance Fee

COMPLIANCE TABLE 1:
SUMMARY of COMPLIANCE CONDITIONS OF CERTIFICATION

CONDITION NUMBER	SUBJECT	DESCRIPTION
COM-10	On-Site Contingency Plans	No less than sixty (60) days prior to the start of commercial operation the project owner must submit an on-site contingency plan.
COM-11	Unexpected Incident Reporting	The project owner shall notify the CPM within one (1) hour, submit a detailed incident report, maintain records of incident report, and submit public health and safety documents with employee training provisions.
COM-12	Reporting of Complaints, Notices and Citations	Within ten (10) days of receipt, the project owner shall report to the CPM, all notices, complaints, and citations. To ensure public and environmental health and safety are protected in the event of an unplanned temporary closure, the project owner shall submit an on-site contingency plan no less than sixty (60) days prior to commencement of commercial operation.
COM-13	Post-certification changes to the Decision Unplanned Permanent Facility Closure	The project owner must petition the Energy Commission to delete or change a condition of certification, modify the project design or operational requirements and/or transfer ownership of operational control of the facility. To ensure public and environmental health and safety are protected in the event of an unplanned permanent closure, the project owner shall submit an on-site contingency plan no less than sixty (60) days prior to commencement of commercial operation.
COM-14	Facility Decommissioning and Closure Plans	With the first annual compliance report, the project owner shall submit for CPM review and approval a preliminary facility closure plan (to be updated and reviewed every five (5) years or due to a closure event). For expected temporary closures, a decommissioning plan shall be submitted at least two (2) months prior to decommissioning activities. For unexpected temporary closures, the plan shall be submitted no later than 30 days after a closure incident. At least two (2) years prior to permanent closure the project owner shall meet with the CPM and submit a draft final closure plan for CPM review and approval. One (1) year prior to permanent closure the project owner must send a letter to all interest parties and must conduct public outreach as necessary.

ATTACHMENT A
COMPLAINT REPORT/RESOLUTION FORM

COMPLAINT LOG NUMBER:_____ DOCKET NUMBER:_____

PROJECT NAME:_____

COMPLAINANT INFORMATION

NAME:_____ PHONE NUMBER:_____

ADDRESS:_____

COMPLAINT

DATE COMPLAINT RECEIVED:_____ TIME COMPLAINT RECEIVED:_____

COMPLAINT RECEIVED BY: _____ ☐ TELEPHONE ☐ IN WRITING (COPY ATTACHED)

DATE OF FIRST OCCURRENCE:_____

DESCRIPTION OF COMPLAINT (INCLUDING DATES, FREQUENCY, AND DURATION):_____

FINDINGS OF INVESTIGATION BY PLANT PERSONNEL:_____

DOES COMPLAINT RELATE TO VIOLATION OF A CEC REQUIREMENT? ☐ YES ☐ NO

DATE COMPLAINANT CONTACTED TO DISCUSS FINDINGS:_____

DESCRIPTION OF CORRECTIVE MEASURES TAKEN OR OTHER COMPLAINT RESOLUTION:_____

DOES COMPLAINANT AGREE WITH PROPOSED RESOLUTION? ☐ YES ☐ NO

IF NOT, EXPLAIN:_____

CORRECTIVE ACTION

IF CORRECTIVE ACTION NECESSARY, DATE COMPLETED:_____

DATE FIRST LETTER SENT TO COMPLAINANT (COPY ATTACHED):_____

DATE FINAL LETTER SENT TO COMPLAINANT (COPY ATTACHED):_____

OTHER RELEVANT INFORMATION:_____

"This information is certified to be correct."

PLANT MANAGER SIGNATURE:_____ DATE:_____

(ATTACH ADDITIONAL PAGES AND ALL SUPPORTING DOCUMENTATION, AS REQUIRED)

THE HIDDEN HILLS SOLAR ELECTRIC GENERATING SYSTEM, APPLICATION FOR CERTIFICATION (11-AFC-2)

PREPARATION TEAM

Executive Summary ..... Mike Monasmith

Introduction ..... Mike Monasmith

Project Description ..... Mike Monasmith

Environmental Assessment

Air Quality/GHG ..... Jacqueline Leyva, Ph.D

Biological Resources ..... Carolyn Chainey-Davis, Chris Huntley, Carol Watson

Cultural Resources ..... Thomas Gates, Ph.D

Hazardous Materials Management ..... Geoff Lesh

Land Use ..... Christina Snow

Noise and Vibration ..... Shahad Khoshmashrab

Public Health ..... Ann Chu, Ph.D, Obed Odoemelam, Ph.D

Socioeconomics ..... Jim Adams, Steven Kerr, Richard McCann

Soils and Surface Water ..... Marylou Taylor

Traffic and Transportation ..... Candice Hill, John Hope, Gregg Irvin, Ph.D

Transmission Line Safety and Nuisance ..... Obed Odoemelam, Ph.D

Visual Resources ..... Melissa Mourkas

Waste Management ..... Ellie Townsend-Hough

Water Supply ..... Mike Conway

Worker Safety and Fire Protection ..... Geoff Lesh

Engineering Assessment

Facility Design ..... Shahab Khoshmashrab

Geology and Paleontology ..... Casey Weaver

Power Plant Efficiency ..... Shahab Khoshmashrab

Power Plant Reliability ..... Shahab Khoshmashrab

Transmission System Engineering ..... Sudath Edirisuriya

Alternatives ..... Jeanine Hinde

General Conditions ..... Joseph Douglas

Project Assistant ..... Cenne Jackson

DECLARATION OF
J. Mike Monasmith

I, J. Mike Monasmith, declare as follows:

1. I am presently employed by the California Energy Commission in its Siting, Transmission and Environmental Protection Division as a Senior Project Manager.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on the **Executive Summary** and **Project Description** sections of the **Final Staff Assessment** for the **Hidden Hills Solar Electric Generating Station** Application for Certification (AFC), based on my independent analysis of the AFC, supplements, data, documents, analysis and testimony from other staff and reliable sources, and based upon my own professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: November 6, 2012 Signed: _____

At: Sacramento, California

J. MIKE MONASMITH

EMPLOYMENT HISTORY

California Energy Commission (Sacramento, CA)

Senior Project Manager (November 2007 – present)

Leads, plans, coordinates, prioritizes, monitors, reviews and conducts work activities associated with the permitting of large thermal energy facilities (including solar thermal) in California by means of certified CEQA regulatory program that incorporates applicable environmental laws, ordinances, regulations and standards. Lead multi-disciplinarian teams of engineers, planners, scientists and analysts who review complex, proposed power plant projects. Responsibilities include power plant proceeding schedule; utilization of principles and practices of engineering and environmental impact analyses, including specifics of Federal, State, and local laws (CEQA, NEPA) and regulations relating to energy and industrial facility siting, construction and operation. Conduct analyses of proposed or potential site areas; develop and recommend goals and objectives for a statewide facility siting program; develop, analyze and evaluate alternative facility siting plans; write research reports and prepare progress reports; coordinate and review energy facility siting standards, conditions, and guidelines with other state and federal regulatory agencies, stakeholders, related organizations and the public; conduct and manage large public hearings, workshops and events. Plans, coordinates, prioritize, monitors, guides, reviews and conducts work activities of project teams to ensure assigned work activities successfully contribute to the overall project completion schedule. Develops and maintains clear and concise communications and working relationships with other departments, agencies and members of the public.

Associate Public Adviser (November 2003 – November 2007)

Liaison between the Energy Commission, intervenors, members of the public and community organizations and stakeholders to ensure legally mandated public participation requirements were met in regard to Energy Commission activities, with particular focus on siting activities; advise departmental staff on various local community issues and developments in areas of concern and/or involvement and provide appropriate strategies and recommendations; oversee the development and implementation of community relations plans; organize and conduct public meetings, conferences and hearings regarding community issues; assist community work groups and advisory committees and maintain a close working relationship with these groups, as well as local agencies and elected officials; facilitate and advocate communication and understanding between technical experts, impacted communities and the general public via periodic emails, newsletters, phone calls and meetings in regard to Commission proceedings, decisions and regulations.

California Resources Agency (Sacramento, CA)

Special Assistant to Secretary Mary Nichols (April 2003 - November 2003)

Provided policy and program analysis and advice to California Resources Agency Secretary Mary Nichols. As a Gubernatorial (Davis) appointee, provided assistant on key resource management issues, including: forest and fire protection, water resource use and development, parks and recreation priorities, and bonds and grant priorities and utilization.

California Democratic Party (Los Angeles, CA)

Director of Communications (March 2002 – December 2002)

Supervised state-wide Press and Communications staff for the California Democratic Party's 2002 California Coordinated Campaign effort to re-elect Governor Gray Davis, Lt. Governor Cruz Bustamante, Attorney General Bill Lockyer, State Treasurer Phil Angelides, State Controller Steve Westly, Secretary of State Kevin Shelley, Insurance Commissioner John Garamendi and Spt. of Public Instruction Jack O'Connell.

Gore/Lieberman *- California Deputy Director* (March 2000 – December 2000)

U.S. CONGRESSWOMAN JANE HARMAN (Washington, DC / Los Angeles, CA)

Chief of Staff (September 1997 – November 1998)

As Chief of Staff for U.S. Rep. Harman in 1997-1998, provided a wide-range of staff management, policy and political leadership, strategic political direction and advise to the Congresswoman on local, state and national issues of importance. Managed and was responsible for a staff of 16 policy and political professionals with a combined annual budget of $2.5 million. As Political Director in 2001, I identified and resolved politically sensitive issues within the Congresswoman's coastal Los Angeles County Congressional district. Worked extensively with the Congresswoman's advisory committees (defense industry retention, education, environment and health care). Coordinated conferences and meetings in DC, the Los Angeles district and elsewhere in California. Provided ongoing analyses of community, economic and political concerns.

Deputy Campaign Manager, **Harman for Governor** (March 1998 - June 1998)
Political Director (June 2001- December 2001)

STATE CONTROLLER KATHLEEN CONNELL (Los Angeles, CA)
Chief Deputy Controller (December 2000 – June 2001)
As Chief Deputy Controller in 2000-2001, I was the lead staff member responsible for all facets of SCO external affairs, including: training, assigning and directing the work of SCO Executive Office press and communications staff; developing work schedules; assisting staff in resolving long-term and immediate/emergency problems and situations; making recommendations in staff performance appraisals; and reporting problems, concerns and developments directly to Controller Connell. As Press Secretary (CEA 1) in 1995-1996, responsibilities included managing, advancing and planning all outreach projects; served as the media project leader; prepared feasibility studies; developed, conducted and analyzed survey data and created public outreach campaign materials for Controller's goal of performance-based governance principles. Also developed work programs and schedules; managed budget and fiscal aspects of outreach projects; and, developed schedules and facilitated workshops and meetings.

Assistant Deputy Controller, External Affairs (April 1995 – June 1996)

VERIZON COMMUNICATIONS (Thousand Oaks, CA)
Director, Los Angeles Government Affairs (May 1999 – March 2000)
Planned, managed and coordinated GTE/Verizon California's Public Affairs program for the Los Angeles City Council and the Los Angeles County Board of Supervisors. Updated outreach and public affairs publications, and recommended candidate organizations for annual giving by the GTE Foundation. As a member of the Public and External Affairs staff, assisted in the preparation of speeches for public appearances before elected officials. Disseminated information on company activities to schools, government entities, elected/appointed officials and the public at large. Developed and implemented a systematic communications outreach program for ongoing relationship building between company and elected officials and community leaders/members within the company's service territory that provided a means for greater outreach and branding opportunity success.

McCOY & ASSOCIATES (Los Angeles, CA)
Senior Associate (December 1998 - April 1999)
Managed campaigns and special event projects for a variety of public and private sector clients as part of a multi-disciplined consulting firm. Responsible for the complete quality management of client deliverables such as development plans.

U.S. DEPARTMENT OF THE INTERIOR (Washington, DC)
Special Water Assistant, Asst. US Secretary Patricia Beneke (April 1997 – August 1997)
As a Schedule C Presidential appointee (President Clinton), I worked as a confidential adviser to Assistant U.S. Interior Secretary Patricia Beneke at United States Department of Interior in Washington, DC. Served Secretary Beneke in several capacities, including her liaison to US Bureau of Reclamation staff and key BOR field offices in California and Nebraska regarding western water issues (Lower Colorado River Basin issues that involved the state of California, and its 4.4 million-acre feet annual allotment of Colorado River water). For Nebraska, worked on the 3-state Platte River water consultations and the final cooperative water user agreement between the Governors of Colorado, Wyoming and Nebraska that involved farmers, environmental organizations, conservationists, the public and other stakeholders interested in the Platte River.

CLINTON/GORE '96 GENERAL COMMITTEE (Los Angeles, CA)
California Deputy State Director (Southern California Political Lead) (1996)
California Desk Co-Director, Presidential Inaugural Committee (1997)

SHEILA JAMES KUEHL FOR ASSEMBLY (Los Angeles, CA)
Campaign Manager (1994)

LOS ANGELES MAYOR RICHARD RIORDAN (Los Angeles, CA)
Deputy Press Secretary / Mayoral Assistant / Advance Co-Lead (1993-94)
Deputy Field Director / Deputy Director, Advance (**Riordan for Mayor**) (1993)

DEMOCRATIC PARTY OF ORANGE COUNTY (Santa Ana, CA)
Office Manager / Chief Assistant to the Chairman (1991-92)

UNIVERSITY OF CALIFORNIA, Santa Cruz
Federal Work-study Program Manager, UCSC Student Employment (1990 – 1991)

ICICLE SEAFOODS/TOWA ROE, Inc. (Seward, AK)
Salmon Cannery Production Supervisor "Team Lead" (Summers, 1988-1991)

EDUCATION:

University of California at Santa Cruz
B.A., Environmental Studies/Politics (Policy & Planning), 1990
(Thesis Honors: Resource Management, Tongass National Forest, Alaska)

Case Western Reserve University, Cleveland, Ohio
B.S. candidate, Industrial, Mechanical Engineering, 1985-88

AFFILIATIONS:

Association of Environmental Professionals, Member (2010-present)

Stonewall Democratic Club, Member (1992-present)

Los Angeles Export Terminal, Commissioner (1999-2005)

DECLARATION OF

I, Jacquelyn Leyva Record declare as follows:

1. I am presently employed by the California Energy Commission in the Facilities Siting Office of the Systems Assessments and Facilities Siting Division as an Air Resources Engineer.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Air Quality** for the **Hidden Hills Solar Electric Generating System** based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony and errata is valid and accurate with respect to the issue addressed therein.

5. I am personally farniliar with the facts and conclusions related in the testimony and errata and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: Oct. 30, 2012 Signed: Jacquelyn Leyva Record

At: Sacramento, California

(925) 324-1173 cell
jlrecord03@gmail.com

Jacquelyn Leyva Record

Experience

March '09 – Present **CA Energy Commission** **Sacramento, CA**

Air Resources Engineer

- Currently authoring staff assessment analyses for the technical area of air quality for the Engineering and Siting Division permitting power plant projects over 50 MW in the state of CA. Worked on renewable ARRA funding projects along with natural gas power projects.
- Reviewing emission compliance reports
- Authored staff analyses for project amendments
- Trained in CEQA and NEPA analysis, along with AERMOD air modeling.

August '08 – March '09 **ERRG, Inc.** **Martinez, CA**

Engineering Assistant

- Assisted with both technical and field duties for a variety of environmental investigations.
- Assisted on an environmental site assessment, preliminary assessments (PA), site inspections, and remedial investigations feasibility studies.
- Field duties performed include groundwater sampling and air sampling

June '07 – March '08 **Tetra Tech EC, Inc** **Santa Ana, CA**

Engineering Assistant Intern

- Working on various Department of Defense projects in environmental engineering.
- Helped assist in 5 year review of remediation approaches.
- Helping assist with a commercial project creating a water reuse/recycle treatment plant.

June '05 – September '05 **SF Regional Water Board** **Oakland, CA**

Contract Work – Special Project

- Wrote a memorandum regarding total petroleum hydrocarbons showing up as false positives in submitted quarterly monitoring reports for NPDES FUEL permit.
- Researched various EPA methods of testing for VOC, and Fuel constituents in water.
- Communicated with consultants from Weiss Associates and state funded laboratories to come to a conclusion for memorandum.
- Site inspections, site reports.

Education

2003-June 2008 University of California Irvine Irvine, CA

- B.S., Chemical Engineering
- MAES (Mexican American Engineers and Scientists) - Vice Chair 2004-2005
- CAMP summer science program participant 2003

June 1999 – September 2003 Las Lomas High School Walnut Creek, CA

- High School Diploma
- Life time member of CSF (California Scholarship Federation).

DECLARATION OF
Carol Watson

I, **Carol Watson**, declare as follows:

1. I am presently employed by the California Energy Commission in the Environmental Office of the Siting Transmission& Environmental Protection Division as a staff biologist (Planner II).

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Biological Resources** for the Hidden Hills Solar Electric Generating System based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 10-30-2012 Signed: _____

At: Sacramento, California

Carol Watson
Sacramento, CA 95816

WORK EXPERIENCE

California Energy Commission — **2/2010 - Present**
Sacramento, CA
Siting Transmission & Environmental Protection Division

As staff biologist, primary duty analysis of power plants over 50MW: solar thermal, photovoltaic (pending litigation), natural gas, and coal technologies. Analyze applications to permit projects, conduct CEQA-certified regulatory program under the Warren-Alquist Act, perform scoping and coordination with resource agencies, the public, "intervenors" to the applicant's process, formulate and recommend mitigation, and defend analysis under oath before Energy Commission Commissioners. Provide compliance oversight for permitted projects during all stages: construction, operation, and closure, and ensure proper implementation of mitigation. Synthesize developing regulations (REAT agency, DRECP Sec. 10 process among others) and relevant legislation to ensure Energy Commission compliance. Coordinate with— and negotiate— solutions with diverse entities as BLM, USWS, Water Quality Control Board, US Army Corps of Engineers, Governor's Office liaisons to the Energy Commission, private interest groups, and solicitors working on behalf of these interests.

Parsons Corporation — **10/2004 - 12/2009**
Las Vegas, Nevada

Principal Scientist

Worked in-house with client, Southern Nevada Water Authority. Served as Principal scientist from 11/2008 to 2/2010. Prepared Environmental Species Act Section 7 Permit for the Southern Nevada Water Authority Pipeline Project. Species included desert tortoise and 10 other Mojave and Great Basin aquatic and upland species. Perform general site surveys, spring snail counts, sage grouse telemetry, mist netting for bats, Amargosa toad surveys in Death Valley, Nevada, and assist the Nevada Department of Wildlife with bat telemetry studies.
From 2004-2008 served as project scientist. Duties included mapping riverbank vegetation of the Virgin river, from the lower reach in Nevada through the confluence with Lake Mead. Ground-truthed plant assemblages based on aerial imagery and 3-dimensional (stereoscopic) views of vegetation. Familiar with cadastral and rastral imagery analysis.
From 9/2005-11/2008 served on consultant basis. Prepared EIS/EIR analysis for impacts to peregrine falcon and special status bat species from the Gerald Desmond Bridge Project, in the Port of Long Beach, California.

Enercon — **9/2005-11/2007**
Tulsa, Oklahoma

Project Biologist

Fulltime from 7/2008-11/2008, consulting status from 9/2005 to 5/2007. Served as project biologist, performing a range of work from baseline surveys for the Oklahoma Department of Transportation, preparing NEPA documents, preparing and responding to Requests for Proposals and Requests for Qualifications. Representative projects include coordination of environmental studies and preparation of an Environmental Assessment for the Federal Highway Administration, on behalf of Kellogg Engineering, in Rogers County, Oklahoma. Conducted public scoping and agency solicitation, attending county plenary sessions as technical environmental consultant. Prepared an Environmental Information Document for the Environmental Protection Agency for the expansion of the Rural Water District #3 Tacora Water Treatment plant in Rogers County, OK. Conduct protocol surveys for the federally endangered American burying beetle on behalf of clients such as Chesapeake Operating Systems, OKDOT, and Panther Energy Company, surveyed new pipeline routes from Oklahoma though northern Texas for OG&E.

Representative Project: City of Moreno Valley, Riverside Co., California. Prepared Caltrans' Natural Environment Study for improvements to SR-60 at the Moreno Beach Drive and Nason Street interchanges. Studies included oversight of a jurisdictional delineation of wetlands and waters of the U.S., and coordination with project engineers to determine project boundaries and impacts. Developed mitigation in conformance with the Western Riverside County Multiple Species Habitat Conservation Plan.

BonTerra Consulting **2/2004 – 10/2004**
Pasadena, California

Wildlife Biologist

Draft RFQ/RFP, perform general biological surveys on behalf of public and private sector clients, and prepare CEQA/NEPA documentation. Representative Project: Plum Canyon Development, Los Angeles Co., California: Conducted salvage (pitfall trapping & grubbing salvage) and relocation of sensitive and local populations of reptiles and amphibians. Species handled included Western spadefoot toad, coastal western whiptail, and silvery legless lizard. Coordinated with CDFG regarding species of special concern, drafting relocation plans, and assisted with developing a protocol to simulate and force spring emergence and subsequent relocation of spadefoot toads prior to grubbing.

Sapphos Environmental **12/2000-2/2003**
Pasadena, California

Wildlife Biologist

Responsible for all phases of project management and biological technical work. Responded to and prepared RFP/RFQ, designed and conducted environmental study sufficient to project details (*i.e.* determination and development of appropriate ESA, NEPA, CEQA, Clean Water Act permits); and prepared environmental documentation. Prepared and conducted all public noticing and scoping per regulations, and prepared as technical consultant before the county and city and planning committees of Ventura and Los Angeles.

Representative Project: Ahmanson Ranch, Ventura County, California: Conducted long-term monitoring of a population of California red-legged frog with detailed notes as to location, behavior, and conditions. Assisted permitted biologists in placing passive integrated transponders, or PIT tags, as part of a radio telemetry study designed to aid understanding of habitat use and foraging distances. Assisted with the preparation of a Biological Assessment for an Endangered Species Act Section 7 consultation. Managed the design and creation of enclosed habitat and a captive breeding program. Conducted various studies at the Ahmanson Ranch, including San Fernando Valley spineflower introduction studies, seed counts and collections, and oak tree surveys and assessments.

EDUCATION

M.S. Zoology, Eastern Illinois University **2000**
Focus: environmental ecology; population dynamics
Paid Teacher's Assistantship

B.S., Biology, Western Michigan University 1998
Chemistry minor

RELEVANT TRAINING

CPR Certified (2011, Energy Commission)
Desert Tortoise Surveying, Monitoring, and Handling Workshop, (2000)
BLM certified to survey for the flat-tailed horned lizard (2001)
California red-legged frog workshop (2001)
Passed U.S. Fish and Wildlife Service survey exam for El Segundo blue butterfly (2002)
American Burying Beetle Bait-away Surveys and Pitfall Trapping (performed under a permitted biologist' supervision), 2006-2007

DECLARATION OF
Testimony of Chris Huntley

I, **Chris Huntley,** declare as follows:

1. I am presently employed by Aspen Environmental Group, a contractor to the California Energy Commission, Siting, Transmission and Environmental Protection Division, as a **Biological Resource Technical Specialist**.

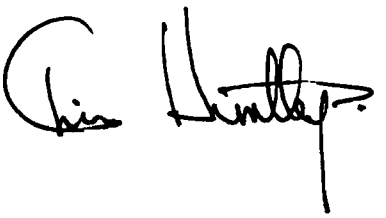
2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **Biological Resources** for the **Hidden Hills Solar Electric Generating System Final Staff Assessment** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.



Dated: November 8, 2012 Signed: _____

At: Sacramento, California

CHRISTIAN S. HUNTLEY
Senior Associate/Biological Group Manager, Southern California

Academic Background

Graduate Studies, Biology, California State University Northridge
BA, Biology, University of California at Santa Cruz, 1992

Professional Experience

Mr. Huntley has 14 years of experience with Aspen supporting and managing CEQA/NEPA projects including EIR/EIS, IS/MND, EA, BE/BA, and BA documents. In addition, Mr. Huntley has extensive energy experience including preparing the biological resource sections on several landscape level solar and wind projects. He also has broad experience conducting biological assessments, managing large-scale construction and restoration projects, and supporting agency clients with permitting tasks including compliance with California Department of Fish and Game (CDFG) 1600 and 2081 permits, US Fish and Wildlife Service (USFWS) Section 7 process, Regional Board 401 compliance, and US Army Corps (Corps) 404 permits. Mr. Huntley has extensive experience working on large scale permitting projects in the Mojave and Colorado Deserts. These projects involved extensive 1600, 2081, Section 7 consultation, and coordination with the BLM, CDFG, and USFWS. With over 20 years of experience as a biologist, Mr. Huntley has demonstrated expertise working with the sensitive biological resources that occur in the arid southwest of California, Arizona, and Nevada. Mr. Huntley has completed detailed vegetation mapping, sensitive species surveys including desert tortoise, and developed revegetation plans for projects throughout southern California, Nevada, and Arizona. With practical experience in managing large-scale construction projects, Mr. Huntley has unique experience in resolving conflicts and ensuring compliance with environmental regulations. Supported by a solid background in biological resources, experience in completing BLM procedures, CEQA, NEPA, USDA Forest Service Biological Assessments, sensitive species consultation, and over a decade of construction management experience, he works closely with resource agency personnel, contractors and affected jurisdictions to ensure that projects are constructed on time and in compliance with applicable laws, ordinances, regulations and standards. Some of the relevant projects Mr. Huntley has worked on are described below.

Aspen Environmental Group 1998-present

Energy Experience

- **Calico Solar Project (formerly SES Solar One Project), California Energy Commission, Biologist (2009-2010).** Mr. Huntley prepared the biological resources analysis of the Staff Assessment/EIS for this solar energy project proposed by Calico Solar, LLC. The proposed project would be located in San Bernardino County and includes the construction and operation of an 850-MW Stirling engine solar generation facility, which would include approximately 34,000 SunCatcher solar dish Stirling systems on approximately 8,230 acres. Key issues include potential impacts to desert tortoise, Mojave fringe-toed lizard, Nelson's bighorn sheep, burrowing owl, and golden eagle, as well as large-scale modifications to existing drainages and interference with regional wildlife movement.
- **Palmdale Hybrid Power Plant, California Energy Commission, Biologist (2009-present).** Mr. Huntley is preparing the biological resources analysis of the Staff Assessment for this power generation project proposed by the City of Palmdale. The proposed project would be located in northern Los Angeles County and includes the construction and operation of a 570-MW hybrid combined-cycle and solar thermal electrical generation facility, which would include an approximate 333-acre plant site and a 35.6-mile transmission line to connect the project to the existing Southern California Edison Vincent Substation, as well as four pipelines to transport water, gas, and wastewater (ranging from 1.5 to

7.4 miles in length). Key issues include potential impacts to Swainson's hawk, desert tortoise, Mojave ground squirrel, and golden eagle.

- **Rice Solar Energy Project, California Energy Commission, Biologist (2009-2010).** Mr. Huntley is contributing to the biological resources analysis of the Staff Assessment/EIS prepared for this solar energy project proposed by Rice Solar Energy, LLC (a wholly owned subsidiary of SolarReserve, LLC). The proposed project would include a 150-MW solar generation facility consisting of up to 17,500 solar-tracking heliostats, a central tower, and associated infrastructure and appurtenant structures. The solar field site would be located on approximately 1,410 acres of privately owned land in eastern Riverside County. In addition, a 10-mile 230-kV generator tie-line would be constructed to interconnect the project with Western Area Power Administration's existing Parker-Blythe transmission line. The new transmission line would traverse lands primarily under the jurisdiction of the Bureau of Land Management (BLM). The new transmission line would also require the construction of a new 4.6-mile access road, also largely located on BLM lands. Key issues include potential impacts to desert tortoise and golden eagle, and potential impacts to birds in general from the solar technology.

- **California Energy Commission Emergency Siting Team, Power Plant Development, Compliance Project Manager.** For two years, Mr. Huntley's duties included management of technical staff for the completion of CEQA equivalent environmental permitting for over nine new emergency power plants, review of applicant submittals, drafting of Memoranda of Understanding with Chief Building Officials, conducting audits of building officials, and coordinating with affected agencies to resolve concerns with potential resource impacts. Other duties included maintaining contractor construction milestones, compliance monitoring and reporting, development of mitigation measures and conflict resolution for power plant compliance issues.

- **California Energy Commission (CEC) Coastal Power Plant Study, Deputy Project Manager/Biologist.** Mr. Huntley conducted biological surveys at 21 coastal power plants as part of the CEC's coastal power plant study. Site visits characterized habitat within the footprint of the power plant, landscaping, and identified potential environmental and permitting issues associated with potential expansion of the power plants.

- **CEC Hydroelectric Power Plant Inventory Study, Deputy Project Manager/Natural Resources Analyst.** Mr. Huntley coordinated a team that collected power and environmental data on over 200 hydroelectric power plants located in California. Physical power data included electrical output, system upgrades, water storage capacity and peaking availability. Environmental information included developing a data base addressing sensitive species issues, fish screens and ladders, monitoring parameters and a map of known hydroelectric facilities and barriers to anadromous fish passage. Mr. Huntley also obtained water use information on thermal power plants in support of the CEC's bi-annual environmental performance report.

- **Topaz Solar Farm EIR, San Luis Obispo County, Issue Area Coordinator/Biologist (2009-2011).** Mr. Huntley is acting as the issue area coordinator for natural resources on this solar energy project proposed by Topaz Solar Farms, LLC (wholly owned by First Solar, Inc.). The proposed project would consist of a 550-MW solar photovoltaic (PV) energy generating facility on approximately 6,200 acres in the Carrizo Plain area of eastern San Luis Obispo County. Key issues include potential impacts to San Joaquin kit fox, jurisdictional drainages, vernal pools, rare plants, and nesting birds.

- **California Valley Solar Ranch EIR, San Luis Obispo County, Issue Area Coordinator/Biologist (2009-2011).** Mr. Huntley is acting as the issue area coordinator for biological resources on this solar energy project. The proposed project involves construction and operation of a 250-MW photovoltaic (PV) solar power plant in the unincorporated portion of eastern San Luis Obispo County. The project would be owned by High Plains Ranch II, LLC, a wholly owned subsidiary of SunPower Corporation

Systems. A 3.5-acre substation and approximately 2.5 miles of 230-kV transmission would be required to connect to the existing PG&E Midway to Morro Bay 230-kV transmission line. The project is one of three solar power plants currently proposed for the Carrizo Plain. Key issues include potential impacts to San Joaquin kit fox, blunt-nosed leopard lizard, and giant kangaroo rat.

- **Panoche Valley Solar Farm EIR, County of San Benito, Biologist (2010-present).** Mr. Huntley is technical support for this large-scale solar energy project. The proposed project would consist of a 420-MW solar energy generation facility on approximately 4,717 acres in the Panoche Valley of southeastern San Benito County. The facility would consist of 1,822,800 solar photovoltaic panels and associated infrastructure. Key issues include potential impacts to California tiger salamander, blunt-nosed leopard lizard, San Joaquin antelope squirrel, giant kangaroo rat, San Joaquin kit fox, San Joaquin coachwhip, mountain plover, golden eagle, northern harrier, burrowing owl, loggerhead shrike, and American badger. In addition, suitable habitat for the following special-status species exists at the project site: vernal pool fairy shrimp, Swainson's hawk, western spadefoot, California horned lizard, merlin, pallid bat, and western mastiff bat.

- **Pacific Wind Energy Project EIR, Kern County, Biologist (2009-2010).** Mr. Huntley oversaw the preparation of the biological resources analysis of this EIR evaluating a proposed 250-MW wind energy generation facility in the Mojave region of Kern County. The proposed project would be located on approximately 8,300 acres in the Tehachapi Wind Resource Area. Key issues include potential impacts to birds and bats from the wind turbines as well as potential impacts to desert tortoise, California condor, Swainson's hawk, and golden eagle.

- **Alta–Oak Creek Mojave Project EIR, Kern County, Biologist (2008-2009).** Mr. Huntley oversaw the preparation of the biological resources analysis of this Initial Study and EIR evaluating a proposed 800 MW wind development in the Tehachapi Wind Resource Area. The proposed project site consists of three distinct land areas comprising a total of approximately 10,750 acres. Key issues include potential impacts to birds and bats from the wind turbines as well as potential impacts to desert tortoise, California condor, Swainson's hawk, golden eagle, and Bakersfield cactus.

- **North Sky River, Jawbone Wind Energy Project, Alta Infill II Project, the Morgan Hills Wind Energy Project, and the Alta East Wind Projects, Kern County, Biologist (2010-2012).** Mr. Huntley oversaw the preparation of the biological resources for these large scale wind farms.

- **Transmission Line Experience**

- **Downs Sub-station and Transmission Line Project IS/MND California Public Utilities Commission (2011-present), Issue Area Coordinator/Biologist.** Mr. Huntley acted as issue area coordinator for biological resources on this transmission line upgrade project to be completed by Southern California Edison in the Mojave Desert. Key issues on this project include the assessment of impacts to desert tortoise and Mohave ground squirrel.

- **Devers–Palo Verde Transmission Line Project No. 2 EIR/EIS, California Public Utilities Commission/ Bureau of Land Management (2005-present), Issue Area Coordinator/Biologist.** Mr. Huntley acted as issue area coordinator for biological resources on this 230-mile 500-kV transmission line upgrade to be completed by Southern California Edison. This project crosses key wildlife areas including the KOFA Wildlife Sanctuary, the San Bernardino National Forest, the Mojave and Sonoran Desert habitats, and sections of the Riverside Multiple Species Conservation Area. Currently, Mr. Huntley is supporting the biological monitoring team responsible for implementing CPUC and BLM monitoring requirements during construction of the project and was responsible for assessing desert tortoise mitigation lands in coordination with the CDFG, BLM, and USFWS.

- **Tehachapi Renewable Transmission Project California Public Utilities Commission/US Forest Service (2007-present), Issue Area Coordinator/Biologist.** Mr. Huntley is acting as the issue area coordinator and principal author for biological resources on this 500-kV transmission line project proposed by Southern California Edison in support of wind energy projects. This transmission line is 173 miles in length and includes two separate segments that cross the Angeles National Forest. Some of the key issues on this project include potential impacts to Mojave ground squirrel, desert tortoise, arroyo toads, California condors, spotted owl, and a host of forest sensitive plant and wildlife species. As part of the project, Mr. Huntley mapped over 190 riparian related features and completed extensive surveys of the Angeles National Forest (ANF). Mr. Huntley managed an extensive biological staff and organized the completion of comprehensive botanical surveys for the proposed right-of-way. Other key issues involve the coordination with State Park, Forest, and resource agency staff. Currently, Mr. Huntley and is responsible for assessing desert tortoise mitigation lands in coordination with the CDFG and USFWS.

- **Antelope Transmission Project, Segments 2 & 3 EIR, California Public Utilities Commission/US Forest Service (2006-2011), Issue Area Coordinator/Biologist.** Mr. Huntley acted as issue area coordinator for biological resources on this 500-kV transmission line proposed by Southern California Edison in support of wind energy projects. Key issues on this project include potential impacts to Mojave ground squirrel, California red-legged frog, burrowing owl, and rare plants. As part of this project Mr. Huntley conducted focused surveys for arroyo toads and coordinated ESA compliance with the USFS and USFWS. As part of the project Mr. Huntley completed the BE/BA to comply with the provisions of the ESA and the Management Indicator Species Report for ANF compliance. Currently, Mr. Huntley provides technical assistance to monitoring staff.

- **El Casco Sub-Transmission Project EIR, California Public Utilities Commission (2006-present), Issue Area Coordinator/Biologist.** Mr. Huntley acted as issue area coordinator for biological resources and completed the impact analysis section of the EIR for this 17-mile subtransmission line upgrade to be completed by Southern California Edison. This line is located in the Western Riverside Multiple Species Conservation Area and crosses areas supporting several federally protected species including least Bell's vireo, southwestern willow flycatcher, and Stephens' kangaroo rat. Currently, Mr. Huntley provides technical assistance to monitoring staff.

- **Antelope-Pardee Transmission Project EIR/EIS-BE/BA, California Public Utilities Commission/US Forest Service (USFS, 2005-2010), Issue Area Coordinator/Biologist.** Mr. Huntley was the issue area coordinator for biological resources on this 500-kV transmission line upgrade to be completed by Southern California Edison. Key issues on this project included compliance with the USFS Forest Plan and sensitive species including California condor, burrowing owl, and rare plants. Mr. Huntley reviewed and prepared the Biological Resource Section for the EIR/EIS, developed project alternatives, coordinated with USFS staff, and conducted sensitive species surveys for arroyo toad in support of this project. Currently, Mr. Huntley provides technical assistance to monitoring staff.

- **SCE Valley-Auld Power Line Project, CPUC, Environmental Monitor.** Conducted inspections of construction of this 11-mile power line upgrade for compliance with the project's Mitigated Negative Declaration mitigation measures and compliance plans. Other tasks included review of pre-construction compliance materials, maintaining inspection documentation, and coordination with SCE and its subcontractors. **Sunset Substation IS/MND and Biological Site Assessment, City of Banning (2006-2007), Biologist.** Mr. Huntley prepared the biology section of the IS/MND as a sub-contractor to R. W. Beck. In addition, Mr. Huntley conducted burrowing owl surveys and managed surveys for Los Angeles pocket mouse at select locations along the proposed right-of-way.

- **Viejo System Project IS/MND, California Public Utilities Commission, Biologist.** Conducted biological surveys and completed the biological section of the Initial Study and Mitigated Negative Declaration for the SCE's transmission line upgrade project.

Pipeline Experience

- **Santa Fe Pacific Pipeline, CPUC, Environmental Monitor.** Inspected construction of three petroleum distribution station sites for compliance with approved project mitigation measures and compliance plans.
- **Line 401 PG&E Redwood Expansion Project, CPUC, Lead Environmental Monitor.** Under contract to the California Public Utilities Commission (CPUC), Mr. Huntley acted as Lead Environmental Monitor and supervised two environmental monitors in the field on the implementation of the CPUC's conditions of approval for construction of this 14-mile natural gas pipeline. Responsibilities included: supervision, guidance and development of environmental monitors, onsite field monitoring, compliance review and mitigation development of pre-construction plans, and mitigation compliance documentation. Other duties included review of variance and temporary extra work space (TEWS) requests; recommendations for CPUC issuance of Notices to Proceed with construction and variance approvals; approval of TEWS requests; preparation of weekly reports for all monitoring activity; and coordination with PG&E, construction managers and subcontractors, local municipalities, affected and interested agencies and the public.
- **Horsethief Creek Road Repairs Project, IS/MND and Biological Assessment, California Department of Water Resources (2005-2009), Biologist/Project Manager.** Mr. Huntley prepared the biological resource section and managed the completion of the IS/MND and the BA for construction of an all weather road at Horsethief Creek located near Lake Silverwood in San Bernardino County. Mr. Huntley also assisted DWR through formal consultation with the USFWS. The project was intended to provide an all-weather access to DWR facilities while avoiding impacts to federally endangered arroyo toads. Mr. Huntley also managed and conducted several of the sensitive species surveys required for this project including arroyo toad, two-striped garter snake, and southwestern pond turtles. Mr. Huntley managed the monitoring efforts at the site to comply with permit regulations identified by the Biological Opinion.

NEPA Experience

- **Littlerock Dam and Reservoir Restoration Project EIR/EIS-BE/BA, Palmdale Water District/US Forest Service (2004-present), Deputy Project Manager/Biologist.** Mr. Huntley is currently acting as deputy project manager and project biologist for the sediment removal activities associated with the Littlerock Dam and Reservoir in the Angeles National Forest. Mr. Huntley is working to develop project alternatives for sediment disposal while avoiding impacts to federally endangered arroyo toads. Mr. Huntley is managing the sensitive species surveys for this project and completing the biological resources section of the EIR/EIS, Management Indicator Species Report, and BE/BA.
- **Newhall Ranch Project, California Department of Fish and Game (2005-2009), Biological Coordinator and CDFG Reviewer.** Mr. Huntley provided biological expertise and assisted CDFG staff in reviewing and revising the EIR/EIS for the proposed 6,000-acre Newhall Development Plan EIR/EIS in Santa Clarita. Primary issues concern the land use conversion of several thousand acres of wild lands and agricultural areas located in and adjacent to the Santa Clara River. This region is known to support numerous threatened and endangered species including least Bell's vireo, southwestern willow flycatcher, California condor, arroyo toad, unarmored three-spine stickleback, and San Fernando Valley spineflower. Other concerns associated with the development include wildlife movement corridors, and effects to riparian habitats. Mr. Huntley reviewed, commented and revised the environmental

documents, scheduled and coordinated meetings with resource professionals and agency staff, and provided technical review of the document. Mr. Huntley will be assisting CDFG staff in the response to comments on the Draft EIR/EIS.

- **Matilija Dam Ecosystem Restoration Project EIR/EIS, US Army Corps of Engineers, Biologist.** Mr. Huntley conducted biological surveys and assisted in the completion of the EIS/EIR to assess impacts to sensitive biological resources located on Matilija Creek and the Ventura River downstream of the of the Matilija Dam. The analysis focused on potential impacts associated with dam removal on sensitive species known to occur on the Ventura River and the beneficial impacts of the restoration of spawning territory for the endangered Evolutionary Significant Unit of Southern Steelhead.
- **Fort Irwin Environmental Baseline Survey Reports US Army Corps of Engineers (2005), Project Manager/Biologist.** Mr. Huntley managed the preparation of two Environmental Baseline Survey reports near Fort Irwin, San Bernardino County to support the land acquisition of over 95 parcels by the US Army for the Fort Irwin National Training Center. Mr. Huntley conducted site investigations, documented existing biological conditions and managed the preparation of the report.
- **Matilija Dam Ecosystem Restoration Project EIR/EIS, US Army Corps of Engineers, Biologist (2008).** Under contract to Parsons Brinckerhoff, Mr. Huntley managed a team of biologists and conducted biological surveys at the proposed sediment disposal sites associated with the removal of the Matilija Dam.
- **Patriot Integrated Air Defense Exercise Project Environmental Assessment and Environmental Baseline Survey, Nellis Air Force Base, Nevada (2006-2008), Project Manager/Biologist.** Mr. Huntley managed the preparation of an EA for ongoing military activities conducted on Bureau of Land Management (BLM) lands surrounding Nellis Air Force Base in Lincoln and Nye Counties, Nevada. Mr. Huntley coordinated with the USAF regarding field surveys of the proposed anti-aircraft sites, the assessment of biological and cultural resources, and prepared the DR/FONSI and Right-Of-Way document for the USAF. Mr. Huntley also prepared sections and managed the completion of an Environmental Baseline Report for each of the artillery sites.
- **Joint Red Flag '05 Exercise Environmental Assessment, US Army Corps of Engineers/Bureau of Land Management, Nellis Air Force Base Nevada (2004-2005), Project Manager/Biologist.** Mr. Huntley managed and coordinated the EA process for the ground component of the Joint Red Flag '05 Exercise which was conducted Bureau of Land Management (BLM) lands surrounding Nellis Air Force Base in Lincoln County, Nevada. Mr. Huntley conducted extensive field surveys of the proposed anti-aircraft sites, completed the assessment for biological and visual resources, prepared the DR/FONSI, managed sensitive species surveys, identified and flagged populations of noxious weeds, and prepared of military training guides for the soldiers in the field.
- **March Air Reserve Base Cactus and Heacock Channels Environmental Assessment and Biological Technical Report and EA, US Army Corps of Engineers (2005-2009), Project Manager/Biologist.** Mr. Huntley conducted and managed the preparation of a Biological Technical Report for two channels located along the perimeter of the March Air Reserve Base in Riverside. Mr. Huntley and a team of biologists conducted burrowing owl surveys, vegetation and vernal pool mapping, and documented existing biological conditions at the two channels. As part of this project detailed GIS maps were created to assist the Corps in preparing environmental documents for the area. Mr. Huntley managed the completion of an Environmental Assessment to evaluate impacts of construction of approximately 3 miles of flood control channel located at Cactus and Heacock Drainages. Currently, Mr. Huntley provides technical assistance to Corps staff for this project.

- **Monterey Bay Accelerated Research System (MARS) Cabled Observatory EIR/EIS, California State Lands Commission/Monterey Bay National Marine Sanctuary (2004-2006), Deputy Project Manager.** The MARS project is an advanced cabled observatory in Monterey Bay that would provide a continuous monitoring presence in the MBNMS as well as serve as the test bed for a state-of-the-art regional ocean observatory, currently one component of the National Science Foundation (NSF) Ocean Observatories Initiative (OOI). Mr. Huntley acted as deputy project manager for this project. In addition, his duties involved review of technical data, development of the project description and alternatives, and coordination with state and federal agencies.
- **Lower Colorado Flood Control Project EIR/EIS, US Army Corps of Engineers (2003-2004), Deputy Project Manager/Biologist.** Mr. Huntley conducted reconnaissance surveys and vegetation mapping along a 23-mile section of the Lower Colorado River in Yuma Arizona. In addition, Mr. Huntley updated the biological resource section of the current baseline conditions and is working with a team of State and federal agencies in an effort to determine the future alignment of the Lower Colorado River in this location. As part of this process Mr. Huntley developed project alternatives that met the criteria identified by the United States Boundary Water Commission and State and federal resources agencies.
- **Murrieta Creek Flood Control Project Phase II-IV Revegetation Plan and Sensitive Species Surveys, US Army Corps of Engineers (2006-2007), Project Manager/Biologist.** Mr. Huntley prepared comprehensive vegetation maps and detailed restoration plan for over six miles of riparian habitat located at Murrieta Creek in Riverside California. As part of this task, Mr. Huntley conducted and managed a team of resource experts in completing sensitive plant and animal species within the Murrieta Creek. Prepared detailed vegetation maps, site assessment and impact analysis for the Environmental Assessment, comprehensive revegetation and restoration plan to address project impacts, and developed mitigation for sensitive plant and wildlife species. In addition, Mr. Huntley worked closely with local resource agencies and managed sensitive wildlife surveys and the trapping and relocation of southwestern pond turtles from the project area. Currently, Mr. Huntley is providing technical assistance to the Corps regarding this project.
- **Murrieta Creek Flood Control Project Supplemental EA, US Army Corps of Engineers (2003-present), Deputy Project Manager/Biologist.** Mr. Huntley conducted site surveys for sensitive plant and animal species within the Murrieta Creek. He also prepared detailed vegetation maps, site assessment and impact analysis for the Environmental Assessment, comprehensive revegetation and restoration plan to address project impacts, and developed mitigation for sensitive plant and wildlife species. In addition, Mr. Huntley worked closely with local resource agencies and managed sensitive wildlife surveys and the trapping and relocation of southwestern pond turtles from the project area. Currently, Mr. Huntley is providing technical assistance to the Corps regarding this project.

Other Relevant Experience

- **Level 3 Fiber Optics Network Construction Monitoring and Supplemental Environmental Review Program, CPUC, Environmental Monitor.** Mr. Huntley's duties included inspection of several southern California segments including Santa Barbara to Burbank, San Bernardino, Corona to Atwood, and San Diego to the California/Arizona state line. He provided environmental compliance during construction addressed biological and cultural resource, air and water quality, traffic control, and public utilities. Other tasks included maintaining daily documentation, review of pre-construction mitigation measures, weekly reporting of compliance activities, and coordination with Level 3 personnel and subcontractors, and affected agencies.

- **Salton Sea Debris Removal Project, Los Angeles Department of Water and Power (2007-2008), Project Manager/Biologist.** Mr. Huntley conducted Phase I, II, and III burrowing owl surveys at several sites scheduled for clean-up in the Imperial Valley. Mr. Huntley managed the monitoring of clean-up activities and developed mitigation strategies to comply with State and local permit requirements regarding the protection of this species.
- **Perris Lake Permit Support, California Department of Water Resources (2005/2006), Biologist.** Mr. Huntley prepared a biological technical report to support permitting activities at Perris Lake in Riverside California. Mr. Huntley also reviewed and prepared the Storm Water Pollution Prevention Plan in compliance with Regional Board requirements.
- **Focused Surveys for least Bell's vireo and southwestern willow flycatchers at the Hansen Dam, Los Angeles River, and San Gabriel River, US Army Corps of Engineers (2005), Project Manager.** Mr. Huntley managed the focused surveys and report preparation for this task.
- **Tortoise Monitoring at Las Vegas Wash, US Army Corps of Engineers (2005-2006), Project Manager.** Mr. Huntley managed the survey and report preparation for monitoring activities associated with this task. Monitoring crews conducted work within the Tropicana, Flamingo, and Blue Diamond tributaries as part of the ongoing flood control activities.
- **Pacific Pipeline Project EIR/EIS for the US Forest Service, Angeles National Forest, and the California Public Utilities Commission, Environmental Monitor.** Served as an Environmental Monitor and supervised mitigation monitoring for all sensitive resources for a construction segment along a 132-mile crude oil pipeline within southern California.
- **San Antonio Creek Erosion Repairs Project BA/EA, US Army Corps of Engineers, Biologist.** Mr. Huntley conducted botanical surveys and prepared detailed vegetation maps within San Antonio Creek. Mr. Huntley also prepared the Biological and Environmental Assessments for the project and developed mitigation for sensitive plant and wildlife species.
- **Vista Del Lago Visitor Center Slope and Waterline Repair Biological Evaluation/Biological Assessment, California Department of Water Resources (2006-2008), Project Manager/Biologist.** Mr. Huntley managed the preparation of the Biological Evaluation/Biological Assessment in compliance with the USFS to conduct repairs to a failed slope at the Vista Del Lago Visitor Center at Pyramid Lake. Mr. Huntley also acted as the USFS and CDFG liaison for this project and managed the preparation of regulatory permits for compliance with CDFG, Corps, and Regional Board requirements. Mr. Huntley also managed the biological monitoring for this project.
- **Pyramid Dam Emergency Access Road IS/MND and Biological Evaluation/Biological Assessment, California Department of Water Resources (2005-2008), Project Manager/Biologist.** Mr. Huntley prepared the biology section of the IS/MND and the Biological Evaluation/Biological Assessment in compliance with the USFS to construct an emergency access road from Interstate 5 to Pyramid Lake Dam. Mr. Huntley acted as the USFS and CDFG liaison for this project and managed the sensitive species surveys for the project.
- **Castaic Lake Biotic Assessment, Los Angeles Department of Water and Power (2007), Project Manager/Biologist.** Mr. Huntley managed the preparation of an updated Biological Resource Assessment for the Castaic Power Plant at Castaic Creek. Mr. Huntley managed a team of experts and conducted focused surveys for arroyo toad and other sensitive plant and wildlife species to support LADWP management of the area.
- **Lake Canyon IS/EIR, Ventura, Ventura County Flood Control District, Biologist (2006-2007).** Mr. Huntley conducted biological surveys of this proposed detention basin and prepared the biological resource section of the Initial Study.

- **Piru Creek Restoration of Natural Flows Project EIR, California Department of Water Resources (2004-2005), Biologist.** Mr. Huntley managed resource specialists for completion of sensitive bird surveys along Piru Creek. In addition, he conducted sensitive species surveys for aquatic resources including two-striped garter snake and southwestern pond turtle, and coordinated with technical experts during reconnaissance surveys for arroyo toad. Mr. Huntley completed engineering cross sections of Piru Creek and prepared a comprehensive State jurisdictional riparian delineation for an 18-mile section of middle Piru Creek between Pyramid Dam and Lake Piru. Mr. Huntley prepared the biological resources section and developed environmentally sound alternatives to address impacts associated with restoring natural flows to Piru Creek. Discussions of biological resources focused on the potential beneficial impacts that may occur to southwestern arroyo toad, southwestern pond turtle, red-legged frog and two-striped garter snake.
- **Angeles National Forest Fuels Reduction Project, Biological Evaluation/Biological Assessment, US Department of Agriculture Forest Service (2005/2009), Biologist.** Mr. Huntley reviewed existing documents and assisted staff in responding to comments from USFS staff. Mr. Huntley met with USFS staff and conducted site inspections at several plantation and natural stands. Currently, Mr. Huntley is revising BE/BA's for the ANF.
- **East Branch Extension Project Phase II, California Department of Water Resources (2006), Project Manager/Biologist.** Mr. Huntley managed and conducted sensitive species surveys for DWR in support of the EIR for this aqueduct extension project. In addition, Mr. Huntley acted as an expert witness and provided testimony in the San Bernardino Superior Court to allow access to key areas in support of the surveys. Focused surveys included the slender horned spineflower, Santa Ana River wooly star, California gnatcatcher, least Bell's vireo, and southwestern willow flycatcher.
- **Emergency Storm Repairs Biological Assessment, California Department of Water Resources (2005), Project Manager/Biologist.** Mr. Huntley prepared the Biological Assessment to evaluate potential impacts to sensitive species from emergency storm repairs at two locations at Piru Creek. The BA documented site conditions, identified potential sensitive species habitat and presence in the project area, and addressed specific USFWS requirements associated with arroyo toads.
- **South Adit Access Road Repair Project Biological Evaluation/Biological Assessment, California Department of Water Resources (2005/2006), Project Manager/Biologist.** Mr. Huntley prepared the Biological Evaluation/Biological Assessment in compliance with the USFS to repair storm damage to the existing asphalt road surface and to stabilize the adjacent hillside to maintain access to the South Adit; a Department of Water Resources facility located along the West Branch of the California Aqueduct. Mr. Huntley managed sensitive resource surveys for rare plants and wildlife, conducted pre-construction surveys, and coordinated with the USFS personnel. As part of ongoing construction activities at the site Mr. Huntley provided environmental training and materials, monitored construction at the site, relocated wildlife from the construction area, developed a stream diversion plan and tree removal plan for CDFG review, reviewed the SWPPP, and conducted restoration activities at the site.
- **Creel Census Surveys, California Department of Water Resources (2004-2005), Project Manager/Biologist.** In an effort to obtain information on species composition and angler usage on DWR waterways, Mr. Huntley managed creel census surveys at three locations in southern California. These included Castaic Lake, Pyramid Lake, and Piru Creek. Piru Creek is located in the Angeles National Forest and contains habitat for the endangered arroyo toad. Creel surveys are supporting analysis currently underway to restore natural flows on Middle Piru Creek to benefit populations of arroyo toad in the National Forest.

- **Rare Plant Surveys and Tree Report for the Lower Reach River Supply Conduit, Los Angeles Department of Water and Power (2006), Biologist.** Mr. Huntley managed and conducted rare plant surveys and a comprehensive tree inventory along a 14-mile water pipeline corridor.
- **Owens Gorge Re-watering Project IS/MND, Los Angeles Department of Water & Power (2006), Biologist.** Mr. Huntley prepared the biology section of the IS/MND to address potential impacts to sensitive plants and wildlife along the Owens Gorge near Bishop. This project involves the restoration of flows to a previously de-watered section of the Owens Gorge.
- **Arundel Barranca Habitat Restoration Plan, Ventura County Flood Control District (2005), Biologist.** Mr. Huntley developed a planting schematic for a 3000-foot section of existing flood control channel as part of the proposed Arundel Barranca flood control channel plan.
- **Piru Creek Repairs Project IS/MND, California Department of Water Resources, Biologist.** Mr. Huntley completed sections of the US Forest Service Biological Assessment/Biological Evaluation, and biological technical report for the Piru Creek Repairs Project. In addition, Mr. Huntley has conducted sensitive species surveys and coordinated with CDFG, USFS and RWQCB regarding permits and sensitive species issues.
- **Compliance and Mitigation Development, California Public Utilities Commission, State Lands Commission, California Department of Water Resources, Biologist.** Working with technical experts Mr. Huntley developed mitigation measures for a number of State and federal projects including the Kinder Morgan pipeline, Santa Ana pipeline and Viejo transmission line project.
- **Hollywood Reservoir Pump Station Upgrade IS/MND, Los Angeles Department of Water and Power Biologist.** Mr. Huntley conducted biological surveys of the lower Hollywood Hills pump station as part of a planned upgrade of the Los Angeles water system and completed the biological resource section of the Initial Study and Mitigated Negative Declaration.
- **Lake Skinner Filtration Plant, Metropolitan Water District, Biologist.** Mr. Huntley conducted biological surveys and completed a biological assessment at the Lake Skinner Filtration Plant to assist Metropolitan in obtaining streambed alteration, regional water, and US Army Corps of Engineers permits.
- **Los Angeles County Drainage Area (LACDA), US Army Corps of Engineers, Environmental Monitor & Biological Assessment.** Mr. Huntley conducted inspections of Los Angeles County Drainage Area levee wall expansions for improved flood control. Also conducted Biological Assessments for proposed project changes.
- **Las Virgenes Municipal Water District IS/MND, Biologist.** Mr. Huntley conducted site surveys for sensitive plants and animal species for potential water pipeline expansion. Prepared detailed vegetation maps and site assessment documenting site botany and reviewed Biological Assessment for the site.
- **Dent Drain Permit Support, Ventura River, Ventura County Flood Control District, Biologist.** Mr. Huntley conducted site surveys for sensitive plants and animals and prepared Biological Assessment for proposed construction along the Ventura River.
- **Honda Barranca Permit Support, Ventura County Flood Control District, Biologist.** Mr. Huntley conducted site surveys for sensitive plants and animals and prepared Biological Assessment for two locations proposed for repairs along the Honda Barranca.
- **Arundel Barranca Permit Support, Ventura County Flood Control District, Biologist.** Mr. Huntley conducted site surveys for sensitive species and prepared Biological Assessment for proposed modification to 3000 feet of existing flood control channel.

- **Looking Glass Networks, CPUC, Mitigation Review and Development.** Mr. Huntley's duties included review and development of mitigation measures for installation of a proposed fiber optic interconnects located across California. Technical areas addressed included biology, soil and water, air quality, and cultural resources.
- **Slender Horned Spineflower Survey, US Army Corps of Engineers, Biologist.** Mr. Huntley conducted sensitive species surveys for the slender-horned spine flower covering approximately 5,300 acres in the Santa Ana River Wash, below the Seven Oaks Dam in San Bernardino County, to assess species impact from changes in hydrology once the Seven Oaks Dam is operational. The survey and mapping required extensive use of GPS equipment for the mapping of transects surveyed and the location of spine flower Populations.
- **INS Air Station, Otay Mesa Biological Assessment, US Army Corps of Engineers, Biologist.** Mr. Huntley conducted sensitive plant and animal surveys and prepared biological assessment for proposed and alternative station sites, including preparation of detailed vegetation maps.
- **Visalia Land Fill Biological Assessment, Biologist.** Surveyed potential expansion sites for sensitive biological species including San Joaquin kit fox, burrowing owls, and several endangered plant species. Prepared Biological Assessment for sensitive and plant and wildlife species.
- **Rancho Cucamonga, Biologist.** Mr. Huntley conducted site surveys for sensitive plants species for site suitable for future wetland revegetation. Prepared detailed vegetation maps and site assessment documenting site botany.

Selected Technical Experience/Training and Certifications

- SWPPP trained 2006
- California Energy Commission Outstanding Performance Award, 2001
- CDFG Scientific Collecting Permit for pond turtle and garter snake.
- Certified Caltrans Horizontal Directional Drilling Inspector 2001
- Desert Tortoise Handling Workshop, Ridgecrest California 2001
- CEC Expert Witness Training 2001
- Railroad Right-of-Way Safety Training 2002
- Small boat handling, licensed and certified since 1993
- Research Scuba-diving certification and training since 1989

DECLARATION OF
GEOFFREY LESH

I, **Geoffrey Lesh** declare as follows:

1. I am presently employed by the California Energy Commission in the Siting, Transmission and Environmental Protection Division as a **Mechanical Engineer**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Hazardous Materials Management,** on **Worker Safety / Fire Protection,** and on **Appendix BIO1 – Biological Resources Risk Assessment of Avian Exposure to Concentrated Solar Radiation** for the **Hidden Hills Solar Electric Generating System [HHSEGS] (11-AFC-2)** project based on my independent analysis of the Application for Certification and any supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 10/30/2012 Signed:

At: Sacramento, California

Geoffrey Lesh, PE

WORK HISTORY

California Energy Commission Mechanical Engineer 2002 - Current

- Analyze siting permit applications for gas-fired and solar-thermal power plants in the technical areas of hazardous materials management, fire safety, security, and worker safety plans
- Provide written and oral expert witness testimony at Commission Hearings on power plant fire protection plans, risk assessments, and adequacy of local fire departments
- Recommend mitigations as needed
- Inspect power plants during construction and operational phases
- Investigate accident, fire, and hazardous materials incidents at power plants

Self-Employed Independent Investor 2000 - 2002

- Wrote market analysis computer software

Read-Rite Corp Wafer Engineering Manager 1994 - 2000

- Designed and developed wafer manufacturing processes for computer data storage systems. Managed team of engineers and technicians responsible for developing wet and dry chemical processes for manufacturing, including process and safety documentation
- Managed product line process and equipment selection for manufacturing processes
- Processes included vacuum processed metals and ceramics, annealing, grinding-polishing, plating, etching, encapsulation, process troubleshooting, and SPC reporting

Dastek Corp (Komag Joint Venture Start-up) Wafer Engineering Manager 1992 - 1994

- Developed wafer processes for new-technology recording head for hard disk drives
- Managed team of engineers and technicians
- This position included start-up of wafer fab, including line layout, purchase, installation, and startup of new process equipment, etc.

Komag, Inc Alloy Development Manager 1989 - 1992

- Developed new vacuum-deposited recording metal alloys
- Responsible for planning and carrying-out tests, designing experiments, analyzing results, managing test lab conducting materials characterizations
- Extensive process modeling, experiment design and data analysis

Verbatim Corp (Kodak) Process Development Manager 1983 – 1989

- Mechanical engineering for computer disk manufacturing, including product, process, and equipment including metal-ceramic-plastic processes for optical disk development
- Production processes included metal plating, metal evaporation, reactive sputtering, laser-based photolithography, injection molding
- Steering Committee Member, Center for Magnetic Recording Research, UC San Diego
- Steering Committee Member, Institute for Information Storage Technology, Santa Clara University

IBM Corp Mechanical/Process Engineer 1977 - 1983

- Product and process development for photocopiers, semiconductors, and computer data tape-storage systems

EDUCATION

Stanford University, Master of Science Degree	Materials Science and Engineering
UC-Berkeley, Bachelor of Science Degree (Double Major)	Mechanical Engineering, Materials Science and Engineering
University of Santa Clara, Graduate Certificate	Magnetic Recording Engineering

PROFESSIONAL LICENSES and CERTIFICATIONS

Registered Professional Engineer, California (PE)	Mechanical #M32576 Metallurgical #MT1940
Certified Safety Professional (CSP)	Board of Certified Safety Professionals
Certified Fire Protection Specialist (CFPS)	Certified Fire Protection Specialist Board (NFPA)
Certified Fire and Explosion Investigator (CFEI)	Board of National Association of Fire Investigators

OSHA 40-hr HAZWOPER Hazardous Materials Incident Training

PROFESSIONAL ASSOCIATIONS

National Fire Protection Association – member
Society of Fire Protection Engineers – Professional-level member
National Association of Fire Investigators - member

PUBLICATIONS

All-Solid Lithium Electrodes with Mixed-Conductor Matrix, J. Electrocchem. Soc. 128, 725 (1981).
Proc. Symp. on Lithium Batteries, H.V. Venkatasetty, Ed., Electrochem Soc (1981), p. 467.

PATENTS

Method of Preparing Thermo-Magneto-Optic Recording Elements, US Patent# 4,892,634, (assigned to Eastman Kodak Co.)

Geoffrey Lesh, PE

WORK HISTORY

California Energy Commission Mechanical Engineer 2002 - Current

- Analyze siting permit applications for gas-fired and solar-thermal power plants in the technical areas of hazardous materials management, fire safety, security, and worker safety plans
- Provide written and oral expert witness testimony at Commission Hearings
- Recommend mitigations as needed
- Inspect power plants during construction and operational phases
- Investigate accident, fire, and hazardous materials incidents at power plants

Self-Employed Independent Investor 2000 - 2002

- Wrote market analysis computer software

Read-Rite Corp Wafer Engineering Manager 1994 - 2000

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- Responsible for planning and carrying-out tests, designing experiments, analyzing results, managing test lab conducting materials characterizations
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- Production processes included metal plating, metal evaporation, reactive sputtering, laser-based photolithography, injection molding
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- Steering Committee Member, Institute for Information Storage Technology, Santa Clara University

IBM Corp Mechanical/Process Engineer 1977 - 1983

- Product and process development for photocopiers, semiconductors, and computer data tape-storage systems

EDUCATION

Stanford University, Master of Science Degree	Materials Science and Engineering
UC-Berkeley, Bachelor of Science Degree (Double Major)	Mechanical Engineering, Materials Science and Engineering
University of Santa Clara, Graduate Certificate	Magnetic Recording Engineering

PROFESSIONAL LICENSES and CERTIFICATIONS

Registered Professional Engineer, California (PE)	Mechanical #M32576 Metallurgical #MT1940
Certified Safety Professional (CSP)	Board of Certified Safety Professionals
Certified Fire Protection Specialist (CFPS)	Certified Fire Protection Specialist Board (NFPA)
Certified Fire and Explosion Investigator (CFEI)	Board of National Association of Fire Investigators

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Society of Fire Protection Engineers – Professional-level member
National Association of Fire Investigators - member

PUBLICATIONS

All-Solid Lithium Electrodes with Mixed-Conductor Matrix, J. Electrocchem. Soc. 128, 725 (1981).
Proc. Symp. on Lithium Batteries, H.V. Venkatasetty, Ed., Electrochem Soc (1981), p. 467.

PATENTS

Method of Preparing Thermo-Magneto-Optic Recording Elements, US Patent# 4,892,634, (assigned to Eastman Kodak Co.)

DECLARATION OF
RICK TYLER

I, **Rick Tyler** declare as follows:

1. I am presently employed by the California Energy Commission in the Siting, Transmission and Environmental Protection Division as a **Sr. Mechanical Engineer**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I supervised and or prepared staff's testimony on **Hazardous Materials Management,** on **Worker Safety / Fire Protection,** and on **Appendix BIO1 – Biological Resources Risk Assessment of Avian Exposure to Concentrated Solar Radiation** for the **Hidden Hills Solar Electric Generating System [HHSEGS] (11-AFC-2)** project based on my independent analysis of the Application for Certification and any supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 10/30/12 Signed: _____

At: Sacramento, California

RICK TYLER

Associate Mechanical Engineer

CALIFORNIA ENERGY COMMISSION

EDUCATION B.S., Mechanical Engineering, California State University, Sacramento. Extra course work in Statistics, Instrumentation, Technical Writing, Management; Toxicology, Risk Assessment, Environmental Chemistry, Hazardous Materials Management, Noise Measurement, and regulations regarding control of toxic substances.

Near completion of course work necessary to obtain a certificate in hazardous materials management from University of California, Davis.

EXPERIENCE

Jan. 1998-
Present

California Energy Commission - Senior Mechanical Engineer
Energy Facility Siting and Environmental Protection Division

Responsible for review of Applications for Certification (applications for permitting) for large power plants including the review of handling practices associated with the use of hazardous and acutely hazardous materials, loss prevention, safety management practices, design of engineered equipment and safety systems associated with equipment involving hazardous materials use, evaluation of the potential for impacts associated with accidental releases and preparation and presentation of expert witness testimony and conditions of certification. Review of compliance submittals regarding conditions of certifications for hazardous materials handling, including Risk Management Plans Process Safety Management.

April 1985-
Jan. 1998

California Energy Commission - Health and Safety
Program Specialist; Energy Facility Siting and Environmental Protection Division.

Responsible for review of Public Health Risk Assessments, air quality, noise, industrial safety, and hazardous materials handling of Environmental Impact Reports on large power generating and waste to energy facilities, evaluation of health effects data related to toxic substances, development of recommendations regarding safe levels of exposure, effectiveness of measures to control criteria and non-criteria pollutants, emission factors, multimedia exposure models. Preparation of testimony providing Staff's position regarding public health, noise, industrial safety, hazardous materials handling, and air quality issues associated with proposed power plants. Advise Commissioners, Management, other Staff and the public regarding issues related to health risk assessment of hazardous materials handling.

Nov. 1977- April 1985	California Air Resources Board - Engineer (last 4 years Associate level) Responsible for testing to determine pollution emission levels at major industrial facilities; including planning, supervision of field personnel, report preparation and case development for litigation; evaluate, select and acceptance-test instruments prior to purchase; design of instrumentation systems and oversight of their repair and maintenance; conduct inspections of industrial facilities to determine compliance with applicable pollution control regulations; improved quality assurance measures; selected and programmed a computer system to automate data collection and reduction; developed regulatory procedures and the instrument system necessary to certify and audit independent testing companies; prepared regulatory proposals and other presentations to classes at professional symposia and directly to the Air Resources Board at public hearings. As state representative, coordinated efforts with federal, local, and industrial representatives.
PROFESSIONAL AFFILIATIONS/ LICENSES	Past President, Professional Engineers in California Government Fort Sutter Section; Past Chairman, Legislative Committee for Professional Association of Air Quality Specialists. Have passed the Engineer in Training exam.
PUBLICATIONS, PROFESSIONAL PRESINTATIONS AND ACCOMPLISHMENTS	Authored staff reports published by the California Air Resources Board and presented papers regarding continuous emission monitoring at symposiums. Authored a paper entitled "A Comprehensive Approach to Health Risk Assessment", presented at the New York Conference on Solid Waste Management and Materials Policy. Authored a paper entitled "Risk Assessment A Tool For Decision Makers" at the Association of Environmental Professionals AEP Conference on Public Policy and Environmental Challenges. Conducted a seminar at University of California, Los Angeles for the Doctoral programs in Environmental Science and Public Health on the subject of "Health Risk Assessment". Authored a paper entitled "Uncertainty Analysis -An Essential Component of Health Risk Assessment and Risk Management" presented at the EPA/ORNL expert workshop on Risk Assessment for Municipal Waste Combustion: Deposition, Uncertainty, and Research Needs. Presented a talk on off-site consequence analysis for extremely hazardous materials releases. Presented at the workshop for administering agencies conducted by the City of Los Angeles Fire Department. Evaluated, provided analysis and testimony regarding public health and hazardous materials management issues associated with the permitting of more than 20 major power plants throughout California.

Developed Departmental policy, prepared policy documents, regulations, staff instruction, and other guidance documents and reference materials for use in evaluation of public health and hazardous materials management aspects of proposed power plants.

Project Manager on contracts totaling more than $500,000.

RES.RT

DECLARATION OF
Christina Snow

I, Christina Snow, declare as follows:

1. I am presently employed by the California Energy Commission in its Siting, Transmission and Environmental Protection Division as a Planner II.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on the **Land Use** section of the **Final Staff Assessment** for the **Hidden Hills Solar Electric Generating Station** Application for Certification (AFC), based on my independent analysis of the AFC, supplements, data, documents, analysis and testimony from other staff and reliable sources, and based upon my own professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: November 2, 2012 Signed: Christina Snow

At: Sacramento, California

Christina Snow

PLANNING PROFESSIONAL
Environmental • Land Use • Transportation

CALIFORNIA ENERGY COMMISSION, SACRAMENTO, CA 2010 to PRESENT

PLANNER II

Review and analyze the Application for Certification (AFC) for projects submitted by applicants in the areas of land use, visual, alternatives and traffic. Prepare staff analysis and provide staff supporting documentation and testimony for proposed projects during the environmental review process. Review submittals for approved projects to determine compliance with the approved AFC and Conditions of Certification.

PLANNER II (2010-2011)

Processed amendments for operational power plants: Included the review of existing Conditions of Certification, preparation of the analysis and other supporting documentation for management and the California Energy Commission. Managed projects and coordinated with applicants, technical specialists and the public to deliver appropriate determination in a timely manner under the CEQA regulatory program. Presented analysis and made recommendations regarding project approval to the Energy Commission at hearings.

PLACER COUNTY, AUBURN, CA 2006 to 2010

SENIOR PLANNER

Process various entitlement applications including use permits, sign permits, design review, and tree and grading permits. Researched and analyzed application materials to determine appropriate project requirements according to County, State and Federal regulations leading to the preparation of environmental documents, regulatory permit requirements, staff reports, PowerPoint presentations, conditions of approval and other supporting documents for public hearings (Zoning Administrator, Planning Commission and Board of Supervisors). Provided environmental analysis assistance to Planning staff. Assisted in the preparation of the Placer County Conservation Plan (Habitat Conservation Plan/Natural Communities Conservation Plan), which included extensive coordination with stakeholders, preparation of agendas and meeting minutes, providing guidance on pertinent issues, coordination of staff and sub-consultants, re-writing portions of the plan, prioritization of work elements and communication with the public and stakeholders.

LSA ASSOCIATES, INC., ROCKLIN, CA 2005 to 2006

SENIOR ENVIRONMENTAL PLANNER

Responsible for managing and writing NEPA/CEQA environmental documents for transportation and development projects (private and public sector). Managed and administered workload to assistant planner(s) and staff biologist. Involved in all aspects of technical reports developed for environmental document and analysis.

CALIFORNIA DEPARTMENT OF TRANSPORTATION, SACRAMENTO, CA 1993 to 2005

ASSOCIATE ENVIRONMENTAL PLANNER/COORDINATOR (2002-2005)

Acted as lead for environmental review and managed the timely completion of project delivery milestones and products essential to the environmental approval phase of transportation projects. Examined assigned transportation projects to determine level of environmental documentation, associated technical studies and other appropriate courses of action in accordance with NEPA and CEQA. Prepared environmental documents for projects, which included researching, gathering and compiling information, analyzing and interpreting data and developing formats to present and display data. Proposed solutions and provided information on environmental issues while working effectively with others in an interdisciplinary team setting. Participated in public workshops, regulatory meetings, external project meetings and internal management meetings regarding environmental information, solutions and other pertinent environmental issues.

- Worked extensively on the final Environmental Impact Statement/Report for the Lincoln Bypass overseeing and participating in completion of significant milestones including: Biological Assessments, NEPA 404/MOU Least Environmentally Damaging Practicable Alternative (LEDPA) concurrence, CWA 404 permit application submittal, FESA Section 7 formal consultation and draft Habitat Mitigation and Monitoring Plan.

ASSOCIATE TRANSPORTATION PLANNER (1999-2002)
Planned, developed, administered, evaluated and monitored transportation plans, programs and projects. Prepared system plans of transportation facilities and services. Participated in environmental review, policy development, implementation strategies and analyzed proposed policies and legislation from other government agencies as it related to the development of the California Transportation Plan. Performed and evaluated transportation planning research. Participated as a departmental representative on transportation planning issues at inter- and intradepartmental meetings and public or private meetings and hearings.Facilitated workshops designed to obtain public input on transportation issues within Los Angeles area for incorporation into the development of the California Transportation Plan.

PROFESSIONAL DEVELOPMENT/EDUCATION

Professional Development/Training:

Alternatives and Cumulative Impacts, Subdivision Map Act, Oak Woodland Planner's Workshop, Design Review, Implementing SB375, Successful CEQA Compliance, Environmental Planning Academy, Project Management, Boundaries of Local Governments, Local Government Planning, Planning Academy, Community Impact Assessment Workshop, Total Quality Management, Managing Yourself on the Job, Arcview, Comprehensive Financial Management Workshop, FHWA Statewide Transportation Planning, Dreamweaver Web Application, Governmental Accounting, Highway Capacity Manual, Intergovernmental Review (IGR/CEQA), and Business Writing.

Relevant Coursework – U.C. Davis Extension:

Environmental Planning and Site Analysis, Financial Aspects of Planning, Planning in California: Overview and Update, Professional Planning Practice and Communication, CEQA compliance, Subdivision Map Act, Design Review.

Education:

Sacramento State University, 1993 - B.S. in Accountancy

DECLARATION OF
SHAHAB KHOSHMASHRAB

I, **SHAHAB KHOSHMASHRAB**, declare as follows:

1. I am presently employed by the California Energy Commission in the **ENGINEERING OFFICE** of the Siting, Transmission, and Environmental Protection Division as a **SENIOR MECHANICAL ENGINEER**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I participated in the preparation of the staff testimony on **Power Plant Efficiency** for **Hidden Hills Solar Electric Generating System** based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 10/30/2012 Signed:

At: Sacramento, California

DECLARATION OF
SHAHAB KHOSHMASHRAB

I, **SHAHAB KHOSHMASHRAB**, declare as follows:

1. I am presently employed by the California Energy Commission in the **ENGINEERING OFFICE** of the Siting, Transmission, and Environmental Protection Division as a **SENIOR MECHANICAL ENGINEER**.

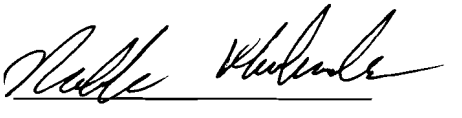
2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I participated in the preparation of the staff testimony on **Facility Design** for **Hidden Hills Solar Electric Generating System** based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 10/30/2012 Signed: 

At: Sacramento, California

DECLARATION OF
SHAHAB KHOSHMASHRAB

I, **SHAHAB KHOSHMASHRAB**, declare as follows:

1. I am presently employed by the California Energy Commission in the **ENGINEERING OFFICE** of the Siting, Transmission, and Environmental Protection Division as a **SENIOR MECHANICAL ENGINEER**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I participated in the preparation of the staff testimony on **Noise and Vibration** for **Hidden Hills Solar Electric Generating System** based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 10/30/2012 Signed:

At: Sacramento, California

DECLARATION OF
SHAHAB KHOSHMASHRAB

I, **SHAHAB KHOSHMASHRAB**, declare as follows:

1. I am presently employed by the California Energy Commission in the **ENGINEERING OFFICE** of the Siting, Transmission, and Environmental Protection Division as a **SENIOR MECHANICAL ENGINEER**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I participated in the preparation of the staff testimony on **Power Plant Reliability** for **Hidden Hills Solar Electric Generating System** based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 10/30/2012 Signed: _____

At: Sacramento, California

Shahab Khoshmashrab
Senior Mechanical Engineer

Experience Summary

Seventeen years experience in the Mechanical, Civil, Structural, and Manufacturing Engineering fields involving engineering and manufacturing of various mechanical components and building structures. This experience includes QA/QC, construction/licensing of electric generating power plants, analysis of noise pollution, and engineering and policy analysis of thermal power plant regulatory issues.

Education

- California State University, Sacramento-- Bachelor of Science, Mechanical Engineering
- Registered Professional Engineer (Mechanical), California

Professional Experience

2001-Current—Senior Mechanical Engineer, Systems Assessment and Facilities Siting– California Energy Commission

Perform analysis of generating capacity, reliability, efficiency, noise and vibration, and the mechanical, civil, and structural aspects of power plant siting cases.

1998-2001--Structural Engineer – Rankin & Rankin

Engineered concrete foundations, structural steel and sheet metal of various building structures including energy related structures such as fuel islands. Performed energy analysis/calculations of such structures and produced both structural plans and detailed shop drawings using AutoCAD.

1995-1998–Manufacturing Engineer – Carpenter Advanced Technologies

Managed manufacturing projects of various mechanical components used in high tech medical and engineering equipment. Directed fabrication and inspection of first articles. Wrote and implemented QA/QC procedures and occupational safety procedures. Conducted developmental research of the most advanced manufacturing machines and processes including writing of formal reports. Developed project cost analysis. Developed/improved manufacturing processes.

DECLARATION OF
Huei-An (Ann) Chu

I, Huei-An (Ann) Chu, declare as follows:

1. I am presently employed by the California Energy Commission in its Siting, Transmission and Environmental Protection Division as an Air Resources Engineer.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on the **Public Health** section of the **Final Staff Assessment** for the **Hidden Hills Solar Electric Generating Station** Application for Certification (AFC), based on my independent analysis of the AFC, supplements, data, documents, analysis and testimony from other staff and reliable sources, and based upon my own professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: November 2, 2012 Signed: Huei-An Chu

At: Sacramento, California

Huei-An (Ann) Chu

1516 Ninth Street, MS 46, Sacramento, CA 95814
Phone: (916) 6510965, Email: Ann.Chu@energy.ca.gov

EDUCATION

PhD, Environmental Sciences and Engineering, 05/2006
School of Public Health, University of North Carolina at Chapel Hill
Area of Specialization: Environmental Risk Assessment, Environmental Management and Policy, Risk-Based Regulation, Biostatistics, Environmental Epidemiology

MEM, Environmental Management, 05/2000
School of Forestry and Environmental Studies, Yale University, New Haven, CT

MS, Environmental Engineering, 06/1998
National Taiwan University, Taipei, Taiwan

BA, Geography, with honors, 06/1996
National Taiwan University, Taipei, Taiwan

SKILLS

Language: Fluent in Chinese and English.

Computer software and programming skills: HARP, SAS, Stata, Minitab, ArcGIS, ArcView, ArcInfo, Stella, Crystal Ball, ISC, ERMapper, Microsoft Excel, PowerPoint, Word.

WORK EXPERIENCE

Air Resources Engineer, California Energy Commission, 1/12/2012 - Present
- Independently performs responsible, varied analyses assessing air quality and public health impacts of energy resource use and large electric power generation projects in California.
- Model air quality and public health impacts of stationary sources using HARP (Hot Spot Analysis and Reporting Program).
- Identify air quality and public health impacts of stationary sources and measures to mitigate these impacts following California Environmental Quality Act and regulations of US EPA (including the National Environmental Policy Act), ARB, and the Districts.
- Collect, analyze, and evaluate data on the effects of air pollutants and power plant emissions on human health, and the environment.
- Ensure conditions of certification are met and recommending enforcement actions for violations.

Research Associate, Taiwan Development Institute, 10/01/2010 – 12/31/2011
- Provided professional consultation for the environmental risk assessment of Taiwan's techno-industrial development initiatives
- Reviewed the environmental risk assessment reports of Taiwan's techno-industrial development initiatives
- Presented in various distinguished lecturer series about environmental risk assessment

Consultant, Chu Consulting, 08/2007 - 07/2010
- Conducted a cumulative risk assessment to evaluate the risk associated with the emissions of VOCs from a petrochemical plants in southern Taiwan
- Used EPA's ISC3 model (based on Gaussian dispersion model) to simulate the dispersion and deposition of VOCs from this petrochemical plant to the neighboring areas, then used ArcGIS to spatially combine the population data and VOC simulation data (and further calculated risks)

- Built a framework of risk-based decision making to set the emission levels of VOCs to reduce people's exposure and the risk of experiencing health problems
- Presented in conference: SRA 2007
- Awarded: CSU-Chico BBS Faculty Travel Funds (2007)

Environmental Justice Intern, Clean Water for North Carolina (CWFNC), Summer, 2005
- Reviewed and critiqued key state environmental policies and the federal EPA Public Participation Policy.
- Interviewed impacted communities, member organizations of the NC Environmental Justice Network, state policy officials about how those policies are actually implemented.
- Wrote a report about the survey and review of environmental justice needs for key state policies.
- Report Publication: "Achieving Environmental Justice in North Carolina Public Participation Policy" (Aug, 2005).

Volunteer, New Haven Recycles and Yale Recycling, 08/1998 – 05/2000
- Promoted recycling and conservation
- Checked trash cans (chosen randomly) and recycling bins at each entryway of residential college, then gave grades.

Volunteer, Urban Resource Initiative (URI), Summer, 1998
- Planted trees for local community of New Haven for a better and sustainable environment

RESEARCH EXPERIENCE

Postdoctoral Research

Department of Public Health Sciences, University of California, Davis, 07/01/2010 - present
Research advisor: Dr. Deborah H. Bennett and Dr. Irva Hertz-Picciotto
- Work on two projects: NIEHS-funded ***Childhood Autism Risks from Genetics and Environment (CHARGE)*** and EPA-funded ***Study of Use of Products and Exposure Related Behavior (SUPERB)***.
- Perform statistical and quantitative analyses with SAS to analyze collected house dust data and children's urine concentrations of metabolites.
- Conduct exposure assessment to investigate if pesticides, flame retardants, and phthalates are risk factors for children autism.
- Conduct exposure assessment to explore the relationships between children's exposure to phthalate, benzophenone-3 (oxybenzone), triclosan, and parabens, and the use of personal care products.
- Produce scholarly peer-reviewed publications of methodology and findings, and write the final reports of both projects.

Carolina Environmental Program, University of North Carolina at Chapel Hill, 01/01/2006 – 12/31/2006
Research advisor: Dr. Douglas J. Crawford-Brown
- Applied a framework of risk-based decision-making to perchlorate in drinking water. (Awarded: SRA Annual Meeting Travel Award 2006)
- Conducted a material and energy flow analysis (MEFA) to quantify the overall environmental impact of Bank of America operations, and quantitatively analyze the strategies BOA might adopt to reduce these impacts and achieve sustainability. (Report Publication: "Environmental Footprint Assessment")

Doctoral Research, 08/2000-12/2005

Department of Environmental Sciences and Engineering, School of Public Health, University of North Carolina at Chapel Hill
Research advisor: Dr. Douglas J. Crawford-Brown
- Dissertation topic: **"A framework of Risk-Based Decision Making by Characterizing Variability and Uncertainty Probabilistically: Using Arsenic in Drinking Water as an Example"**.
- Conducted risk assessment for arsenic in drinking water.
- Conducted theoretical analysis on the variability and uncertainty issues of risk assessment.

- Conducted a meta-analysis to improve dose-response assessment.
- Conducted analytical and numerical analysis to build a new framework of risk-based decision-making which can be applied coherently across the regulation decisions for different contaminants.
- Presented in conferences: APPAM (2004), SRA (2004, 2005 and 2006), DESE Seminar (2005), CEP Symposium on Safe Drinking Water (2006).
- Awarded: SRA Annual Meeting Student Travel Award (2004 & 2005), UNC-CH Graduate School Travel Grants (2004), UCIS Doctoral Research Travel Awards (2002).

Master's Research

School of Forestry and Environmental Studies, Yale University, 08/1999 - 06/2000
Research advisor: Dr. Xuhui Lee
- Master's project: **"Forest Stand Dynamics and Carbon Cycle"**.
- Research project: "Monitoring Forest CO_2 Uptaking"
- Used remote sensing (ERMapper) to investigate the role of forest in the uptake of CO_2.
- Awarded from Teresa Heinz Scholars for Environmental Research Program (2000) and Klemme Award (1999).

Graduate Institute of Environmental Engineering, National Taiwan University, 06/1996 - 06/1998
Research advisor: Dr. Shang-Lien Loh
- Master's thesis: **"The Loads of Air Pollutants from Urban Areas on a Neighboring Dam and its Water Quality"**
- Research Projects: "Research on Air Pollutant Deposition in Urban Areas" and "the Fate and Flow of Recyclable Materials"
- Used Gaussian's Dispersion model (ISC3) to investigate the loads of air pollutants on dam water.

TEACHING EXPERIENCE

Lecturer

Department of Environmental Studies, California State University at Sacramento
- Environmental Politics and Policy, Fall 2011

Department of Geological & Environmental Science, California State University at Chico
- Environmental Risk Assessment, Spring 2009 & 2010
- Applied Ecology, Spring 2008
- Pollution Ecology, Fall, 2007

Department of Geography & Planning, California State University at Chico
- Seminar in Applied Geography & Planning – Environmental Regulation and Policy, Fall, 2007

Department of Forestry and Environmental Resources, North Carolina State University
- Environmental Regulation, Fall, 2006

Teaching Assistant

Department of Environmental Sciences and Engineering, UNC-Chapel Hill
- Environmental Risk Assessment, Spring, 2002
- Introduction to Environmental Science, Fall, 2001
- Analysis and Solution of Environmental Problems, Fall, 2001

Lab Instructor

Department of Environmental Sciences and Engineering, UNC-Chapel Hill
- Biology for Environmental Science, Fall, 2000

Graduate Institute of Environmental Engineering, National Taiwan University
- Water Quality Analysis, Fall, 1997

AWARDS and HONORS

- CSU-Chico BBS Faculty Travel Funds, 2007
- Member of Society of Risk Analysis (SRA), 2006-2008
- SRA Annual Meeting Student Travel Award, 2004-2006
- UNC-CH Graduate School Travel Grants, 2004
- Member of Association for Public Policy Analysis and Management (APPAM), 2004-2005
- UCIS Doctoral Research Travel Awards, 2002
- Graduate Student Teaching and Research Assistantships, 2000-2005
- Teresa Heinz Scholars for Environmental Research Program, 2000
- Yale Forestry & Environmental Studies, Klemme Award, 1999

PUBLICATIONS (SELECTED LIST)

Huei-An Chu, Deborah H. Bennett, Irva Hertz-Picciotto, "Phthalates in relation to autism and developmental delay: Exploratory analyses from the CHARGE Study". (In preparation)

Huei-An Chu, Deborah H. Bennett, Irva Hertz-Picciotto, "Peronal Care Products: Possible Sources of Children Phthalate Exposure". (In preparation)

Huei-An Chu and Douglas J. Crawford-Brown, "A Probabilistic Risk Assessment Framework to Quantify the Protectiveness of Alternative MCLs for Arsenic in Drinking Water", *Journal of American Water Works Association*. (Being revised)

Huei-An Chu and Douglas J. Crawford-Brown, "Letter to the Editor: Inorganic Arsenic in Drinking Water and Bladder Cancer: A Meta-Analysis in Dose-Response Assessment", *International Journal of Environmental Research and Public Health*, 2007, 4(4), 340-341.

Huei-An Chu and Douglas J. Crawford-Brown, "Inorganic Arsenic in Drinking Water and Bladder Cancer: A Meta-Analysis in Dose-Response Assessment", *International Journal of Environmental Research and Public Health* 2006, 3(4), 316-322.

S.L. Lo and **H.A. Chu**, "Evaluation of Atmospheric Deposition of Nitrogen to the Feitsui Reservoir in Taipei", *Water Science & Technology*, 2006, 53(2), 337-344.

CSE Consulting and the UNC Carolina Environmental Program (CEP), "Environmental Footprint Assessment", Report for Bank of America, Aug, 2006.

Huei-An Chu, "Achieving Environmental Justice in North Carolina Public Participation Policy", Report for Clean Water for North Carolina (CWFNC), Aug, 2005.

Huei-An Chu, "Arsenic and its Health Implications", Report for University Center for International Studies Graduate Travel Awards, 2002.

PRESENTATIONS (SELECTED LIST)

Guest Speaker, "Human Health Risk Assessment – Arsenic in Drinking Water as an Example". Tunghai University, Taichuang, Taiwan. (December 16th, 2010)

Guest Speaker, "Environmental Problems in Developing Countries", Course Title: Developing Countries, Department of Economics, CSU-Chico (October 31st, 2008)

"Cumulative Risk Assessment for Volatile Organic Compounds (VOCs) from Petrochemical Plants in Southern Taiwan". Oral Presentation in Society of Risk Analysis (SRA) 2007 Annual Meeting, San Antonio, TX. (December, 2007)

Guest Speaker, "Arsenic in Drinking Water", Course Title: Environmental Geology, CSU-Chico. (November 13th, 2007)

"Risk-Based Environmental Regulation for Arsenic in Drinking Water", Oral Presentation in Department of Environmental Health Seminar, East Tennessee State University (February 2nd, 2007)

"A Framework of Risk-based Decision Making by Characterizing Variability and Uncertainty Probabilistically: Using Arsenic in Dinking Water as an Example", Oral Presentation in Society of Risk Analysis (SRA) 2006 Annual Meeting, Baltimore. MD. (December, 2006)

"A New Policy Tool to Choose Water Quality Goals under Uncertainty", Poster Presentation in Society of Risk Analysis (SRA) 2006 Annual Meeting, Baltimore. MD. (December, 2006)

"A framework of Risk-Based Decision Making by Characterizing Variability and Uncertainty Probabilistically: Using Arsenic in Drinking Water as an Example", Oral Presentation for National Center for Environmental Assessment (NCEA), Environmental Protection Agency (EAP). (October 26th, 2006)

"Probabilistic Risk Assessment for Arsenic in Drinking Water", Poster Presentation in Carolina Environmental Program (CEP) 2006 Symposium on Safe Drinking Water, Chapel Hill, NC. (March, 2006)

"Probabilistic Risk and Margins of Safety for Water Borne Arsenic", Poster Platform Presentation in Society of Risk Analysis (SRA) 2005 Annual Meeting, Orlando, FL. (December, 2005)

"Using Meta-Analysis in Dose-Response Analysis – Risk Assessment of Arsenic in Drinking Water as an Example", Poster Platform Presentation in Society of Risk Analysis (SRA) 2004 Annual Meeting, Palm Springs, CA. (December, 2004)

DECLARATION OF
Dr. Obed Odoemelam

I, Obed Odoemelam, declare as follows:

1. I am presently employed by the California Energy Commission in its Siting, Transmission and Environmental Protection Division as a Staff Toxicologist.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on the **Transmission Line Safety and Nuisance** section of the **Final Staff Assessment** for the **Hidden Hills Solar Electric Generating Station** Application for Certification (AFC), based on my independent analysis of the AFC, supplements, data, documents, analysis and testimony from other staff and reliable sources, and based upon my own professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: November 2, 2012 Signed: Odoemelam

At: Sacramento, California

RESUME

DR. OBED ODOEMELAM

EDUCATION:

1979-1982 University of California, Davis, California. Ph.D., Ecotoxicology

1976-1978 University of Wisconsin, Eau Claire, Wisconsin. M.S., Biology.

1972-1976 University of Wisconsin, Eau Claire, Wisconsin. B.S., Biology

EXPERIENCE:

1987
The Present: California Energy Commission. Staff Toxicologist.

Responsible for the technical oversight of staffs from all Divisions in the Commission as well as outside consultants or University researchers who manage or conduct multi-disciplinary research in support of Commission programs. Research is in the following program areas: Energy conservation-related indoor pollution, power plant-related outdoor pollution, power plant-related waste management, alternative fuels-related health effects, waste water treatment, and the health effects of electric and magnetic fields. Serve as scientific adviser to Commissioners and Commission staff on issues related to energy conservation and transmission line health, safety, and nuisance. Serve on statewide advisory panels on issues related to multiple chemical sensitivity, ventilation standards, electric and magnetic field regulation, health risk assessment, and outdoor pollution control technology. Testify as an expert witness at Commission hearings and before the California legislature on health issues related to energy development and conservation. Review research proposals and findings for policy implications, interact with federal and state agencies and industry on the establishment of exposure limits for environmental pollutants, and prepare reports for publication.

1985-1989 California Energy Commission.

Responsible for assessing the potential impacts of criteria and non-criteria pollutants and hazardous wastes associated with the construction, operation and decommissioning of specific power plant projects. Testified before the Commission in the power plant certification process, and interacted with federal and state agencies on the establishment of environmental limits for air and water pollutants.

1983-1985 California Department of Food and Agriculture.

Environmental Health Specialist.

Evaluated pesticide registration data regarding the health and environmental effects of agricultural chemicals. Prepared reports for public information in connection with the eradication of specific agricultural pests in California.

DECLARATION OF
James Adams

I, **James Adams**, declare as follows:

1. I am presently employed by the California Energy Commission in the **Environmental Office** within the **Siting, Transmission** and **Environmental Protection Division** as a **Planner II**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **Growth-Inducing Impacts** in the **Socioeconomics** section of the **Hidden Hills Solar Electric Generating Station Final Staff Assessment**, based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 10/30/12 Signed: James Adams

At: Sacramento, CA

James S. Adams
Environmental Office
Siting, Transmission and Environmental Protection Division
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814-5504
PH (916) 653-0702, FAX (916) 651-8868
Adams, Jim@energy.ca.gov

5/1999
Present **Environmental Planner II**
Review applications for certification to acquire permits from the California Energy Commission to build electric generating power plants. Specific technical fields include traffic and transportation, land use, socioeconomics, and visual resources. Provide technical analysis when requested for the Energy Commission's Integrated Energy Policy Report.

11/1997
Present **Energy and Resource Consultant**
Provide clients with technical expertise on various issues related to natural resource use and development. Recent activities include providing expert testimony before the California Public Utilities Commission regarding decommissioning issues concerning Humboldt Bay, Diablo Canyon and San Onofre nuclear reactors.

9/1994--
10/1997 **Senior Analyst - Safe Energy Communication Council (SECC)**
Responsible for developing and/or implementing campaigns on various energy issues involving the promotion of energy efficiency and renewable energy and advocating less reliance on nuclear power. Managed educational outreach efforts to newspaper editorial writers throughout the U.S. to encourage coverage of energy issues. Participated in meetings and negotiations with key Clinton administration officials, members of Congress and staff, national coalitions, and grassroots organizations on important energy issues (e.g. U.S. Department of Energy Budget for Fiscal Years 1996-1998). Successfully raised $140,000 from private foundations to support SECC activities.

6/1978--
12/1992 **Principal Consultant - Redwood Alliance**
Provided consulting services to the Alliance; a renewable energy/political advocacy organization. Major responsibilities included managing and/or participating in several interventions/appearances before the California Public Utilities Commission, California Energy Commission, California Legislature, U.S. Congress and the U.S. Nuclear Regulatory Commission. Issues included electric utility planning options, greater reliance on energy efficiency and renewable energy, nuclear power economic analyses, decommissioning cost estimates, and nuclear waste management and disposal.

2/1983--
8/1986 **Natural Resource Specialist**
Assisted private consulting, firms, non-profit corporations and government agencies in various projects related to the enhancement and protection of national forests in Northern California and Southern Oregon. This included contracts with the U.S. Forest Service, Fish and Wildlife Service, National Park Service, the California Coastal Conservancy, and private landowners.

6/1978--
12/1984 Consultant/Journalist/Paralegal
Throughout the period of work outlined above, I have written a considerable amount of news articles and reports connected to ongoing projects and issues of personal interest. The legal/administrative interventions have required extensive paralegal work to support attorneys, and technical expertise to identify and assist consultants. In addition, many of the projects required consulting services and lobbying, at the local, state and federal level whenever necessary, as well as working with the print and television media as appropriate.

From 1978 through 1984 I served on the Board of Directors for two local non-profit agencies devoted to sustainable community development, Redwood Community Development Council and Redwood Community Action Agency (RCAA). I also was hired on staff at RCAA as a natural resource specialist which is explained more fully above. I am proficient with computers, printers, fax machines and related equipment.

EDUCATION

M.A. Social Science. Political science and natural resources emphasis. California State University at Humboldt. Graduated December 1988.

B.A. Political Science. Political and economic aspects of natural resource development, with a particular emphasis in forest ecology and appropriate technology. California State University at Humboldt. Graduated June 1978.

Academic
Honors. Member of PI GAMMU MU Honor Society since 1986.

MILITARY SERVICE

7/1969--
9/1975 U.S. Navy. Air Traffic Controller.
Honorable Discharge.

DECLARATION OF
Steven Kerr

I, **Steven Kerr**, declare as follows:

1. I am presently employed by **California Energy Commission** in the **Siting, Transmission, and Environmental Protection Division** as a **Planner I**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **Socioeconomics**, for the **Hidden Hills Solar Electric Generating System (11-AFC-2)**, based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: October 30, 2012 Signed: original signed by S. Kerr

At: Sacramento, California

Steven Kerr

Professional Experience:

California Energy Commission — Sacramento, CA
January 2012-Present — *Planner I*

- Review power plant applications and amendments for socioeconomic, land use, transportation, and visual impacts.
- Evaluate projects in accordance with CEQA, the California Energy Commission siting regulations, and federal, state and local laws, ordinances, regulations, standards (LORS).
- Participate in public workshops regarding proposals.
- Write environmental analysis documents.

Thomas P. Kerr Inc. — Sacramento, CA
August 2011-January 2012 — *Property Manager*

- Management of properties and assets throughout California and Oregon.
- Assist in the preparation of mobile home park closure impact report for Port of San Luis.
- Use various software applications to produce and review billing and financial records.
- Work with local agencies to coordinate infrastructure improvements.

Ground(ctrl) — Sacramento, CA
February 2010-August 2011 — *Director of Customer Support*

- Coordinate and provide customer support for A-list musical artist fan clubs, online stores, e-mail marketing, ticketing, aggressive online marketing, and much more.
- Resolve escalated customer support issues, credit card disputes, and Better Business Bureau cases.
- Supervise and train customer support team members and interns.

City of Sacramento — Sacramento, CA
General Services Department — *Customer Service Representative*
July 2009-February 2010

- Perform concurrently multiple customer service related duties for all City of Sacramento departments by phone/email.
- Interpret and apply City regulations and procedures as applicable to billing, fees, and collections.
- Learn and explain the organization, procedure and operation details of the City.
- Use a variety of business software applications and assess maps.

City of Sacramento — Sacramento, CA
Development Services Department — *Assistant Planner*
February 2007-July 2009

- Project manager for various residential, commercial, industrial, and office development projects.
- Assist customers with zoning, design review, preservation, environmental, subdivision code, and sign questions, both at the public counter and by phone/email.
- Provide customers with required entitlement information, fee estimates, and accept applications for proposed development projects.
- Review applications and plans for consistency with City Codes, General Plan, and applicable community plans, specific plans and planned unit development guidelines.
- Present projects at interdepartmental meetings and coordinate project review with other city departments and government agencies.
- Present projects at community meetings and work with neighborhood association leaders on controversial projects.
- Brief city council members on controversial projects.
- Write staff reports and conditions of approval.

- Prepare and post legal notices for public hearings.
- Present projects at Zoning Administrator, Planning Commission, and City Council public hearings.
- Create maps using geographic information systems (GIS) software.
- Research development and entitlement histories of parcels.

City of Atascadero — Atascadero, CA
Community Development Department — *Planning Intern*
March 2005-June 2006

- Prepare environmental review documents.
- Review business licenses and building permits.
- Draft letters and staff reports.
- Respond to questions from the public on planning and zoning related issues.
- Access and update information in GIS and Excel

Education:

2005-2006 California State Polytechnic University, San Luis Obispo, CA
Coursework toward MS in Public Policy

2000-2005 California State Polytechnic University, San Luis Obispo, CA
Bachelor of Science in City and Regional Planning

DECLARATION OF
Testimony of Richard McCann

I, **Richard McCann,** declare as follows:

1. I am presently employed by Aspen Environmental Group, a contractor to the California Energy Commission, Siting, Transmission and Environmental Protection Division, as a **Socioeconomic Technical Specialist**.

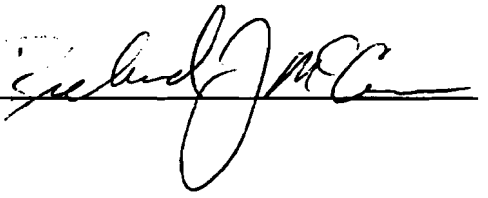
2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **Socioeconomics** for the **Hidden Hills Solar Electric Generating System Final Staff Assessment** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: November 1, 2012 Signed: 

At: Sacramento, California

DR. RICHARD MCCANN
Senior Associate
Energy, Water & Natural Resource Economics

Academic Background

PhD, Agricultural and Resource Economics, University of California, Berkeley, 1998
MS, Agricultural and Resource Economics, University of California, Berkeley, 1990
MPP, Institute of Public Policy Studies, University of Michigan, 1986
BS, Political Economy of Natural Resources, University of California, Berkeley, 1981
Dissertation: "California's Evolving Water Management Institutions: Markets and Agricultural Water Districts"

Selected Professional Experience

Dr. McCann specializes in environmental and energy resource economics and policy. He has testified before and prepared reports on behalf of numerous federal, state and local regulatory agencies on energy, air quality, and water supply and quality issues. Dr. McCann has been involved in developing and assessing climate change policies and action plans for two decades. He started with Proposition 128 (*a.k.a.* "Big Green") in 1990 by compiling and analyzing a comprehensive set of statewide and local reduction measures—the first ever such plan. He has continued to conducted large-scale studies on the costs of meeting GHG reduction targets for California, and proposed alternative policy approaches for addressing global climate change issues. He has compiled GHG and fuel use inventories at the local and statewide level. Most recently, he analyzed the AB 32 Scoping Plan and policies for controlling high global warming potential (HGWP) gases. He also critiqued the proposed low carbon fuel standard (LCFS) proposal. He has been developing a scenario-based analytic method to assess vulnerabilities and opportunities arising from uncertainty and risk for designing climate change and renewable energy policies. He also has analyzed other specific GHG reduction measures, including the pumping engine conversions eventually implemented statewide, vehicle fuel choices, community-based environmental programs and incentive-based programs in numerous settings.

Aspen Environmental Group.....2008-present

Regional Economics and Fiscal Impacts

- **Desert Renewable Energy Conservation Plan, California Energy Commission (2011-present).** Developing estimates for cost of implementing different alternatives for managing the environmental consequences from developing renewable power in southeast California. This analysis involves collecting program and project data on environmental mitigation and habitat conservation efforts, and estimating the cost of acquiring land for habitat restoration and rehabilitation.
- **Hidden Hills Solar Energy Generator Fiscal Impacts, California Energy Commission (2012).** Assessing reasonably expected to occur fiscal impacts in Inyo County from constructing and operating the proposed HHSEGS solar photovoltaic utility-scale power projects. The report will be submitted in the AFC docket on behalf of the Commission Staff.
- **Burning Man Festival Environmental Assessment, Black Rock LLC and Bureau of Land Management (2011-present).** Preparing analysis of the socio-economic impacts and contributions in northern Nevada from the annual Burning Man Festival. The analysis is part of environmental assessment prior to BLM renewing Black Rock LLC's permit for the festival.
- ***Diesel Powering the U.S. Economy*, Diesel Technology Forum (2011).** Prepared a report and presented results on analysis of how production and use of diesel technology affects the U.S.

economy. The analysis relied on supplementing an IMPLAN regional economic model data set with other data sources and reports.

- **Solar Power Plant Fiscal Impacts, San Benito County Planning Department (2010).** Assessed reasonably expected to occur fiscal impacts from constructing and operating the proposed Panoche Valley Solar Farm solar photovoltaic utility-scale power projects.
- **Solar Power Plants Fiscal Impacts, San Luis Obispo County Planning Department (2010).** Assessed reasonably expected to occur fiscal impacts from constructing and operating the proposed California Valley Solar Ranch and Topaz Solar Farm solar photovoltaic utility-scale power projects.
- **Review of AB 32 Proposed Scoping Plan Economic Modeling, Environmental Defense Fund (2008).** Reviewed economic modeling by the California Air Resources Board Staff used to assess the Proposed Scoping Plan to meet greenhouse gas emission reduction goals specified in AB 32.
- **Review of Economic Analysis of Proposed In-Use On-Road Diesel Fleet Regulations, Construction Industry Air Quality Coalition (2008).** Highlighted key issues in CARB Staff analysis if potential health benefits and costs to complying firms for proposed accelerated scrappage and retrofit program.
- **Habitat Restoration Economic Impacts Analysis, Solano County Water Agency (2008-2009).** Prepared an economic and fiscal impact analysis from proposed wetlands conversion and restoration of productive agricultural lands in the Cache Slough area from agricultural and wetlands use in Solano County. Analysis estimated lost agricultural revenues and activity, and changes in revenues and expenditures for affected reclamation districts.

M.Cubed.....1993-2008

Regional Economics and Fiscal Impacts

- **Construction Fleet Emission Standard Impacts, Construction Industry Air Quality Coalition (2006-2007).** Reviewed ARB Staff regulatory proposal and analysis. Prepared responding economic impact analysis using the ARB's emission inventory database of 170,000 pieces of equipment.
- **Socio-economic Impacts of Stationary Engine Air Regulations, San Joaquin Valley Agricultural Industries Association (2005)**. Testified before the SJVUAPCD on a proposal to change Rule 4702 which would impose emission controls on existing agricultural pumps and other stationary engines. A cost-effectiveness analysis was conducted based on estimated pump populations and regional agricultural characteristics. IMPLAN was used to estimate the regional economic impacts on incomes and jobs.
- **Proposed Tribal Casino Impacts, Elk Valley Rancheria (2004).** Developed a socio-economic regional impact analysis for the casino proposed by the Elk Valley Rancheria in Del Norte County. The analysis included accounting for local substitution effects on the economy and fiscal impacts on local government..
- **Proposed Tribal Casino Impacts, Analytical Environmental Services (2004).** Developed a socio-economic regional impact analysis for the casino proposed by the Timbisha Shoshone in Hesperia, San Bernardino County. The analysis included accounting for local substitution effects on the economy and fiscal impacts on local government, as well as a portrait of tribal socio-economic conditions.
- **Monterey Amendment EIR, California Department of Water Resources (2003-2007).** Evaluated the potential growth inducing impacts from implementing the Monterey Amendment components. This analysis relied on assessing how retail water rates might change under different scenarios, and then estimating the regional economic impacts from those changes.

- **Water Transfer Impact Analysis, Glenn-Colusa Irrigation District (2004).** Evaluated the socio-economic impacts in Glenn and Colusa counties from a proposed water transfer from GCID to the Metropolitan Water District of Southern California (MWDSC).
- **Diesel Phase-Out Impacts, Californians for Sound Fuel Policy (2000).** Estimated the potential economic impacts from adopting statewide policies to phase-out diesel fuel for natural gas.
- **Property Value Impacts from Powerplants, Calpine Corporation (1999).** Analyzed whether residential property values were affected by the announcement of the proposed power project in the vicinity of the site using residential housing sale data. Estimated fiscal impacts on local governments from construction and operation of a new power plant.
- **Proposed Tribal Casino Impacts, Environmental Science Associates (1999).** Developed a socio-economic regional impact analysis for the casino proposed by the Shingle Springs Band of the Miwoks in El Dorado County (now Red Hawk Casino). The analysis included accounting for local substitution effects on the economy and fiscal impacts on local government, as well as a portrait of tribal socio-economic conditions.
- **Regional Forecasting Uncertainty, Western States Petroleum Association (1997).** Reviewed the forecasts used for developing air quality management plans and regulations and highlighted issues that increase uncertainty in these forecasts.
- **Proposed Landfill Impacts, USA Waste (1997).** Evaluated the economic benefits to Riverside County of siting a regional landfill. Assessed the savings and revenues generated for the local waste management district, and the regional economic impacts. Testified before Riverside County Planning Commission on two proposed landfills' economic impacts.
- **Agricultural Land Preservation Analysis, Save Our Agricultural Land (1997).** Testified before County Board of Supervisors on the significance of maintaining a narrow definition of "agricultural land" under Santa Cruz County's Agricultural Preservation ordinance.
- **NGV Impacts, Southern California Gas Co. (1994).** Evaluated regional economic impacts associated with increased use of natural-gas-fueled vehicles in Southern California.
- **CalEPA Evaluation Guidebook, California Air Resources Board (1994).** Developed a handbook for use by California Environmental Protection Agency staff to evaluate reports submitted to CalEPA boards and departments.
- **Agricultural Waste Burning Alternatives Study, California Air Resources Board (1993).** Evaluated crop residue removal and disposal alternatives, such as energy or fiber production, and assessed farm-level and regional economic impacts using a rice farm production model and a computable general equilibrium (CGE) regional economic model of the Sacramento Valley from a ban on agricultural residue burning.

Foster Associates/Spectrum Economics/QED Research 1986-1992

Dames & Moore 1985-1986

Professional Affiliations

- American Agricultural Economics Association, Association of Environmental and Resource Economists, American Economics Association, Western Economics Association International.

- Member, City of Davis Citizens Electricity Restructuring Task Force
- Member, Western Manufactured Housing Communities Association Utilities Task Force

DECLARATION OF
Marylou Taylor, PE

I, **Marylou Taylor**, declare as follows:

1. I am presently employed by the California Energy Commission in the Engineering Office of the Siting Transmission& Environmental Protection Division as an Associate Civil Engineer.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Soils and Surface Water** for the Hidden Hills Solar Electric Generating System based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: November 2, 2012 Signed: Marylou Taylor

At: Sacramento, California

MARYLOU P. TAYLOR, PE

REGISTRATIONS/LICENCES:

California Professional Engineer License # C64353

EDUCATION:

B.S. Civil Engineering
University of California, Davis

PROFESSIONAL HISTORY:

Associate Civil Engineer 2010 to Present
California Energy Commission, Sacramento, CA
Duties within the Water and Soils Unit of the Engineering Office in the Facilities Siting Division include review and evaluation of applications for certification of thermal power plants within the state of California. The focus of the work is on sensitive project sites that may have issues involving groundwater and surface water resources, soil erosion, flooding potential, water quality and plant-derived waste generation and disposal. In addition, evaluate construction, operation and maintenance of the facilities and conduct investigations to determine if violations of the program's regulations, the Energy Commission's conditions of certification, or the California Environmental Quality Act (CEQA) have occurred.

Transportation Engineer, Civil 2000 to 2010
California Department of Transportation (Caltrans), District 3, Sacramento, CA
As Project Engineer in the Office of Design, identified storm water quality issues along public highways within the Tahoe Lake area and designed appropriate features in an effort to preserve and enhance the unique natural environment; and prepared reports evaluating alternatives and proposing a design concept and scope for development and programming.

Designed drainage systems for highways throughout Northern California to comply with Caltrans standards, including: analysis of site hydrology and hydraulic design; storm water management near impaired water bodies; and preparing layouts and construction details for contract plans.

Also performed engineering inspections of State contract construction projects and enforced contractor's compliance with plans and State specifications. Duties include: assisting Resident Engineer in re-designing areas where the contract plans conflicted with field conditions; performing inspections of construction site activities; and managing problems that develop in the field.

DECLARATION OF
Candace M. Hill

I, **Candace M. Hill**, declare as follows:

1. I am presently employed by **California Energy Commission** in the **Siting, Transmission, and Environmental Protection Division** as a **Planner II**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **Traffic and Transportation**, for the **Hidden Hills Solar Electric Generating System (11-AFC-2)**, based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: November 7, 20120, 2012 Signed: C M Hill

At: Sacramento, California

CANDACE M. HILL

PROFESSIONAL EXPERIENCE

CALIFORNIA ENERGY COMMISSION - December 2009 – Present
Siting, Transmission and Environmental Protection Division, Sacramento, California
Planner II

- Responsible for researching and writing complex technical analyses assessing land use and traffic and transportation implications per the California Environmental Quality Act (CEQA) and related federal, state and local laws and regulations for solar energy projects and gas-fired energy projects.
- Review and comment on approved energy projects for compliance with adopted conditions of certification's.
- Prepare analysis of proposed amendments for existing projects.
- Site visits to projects.

DEPARTMENT OF TRANSPORTATION (Caltrans) – December 2008 – December 2009
Division of Mass Transportation, Sacramento, California
Associate Transportation Planner

- Administered two Federal Transit Administration (FTA) Grant Programs – Job Access and Reverse Commute (JARC) and New Freedom (NF).
- Reviewed and assessed grant proposals, monitored and prepared weekly and bi-weekly status reports for both Programs, managed the day-to-day operations of the grants and budgets for transportation, capital, operating and mobility management grants administered through the Department of Transportation for District 4 and District 5 which covered 14 counties.
- Responded to inquiries from grant recipients and the general public regarding the grants.

DEPARTMENT OF CONSERVATION - May, 2000 – December, 2008
California Geological Survey, Sacramento, California
Associate Planner

- Met with staff of the planning, building, public works and engineering departments of affected cities and counties throughout the State to explain the requirements and implementation of the California Seismic Hazards Mapping Act in the land use development process such as the General Plan, Zoning Code, building process and the California Environmental Quality Act.
- Analyzed and commented on General Plan Draft Safety Elements to incorporate the Seismic Hazard Zone Maps into the Safety Element.

- Presented the Seismic Hazard Zone Maps before the State Mining and Geology Board and coordinated with the public affairs office and legislative office regarding the issuance of the Seismic Hazard Zone Maps.
- Maintained a database of affected cities and counties.
- Point person for outreach events.
- Responded to public inquires regarding Zone Maps.

SACRAMENTO COUNTY PLANNING DEPARTMENT July, 1999– May, 2000
Current Planning, Sacramento, California
Associate Planner

- Researched, analyzed and wrote staff reports for land use development proposals.
- Presented staff reports and recommendations for the land use development proposals to the Sacramento County Planning Commission and Sacramento Board of Supervisors.
- Staff Planner for the Cosumnes Community Planning Advisory Council.
- Supervised one Assistant Planner.
- Assisted the public with zoning, planning and general questions via the public counter and telephone.

STANISLAUS COUNTY PLANNING DEPARTMENT – December, 1996 – July1999
Current Planning, Modesto, California
Associate Planner

- Researched, analyzed and wrote staff reports for land use development proposals.
- Prepared Initial Studies and associated documents per the California Environmental Quality Act.
- Presented staff reports and recommendations for the land use development proposals to the Stanislaus County Planning Commission.
- Assisted the public with zoning, planning and general questions via the public counter and telephone.

IMPERIAL COUNTY PLANNING AND BUILDING DEPARTMENT - October, 1990 – December, 1996
Current Planning, El Centro, California
Planner III

- Researched, analyzed and wrote staff reports for land use development proposals.
- Prepared Initial Studies per the California Environmental Quality Act.
- Assisted the public with zoning, planning and general questions via the public counter and telephone.

EDUCATION

University of California, Riverside
Bachelor of Arts in Administrative Studies – 1989

DECLARATION OF
John Hope

I, **John Hope**, declare as follows:

1. I am presently employed by **California Energy Commission** in the **Environmental Protection Office** of the **Energy Facilities Siting Division** as a **Planner II**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **Traffic and Transportation**, for the **Hidden Hills Solar Energy project**, based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 12/20/12 Signed: _____

At: Sacramento, California

JOHN HOPE

1516 9th Street, MS 40
Sacramento, California 95814

(916) 654-7119
john.hope@energy.ca.gov

Land Use and Environmental Planner

John Hope has twelve years experience with current and long-range land use planning and environmental planning. He has served the public interest through evaluating economic, social, and environmental issues in communities. He is a skilled advocate effective in presenting professional planning knowledge to interest groups, the public, and political affiliations.

PROFESSIONAL EXPERIENCE

CALIFORNIA ENERGY COMMISSION, Sacramento, California
Environmental Planner II, December 2011 to Current

As part of the Siting, Transmission and Environmental Protection (STEP) division - Environmental Office, I prepare environmental documentation for proposed energy facilities for the Commission as required by the California Environmental Quality Act (CEQA). Specifically, I write technical analyses for facility siting cases and planning studies in the areas of socioeconomics, environmental justice, land use, traffic and transportation, and visual resources, along with and formulate solutions and mitigation unique to each individual energy facility. I provide expert technical expertise and serve as a member of inter-disciplinary team that evaluates potential environmental and socioeconomic effects of proposed power plants, policies, and plans for energy development in order to satisfy the requirements of the Warren-Alquist Act and CEQA.

AECOM, Sacramento, California
Noise Analyst, February 2010 to July 2011

I served as assistant project manager, environmental planner, or air quality/noise analyst for various CEQA/NEPA documents. My work focused on preparing environmental setting and impact analysis sections, such as land use, traffic, public services, for projects related to infrastructure improvements, residential development, fairgrounds, industrial expansion, business parks, mixed-use developments, and economic appraisal. I used various modeling techniques along with SoundPLAN, a software-based noise prediction modeling program, to assess project-generated noise levels in an environment. Through the use of SoundPLAN, I graphically mapped and visually evaluated project-generated noise levels based on principles of acoustics. I also used SoundPLAN to model noise maps, design traffic noise mitigation, and predict combined noise levels. My experience in long-range planning also involved preparation of various elements for general plans and community plans.

EDAW | AECOM, Sacramento, California
Associate Environmental Planner, September 2004 to June 2009

I wrote technical sections and managed environmental documents that analyze and describe to the public the potential environmental impacts of implementing development projects, including needed on-site and offsite infrastructure. I supervised preparation of environmental documents utilizing information from the client (i.e., state, county, city) and other professionals (e.g., air quality consultant, traffic engineers) to conduct environmental impact analysis of development projects. I also wrote sections and conducted research for general plans and specific plans. I worked as part of a team in preparing these documents to meet the requirements of state and federal permit regulations. I diligently maintained budgets and worked within stringent schedules as part of managing preparation of environmental and community planning documents with local agencies, cities and counties, and environmental specialists. I prepared scopes of work and proposals for new work opportunities.

STANTEC CONSULTING, Sacramento, California
Project Planner, July 2002 to August 2004

I was responsible for providing land planning and environmental impact analysis in environmental engineering firms with various environmental remediation projects throughout northern California. I conducted hands-on oversight of remediation projects to assess the onsite environmental impacts and analyzed their successfulness. I provided my proficient writing skills through the preparation of site reports

related to remediation projects. I was relied upon to provide my land planning, environmental impact analysis, and entitlement processing expertise.

I was also responsible for providing assistance to land developers through the entitlement process including preparing development applications, preparing due diligence reports, and representation of the project to the public-at-large. I assisted cities and counties with the preparation of environmental documents and the processing of proposed land development projects. I managed the implementation of land development projects including large residential subdivisions, commercial development, public facilities, and business parks by coordinating efforts being pursued by other associates including surveyors, engineers, environmental specialists, public agencies, and the developer themselves. I also wrote technical sections that analyzed the environmental impacts associated with large infrastructure improvement projects and prepared the environmental document articulating the team's findings. Co-workers relied upon me to provide land use and environmental planning expertise towards a team effort.

PACIFIC MUNICIPAL CONSULTANTS, Rancho Cordova, California
Assistant Planner, July 1999 to July 2002

As part of my work experience I evaluated proposed development projects, provided code enforcement, and assisted the public-at-large. I gained experience in long-range planning from diligent researching, and writing technical sections for General Plans and environmental documents.

As part of a team effort, I was responsible for the expedited review and management of proposed development applications through the entitlement process and conducting environmental review while working as a land use planner for the City of Elk Grove. I was responsible for processing and reviewing current planning projects applications such as subdivision maps, use permits, design review applications, staff level discretionary review, and other entitlements as assigned by the Community Development Director. As part of this process, I evaluated proposed projects with the requirements of the municipal code and General Plan, presented development projects, and portrayed issues surrounding the project to decision makers and the public through writing staff reports and articulating my professionalism to Planning Commissions and City Councils. As time went on, I worked my way up for the opportunity to process larger and more complicated development projects.

In addition, I worked on the City of Elk Grove's first General Plan by writing and analyzing all the quantitative and statistical data for the Housing element and administered public meetings and workshops. I wrote the draft Housing Element, started the State certification process with the Department of Housing and Community Development, and assisted with the preparation of other required elements of the General Plan. I also utilized GIS software for manipulating and visually presenting information related to the community.

I gained experience with the environmental impact review process which resulted from analyzing and comprehending technical studies and incorporating their information by writing technical sections for environmental documents and I coordinated the implementation of mitigation monitoring and reporting programs. As my experience with the environmental review process grew, my work ethic allowed me to increase my responsibilities as related to more environmentally controversial projects.

EDUCATION

California Polytechnic State University, San Luis Obispo
Bachelor of Sciences, City and Regional Planning

This program provided a hands-on experience which allowed me to execute environmental impact assessments and site analysis, create site designs, research planning law and ordinances, present to several public and private groups, create graphic presentations, and conduct hands-on field research for specific projects located along the California central coast. I gained knowledge of various land use design concepts through hands-on draft work with computers and graphic tools.

DECLARATION OF
Gregg Irvin, Ph.D.

I, Gregg Irvin, declare as follows:

1. I am presently employed by the California Energy Commission in the Siting, Transmission and Environmental Protection Division, as a Planner II.

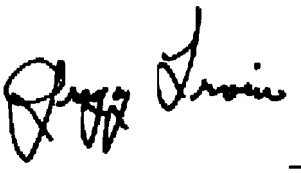
2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony for the **Visual Resources section** for the **Hidden Hills Solar Electric Generating Station (11-AFC-2)** based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: October 30, 2012 Signed: 

At: Sacramento, CA

GREGG E. IRVIN, PH.D.
3731 Blossom Heath Road
Dayton, OH 45419
937-271-2715

EMPLOYMENT

2005-Present	President, Spectrus, Ltd.
1996-2005	Principal Partner and Director of Operations, Mobium Enterprises, Inc.
1994-1997	Executive Director, Assistive Technologies Group
1996-2000	Employee Consultant, National Security Studies and Strategies Group, Science Applications International Corporation (SAIC), McLean, VA.
1993-1996	Assistant Vice President, SAIC, Dayton, OH.
1995-1996	Division Manager, Human Systems Technology Division, SAIC
1992-1995	Division Manager, Aerospace Systems Division, SAIC
1990-1991	Chief Scientist, Human Performance Technology Division, SAIC
1989-1990	Senior Scientist, Human Performance Technology Division, SAIC
1986-2000	Director, ICON Consultants, Birmingham, AL & Dayton, OH.
1985-1989	Senior Research Scientist, Systems Research Laboratories, Dayton, Ohio.
1984-1985	Visual Neurophysiologist, Vision Science Research Center, University of Alabama Medical School at Birmingham.

EDUCATION

1982-1984	National Eye Institute, Postdoctoral Fellow, Electrophysiology, Vision Science Research Center, School of Optometry, University of Alabama Medical School at Birmingham.
1981-1982	Postdoctoral Research Associate, Visual Neurophysiology, Department of Physiological Optics, School of Optometry, University of Alabama Medical School at Birmingham.
1981	Ph.D. Physiological Psychology, Syracuse University.
1976	B.A. Psychology, Syracuse University.

AWARDS/FELLOWSHIPS/DISTINCTIONS

1995-2003	Adjunct Faculty, Department of Biomedical and Human Factors Engineering, Wright State University, Dayton, OH.
1982-1984	National Eye Institute, Individual National Research Service Award
1979	Behavioral Neurobiology Scholarship, Cold Spring Harbor Research Laboratory, Syracuse University School of Engineering, Institute for Sensory Research.
1978-1980	Graduate Fellowships in Biopsychology (two awards), Syracuse University.
1977-1978	Graduate Fellowship in Physiological Psychology, Syracuse University.
1976-1977	Research Associate, Visual Psychophysics Laboratory, Syracuse University.

PROFESSIONAL SUMMARY

Dr. Irvin is a sensory neurophysiologist/ psychologist with a multidisciplinary background in visual science related fields including; applied experimental psychology, sensory perception, visual physiology and psychophysics, human systems interface, advanced image processing, human information processing, human perception and performance, mathematical visualization, neurobiology and human factors engineering. Dr. Irvin's focus is on applied technology

development and has 25 years of experience in laser exposure effects and laser hardening technologies.

Dr. Irvin is president of Spectrus, Ltd. Spectrus is a diversified small business providing services in engineering, human factors, neuroscience, physics, chemistry and life sciences. Spectrus develops advanced sensing technologies for indirect view multispectral and hyperspectral applications, which incorporate proprietary spectral mapping principles and (active and passive) frequency agile sensing capabilities. Spectrus also provides sensory modeling, image understanding, computational vision, specialized spectral sampling applications, advanced Human-System Interface development, and multidisciplinary sensing strategy services.

Dr. Irvin has strong leadership and managerial skills with a record of success in leading major research and development programs. This includes Air Force Research Laboratory programs developing physiologically based computer vision systems (stereovision, detection, and texture generation), laser eye and sensor protection, laser optical countermeasures, low-observable technologies, and multispectral adaptive and passive camouflage, concealment and deception technologies. Efforts include developing and interfacing both head-steerable and advanced helmet mounted displays with integrated multisensor fusion capabilities for strategic aircraft, developing imaging architectures, information visualization technologies, and display technologies incorporating specialized chromatic, motion, and texture processing. Contributions to visual science include a model of developmental amblyopia, various models of human visual detection, studies of information transfer to primate visual cortex, and structure-function studies of neuronal morphology and visual information processing. Dr. Irvin's experience and qualifications span basic and applied advanced research and development, and technology transfer and application. Dr. Irvin has been featured in National Geographic "The Sense of Sight" and in a PBS NOVA documentary "The Disguises of War."

EMPLOYMENT EXPERIENCE

Spectrus, Ltd. (2005-Present)

President, Spectrus, Ltd. is an Ohio based Limited Liability Company established in January 2005 and provides consulting services to Government and industry. Dr. Irvin is the president and sole partner in Spectrus, Ltd. Spectrus represents a reorganization of Mobium Enterprises, Inc. and Mobium, Inc., for which Dr. Irvin was the president of both.

Representative Research and Development Efforts at Spectrus:

Visor Laser Eye Protection Ground and Flight Testing Support. (2011-). Program lead to the AFRL Human Effectiveness Directorate, Directed Energy Bioeffects Division, Optical Radiation Branch (RHDO) for the development of all ground and flight testing materials (pre-briefs, pilot questionnaires for visual compatibility and life support equipment compatibility, experimenter materials, eyewear fitting procedures, and data analysis) for the evaluation of laser protection spectacles and visors developed under the Visor Laser Eye Protection, Advanced Technology Demonstration (VLEP ATD) program. Effort includes the testing conduct for the Joint Helmet Mounted Cueing System (JHMCS) LEP visor, the F-35 Joint Strike Fighter LEP visor and spectacle, and the ACC/AMC/AFSOC all-dye daytime and hybrid dye-dielectric nighttime LEP visors.

Security Lighting Development Program. (2011-). Consultant to Acuity Brands Lighting, Inc., Northeast Innovation Center (NEIC) for the development of RGB LED lighting hardware,

software and supporting algorithms for visual, physiological and psychological disruption and disabling human performance effects. Lead developer for strategic architecture design and disruptive algorithm development to support a modular and adaptable security lighting system for a variety of industrial and government applications.

Solar Power Plant Develop for the California Energy Commission. (2010-). Providing analytic and modeling support to Traffic and Transportation, Visual Resources, and Biological Resources for the assessment of the visual impacts of heliostat mirror fields and solar power towers for proposed Solar Electric Generation Facilities (SEGF). Ongoing and past research includes determining the magnitude of visual and thermal effects (e.g., glint, glare, aesthetics, avian mortality), their level of significance, and the development of potential mitigating procedures for the proposed Calico, Rio Mesa, and Hidden Hills SEGFs.

Visor Laser Eye Protection, Advanced Technology Demonstration (VLEP ATD) (2009-). Under the Hardened Materials Research and Survivability Studies (HMRSS) contract developing and integrating advanced laser protection technologies for visors and visor helmet mounted display systems. Efforts include identification and optical performance characterization of laser threat systems and the development of laser hardening goals via engagement modeling and simulation with airborne platforms in representative mission profiles. Supporting absorptive and reflective technology development includes modeling and performance characterization of the absorptive spectra of candidate molecular structures for chemical synthesis, and modeling and analysis of dielectric deposition processes for binocular visor protection performance, stress factors and mechanisms of haze generation. Lead for the development of laser protection designs and their performance evaluation for visors and hybrid visor-spectacle systems with various helmet mounted display systems.

Joint Strike Fighter Field Testing of Laser Eye Protection Devices (2009-2010). Program manager for this effort funded by the Office of the Under Secretary of Defense (Acquisition, Technology & Logistics) OUSD (AT&L) JSF, ASC 640th Aeronautical Systems Squadron under the AFRL/RXPJ Laser Materials Testing contract. Responsibilities included the development and conduct of both laboratory and field testing for JSF LEP spectacle and visor configurations. Laboratory visual psychophysical evaluations included contrast sensitivity, visual acuity and color discrimination. Field evaluations included the development of pre- and de-briefing materials and assessment questionnaires for aircrew in-cockpit evaluations visual compatibility and AFE compatibility and user acceptance. Evaluations were conducted at the Naval Air Station Patuxent River on the F-35 Lightning II STOVL F-35B test jet (BF-4).

Agile Visible and Near Infrared Imaging and Analysis (2011-2012). Program manager for this effort under the Hardened Materials Research and Survivability Studies (HMRSS) contract. Research focused on software and hardware solutions to support the analysis of agile filters and detectors operating in the visible and near-infrared (NIR) spectrums. Component and system characterization for the development and assessment of agile filters and detectors was conducted for filters developed under the Advanced Agile Device Implementation Program (AADI) for uniformity mapping, full aperture optical density, contrast grating MTFs, and haze and scatter measurements. Improved measurement techniques and instrumentation for haze/ scatter classification and assessment were developed. Software development efforts included a variety of image processing and image quality assessment techniques such as the Modulation Transfer Function Area (MTFA), Integrated Contrast Sensitivity (ICS) metric, and the Square-Root

Integral (SQRI) metric. The research effort characterized scatterometry measurements of the cosine corrected Bi-directional transmission functions (BTDF) of various filters for differential scatter distributions. Human visual acuity and contrast sensitivity functions were measured and correlated with the scatterometry distribution classes to establish correlative linkages between human perception and performance and scatter distribution properties.

Hardened Night Vision Goggle Program (2005-2009). As a subcontractor to GDIT designed, performance modeled and field evaluated laser hardening for NVGs. Technologies included Optical Power Limiters (OPLs), Cholesteric Liquid Crystals CLCs), Complimentary Comb Filters (CCombs), Laser Warning Receivers, and fixed filters including Out-of-Band and Flip-in. An extensive laboratory NVG test bed has been developed at AFRL/RXPJ to characterize laser exposure effect and evaluate various laser hardening technologies both in terms of their laser hardening effectiveness and impact on sensor and human-systems performance. Modeling and analysis was conducted to define candidate integrated System Level configurations capable of laser hardening NVGs against both fixed and agile laser threat systems. Several prototype Systems Level configurations were subsequently field evaluated at the WPAFB Laser Infrared Development (LID) range. The field environment provided an opportunity for mission representative levels of illumination, realistic atmospheric turbulence effects, the recording of real-world calibrated targets, and an opportunity for operator psychophysical performance assessments. The experiments conducted enabled an assessment of the laser protection levels provided by the hardening technologies and an assessment of the performance impacts of the technology without and with laser exposure.

Raytheon CV-22 Helmet Mounted Display. (2011) Subcontract to Raytheon for proposal development and review for the Boeing Defense Space and Security Division CV-22 Helmet Mounted Cueing System (HMCS). Activities included HDM architecture and functional capabilities for HMD interfaces, processing and control equipment, NVG capability, resolution, field of view, eye relief and exit pupil, display brightness and internal contrast ratios, luminance uniformities, and helmet tracking, slew and acceleration rates, latency and readout stability.

Advanced Optical Coatings (2007-2010). Designed, performance modeled and field evaluated distributed (spectacle and visor) laser eye protection for the F-35 Joint Strike Fighter. The Advanced Optical Coatings Monolithic Demonstration (AOC Mono Demo) was a design and manufacturing demonstration for a monolithic (non-laminated) LEP spectacle. Additionally, the AOC Mono Demo addressed the LEP design requirements for the F-35 Joint Strike Fighter. Due to visual compatibility issues with the JSF Helmet Mounted Display System (HMDS) the LEP solution required a hybrid approach in which the LEP is split between the spectacle and a visor. A variety of spectacle and visor designs were developed, manufactured, characterized, and both lab and field evaluated.

All-Dye Daytime Army LEP Spectacle Demonstration (2009). This Demonstration represented the first design and prototype manufacturing initiative for an all-dye spectacle which integrated a new visible dye, TBAF-1, into the laser hardening solution space. The laser hardening and visual performance requirements for an Army LEP acquisition were adopted as the demonstration challenge. An optimized all-dye design was developed for a daytime application and was successfully manufactured and evaluated. The demonstration was successful as a prototype manufacturing initiative for an all-dye spectacle which integrated the new TBAF-1dye into the laser hardening solution space.

DECLARATION OF
Melissa Mourkas, ASLA

I, Melissa Mourkas, declare as follows:

1. I am presently employed by the California Energy Commission in the Siting, Transmission and Environmental Protection Division, as a Planner II.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony for the **Visual Resources section** for the **Hidden Hills Solar Electric Generating Station (11-AFC-2)** based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: October 30, 2012 Signed:

At: Sacramento, CA

MELISSA MOURKAS, ASLA

EDUCATION

MASTER OF ARTS, LANDSCAPE DESIGN & PLANNING, 1994
CONWAY SCHOOL OF LANDSCAPE DESIGN, CONWAY, MASSACHUSETTS

Graduate landscape design program providing professional training in site design and land-use planning. Curriculum emphasis is on sustainable landscape planning and design. Graduate projects included: Master Plan for a 45-acre historic resort, original landscape designed by F.L. Olmsted and Performance Standards for a proposed industrial park.

BACHELOR OF ARTS, HISTORY OF ARCHITECTURE & ART, 1981
SCRIPPS COLLEGE, CLAREMONT, CALIFORNIA

Major studies in Art and Architectural History, Urban Development. Senior thesis: documentation and analysis of the innovative residential designs and construction techniques of California modern architect Rudolf M. Schindler. Minor studies in Art and the Humanities.

PROFESSIONAL EXPERIENCE/QUALIFICATIONS

- Licensed Landscape Architect, California #5139, Montana #211
- Qualified Architectural Historian, Secretary of the Interior's Standards for Historic Preservation, Code of Federal Regulations, 36 CFR Part 61.
- Chair, City of Sacramento Preservation Commission

LANDSCAPE ARCHITECTURE:

1994 to Present: Landscape Architecture and Design. Experience in landscape architecture, landscape construction estimating, site planning and landscape master plans. Provide landscape architecture and consulting services to private clients, public organizations, contractors, and design firms. Preparation of Cultural Landscape Reports. Frequent speaker to various groups on landscape design, construction and cultural landscapes. Owner of Landscape Legacy, est.1998.

PLANNING AND HISTORIC PRESERVATION:

April 2010 to Present: Planner II, California Energy Commission, Siting, Transmission and Environmental Protection Division. Provide technical analysis of proposed energy planning, conservation, and development programs. Review of EIR/EIS documents prepared by other agencies under NEPA. Specific tasks include: the assessment of potential impacts of new electric power plants on both visual and cultural (built environment) resources; identification of suitable mitigation measures under CEQA; preparation of written testimony; participation in public workshops; present sworn testimony during evidentiary hearings, and project monitoring to ensure compliance with local, state and federal environmental laws and regulations.

2005 to 2008: Assistant Planner, Historic Preservation Office, City of Sacramento, CA
Responsible for design review and approval for private and public development projects involving rehabilitation, preservation and restoration of historic resources and districts under CEQA. Prepared staff reports for Preservation Commission and Council, and coordinated with other planning staff on concurrent entitlements. Staff liaison on municipal development projects involving historic resources, including buildings, other structures, parks and roadways.

DECLARATION OF
Ellen Townsend-Hough

I, **Ellen Townsend-Hough** declare as follows:

1. I am presently employed by the California Energy Commission in the Environmental Siting Office of the Energy Facilities Siting Division as an Associate Mechanical Engineer.

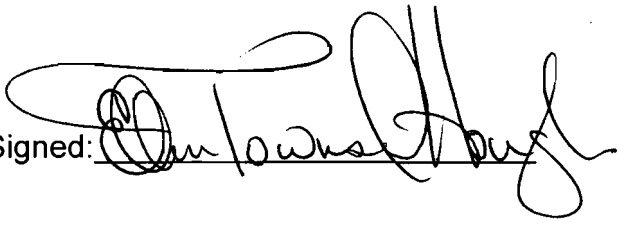
2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on Waste Management for the Hidden Hill Solar Electric Generating System based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: October 31, 2012 Signed: 

At: Sacramento, California

Ellen Townsend-Hough, REA

(Registered Environmental Assessor, REA 1 – 05465)

SUMMARY

I am a chemical engineer with 30 years of experience. My professional career has afforded me many unique growth and development opportunities. I have a working knowledge of the California Environmental Quality Act. My strengths are in analyzing and performing complex environmental engineering analyses, in areas such as Waste Management, Hazardous Materials Management, Worker Safety, and Water Resources. I worked as a policy advisor to a California Energy Commissioner for three years. I am also an US Environmental Protection Agency Environmental Justice trainer.

PROFESSIONAL EXPERIENCE

Technical Analysis and Presentation

- Provide analysis on projects that require compliance with the Resource conservation and Recovery Act (RCRA) Title 40 CFR Subtitle C and Subtitle D, the Comprehensive Environmental Response, compensation and Liability Act, Title 42, USC, Section 9601, the Unified Hazardous Waste and Hazardous Materials Management Regulatory Program, Title 27, the Hazardous Waste and Management Review, Title 22 and the Integrated Waste Management Act, Title 14.

- Performs mechanical engineering analysis of designs for complex mechanical engineering analysis of designs for systems such as combustion chambers and steam boilers, turbine generators, heat transfer systems, air quality abatement systems, cooling water tower systems, pumps and control systems

- Review and process compliance submittals in accordance with the California Environmental Quality Act, the Warren Alquist Act, the Federal Clean Air Act and the California and Federal Occupational Health and Safety Acts to assure compliance of projects

- Provides licensing recommendations and function as an expert witness in regulatory hearings.

- Provide public health impact analysis to assess the potential for impacts associated with project related air toxic/non-criteria pollutant emissions.

- Evaluate the potential of public exposure to pollutant emissions during routine operation and during incidents due to accidents or control equipment failure

- Provide an engineering analysis examining the likelihood of compliance with the design criteria for power plants and also examine site specific potential significant adverse environmental impacts

Technical Skills

- Deal with the aftermath of improper hazardous waste management by overseeing site cleanups.
- Prevent releases of hazardous waste by ensuring that those who generate, handle, transport, store and dispose of wastes do so properly.
- Take enforcement actions against those who fail to manage hazardous wastes appropriately.
- Explore and promote means of preventing pollution and encourage reuse and recycling.
- Evaluate soil, water and air samples taken at sites and develop new analytical methods.

- Practice other environmental sciences, including toxicology, risk assessment, and technology development.
- Establish mitigation that reduces the potential for human exposure to levels which would result in significant health impact or health risk in any segment of the exposed population.
- Assist with on-site audits and inspection to assure compliance with Commission decisions.
- Review and evaluate the pollution control technology applied to thermal power plants and other industrial energy conversion technologies.
- Work with the following software applications: WORD, Excel, and PowerPoint.

Policy Advisor

- Provided policy, administrative and technical advice to the Commissioner Robert Pernell. My work with the Commissioner focused on the policy and environmental issues related to the Commission's power plant licensing, research and development and export programs.
- Track and provide research on varied California Energy Commission (CEC) programs. Prepare analysis of economic, environmental and public health impacts of programs, proposals and other Commission business items.
- Represent Commissioner's position in policy arenas and power plant siting discussions.
- Write and review comments articulating commission positions before other regulatory bodies including Air Resources Board, California Public Utilities Commission, and the Coastal Commission.
- Wrote speeches for the Commissioner's presentations.

Writing

- Write environmental impact reports, negative declarations that require technical evaluation of mechanical engineering and environmental aspects of pollution control systems, environmental impacts, public health issues and worker safety.

EDUCATION

Bachelor of Science, Chemical Engineering
Drexel University, Philadelphia Pennsylvania

Continuing Education

Hazardous Material Management Certificate, University California Davis
Urban Redevelopment and Environmental Law, University of California Berkley
Analytical Skills, California Department of Personnel Administration (DPA) Training Center
Legislative Process/Bill Analysis, DPA Training Center
Federally Certified Environmental Justice Trainer

DECLARATION OF
Mike Conway

I, Mike Conway, declare as follows:

1. I am presently employed by the California Energy Commission in its Siting, Transmission and Environmental Protection Division as an Engineering Geologist.

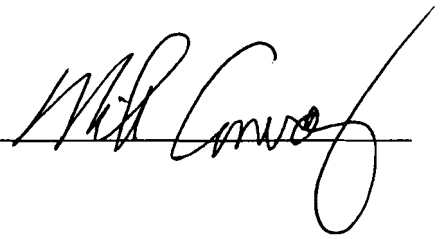
2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on the **Water Supply** section of the **Final Staff Assessment** for the **Hidden Hills Solar Electric Generating Station** Application for Certification (AFC), based on my independent analysis of the AFC, supplements, data, documents, analysis and testimony from other staff and reliable sources, and based upon my own professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: November 2, 2012 Signed: 

At: Sacramento, California

Resume For: Mike Conway

Education: Bachelor of Science in Geology, University of California, Davis, August 2003.
Master of Science in Geology, California State University, Sacramento, Spring 2012

Certifications: Geologist in Training (GIT)
Certified Professional in Erosion and Sediment Control (CPESC)
Leadership in Energy and Environmental Design Accredited Professional (LEED AP)

Experience:

Engineering Geologist: California Energy Commission, Sacramento, CA ***2009***

- Conduct analyses of soil and water resource reports submitted to Commission
- Assess impacts to soil and water resources from construction and operation of energy producing facilities
- Perform onsite evaluations of soil and water resources pre and post-project
- Implement a CEQA-like review of proposed energy projects to evaluate environmental impacts

Environmental Scientist: Central Valley Water Board, Rancho Cordova, CA ***2009***

- Wrote municipal storm water permits for Phase I communities in the Central Valley
- Reviewed storm water annual reports for Phase I and II municipalities
- Conducted audits of industrial sites for compliance with storm water permits
- Conducted audits of municipalities for compliance with municipal permits
- Help communities better understand how to effectively implement storm water programs
- Represented Water Board in large technical workshops and other public forums

Environmental Consultant: Wood Rodgers, Inc., Sacramento, CA ***2006-2009***

- Consulted clients on how to comply with Federal, State and local storm water quality and environmental regulations
- Helped public and private sector clients gain State Water Resources Control Board (SWRCB) permit coverage under Large and Small MS4 General Permits, NPDES Permits, CWA Section 401 Permits
- Consulted clients on Army Corps of Engineers, 404 Permitting
- Developed a storm water quality manual for Yolo County
- Prepared Caltrans environmental documentation and design for all project phases
- Prepared Storm Water Management Plans (SWMP) and Storm Water Pollution Prevention Plans (SWPPP)
- Drafted water pollution control exhibits using both AutoCAD and MicroStation
- Prepared Caltrans Storm Water Data Reports including cost estimates
- Designed landscaping plans for Caltrans' Modesto Ramp Rehabilitation Project
- Prepared Spill Prevention Control and Countermeasure (SPCC) plans
- Created Hazardous Materials Business Plan for City of Fort Bragg, California
- Prepared proposals for outgoing environmental quality project bids
- Performed field visits to evaluate Best Management Practice (BMP) effectiveness in reducing erosion and sedimentation
- Facilitated multiple storm water quality training workshops for groups up to 20 plus

Storm Water Quality Consultant: Envirosafety Services, Elk Grove, CA ***2004-2006***

- Wrote site specific SWPPPs to include guidance specific to city, county, and geographical constraints
- Designed BMP exhibits using AutoCAD
- Conducted inspections at construction sites throughout the Central Valley for (SWPPP) compliance
- Resolved storm water compliance issues in cooperation with site superintendents, county and city inspectors
- Researched current storm water protection regulations to best protect clients

Post-Graduate Researcher: Dept. of Land, Air, and Water Resources, U.C. Davis, CA ***2003***

- Studied the effects of irrigation practices on wetland ecology and water quality
- Independently organized monthly analyses and data processing of selenium contaminated invertebrate, algae, and water samples from the Tulare Lake Drainage District
- Managed concentrated acids, carcinogenic solutions, and final fluorescence measurements
- Compiled research data and presented findings to a team of eight colleagues

Lab Technician: Raney Geotechnical Laboratory, West Sacramento, CA ***2001***

- Conducted moisture density, unconfined compression tests, Atterburg Limit, curve, plasticity tests, and basic calculations for soil samples
- Administered load tests on concrete cylinders and mortar samples
- Performed percolation tests and Dynamic Cone Penetrator (DCP) tests in the field and gathered water samples for environmental analysis

DECLARATION OF
Casey Weaver

I, **Casey Weaver** declare as follows:

1. I am presently employed by the California Energy Commission in the **Engineering Office** of the Energy Facilities Siting Division as an **Engineering Geologist**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I helped prepare the staff testimony on **Geology and Paleontology**, for the **Hidden Hills Solar Electric Generating Station** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 12/12/2012 Signed:

At: Sacramento, California

CASEY W. WEAVER, PG, CEG
1621 Delta Drive
Woodland, CA 95695
(530) 662-0482

SUMMARY OF EXPERIENCE:

Certified Engineering Geologist with over 20 years of environmental and geotechnical consulting experience. Experience includes remedial investigations and feasibility studies (RI/FS), groundwater investigations, corrective action plans, landfill studies (SWATs, siting, closure), preliminary environmental site assessments (PESA, Phase I), regulatory compliance (RCRA/CERCLA), geotechnical investigation/evaluation, geologic hazard evaluations, active fault evaluations, seismic studies, landslide evaluation/repair, foundation suitability studies, personnel management and business development.

EDUCATION:

B.S. Geology, Humboldt State University, Arcata, CA, 1981
University of California, Davis Extension Courses

REGISTRATIONS/LICENCES/CERTIFICATIONS:

Certified Engineering Geologist, California
Registered Geologist, California, Oregon, Arizona
Registered Environmental Assessor
OSHA 1910.120 Hazardous Waste Operations and Emergency Response - 40hr
OSHA 1910.120 Hazardous Waste Operations and Emergency Response - Supervising Operations at Hazardous Waste Sites.

PROFESSIONAL HISTORY:

2008 to Present

Engineering Geologist
California Energy Commission, Sacramento, CA

Duties within the Water and Soils Unit of the Environmental Office in the Facilities Siting Division include review and evaluation of applications for certification of thermal power plants within the state of California. The focus of the work is on sensitive project sites that may have issues involving groundwater and surface water resources, soil erosion, flooding potential, water quality and plant-derived waste generation and disposal. In addition, evaluate construction, operation and maintenance of the facilities and conduct investigations to determine if violations of the program's

regulations, the Energy Commission's conditions of certification, or the California Environmental Quality Act (CEQA) have occurred. Selected as the Energy Commission's seismic expert and representative on the multi-jurisdictional Independent Peer Review Panel reviewing seismic evaluations conducted for California's nuclear power plants.

2001 to 2008

Engineering Geologist
State Water Resources Control Board, Headquarters, Sacramento, CA

With the UST Enforcement Unit, under direction from the State Attorney General's Office, conducted inspections of UST systems to evaluate compliance with 1998 upgrade requirements. This work culminated in the largest settlement of its kind in the nation's history. In addition, conducted surveillance of unlawful discharges from remediation systems and conducted investigations of UST Fund fraud cases.

With the USTCF Technical Review Unit, evaluated the technical elements of USTCF claims.

With the Division of Financial Assistance, assisted with the development of program policy for the Agricultural Water Quality Grant Program ($46 million) and the Integrated Water Quality Grant Program ($380 million), participated in stakeholder workshops, contributed to multijurisdictional work groups for program development and implementation.

With the Office of Enforcement, conducted investigations of operator misconduct, wrote enforcement investigation reports and prepared disciplinary letters.

1998 to 2001

Senior Engineering Geologist
BSK & Associates, Rancho Cordova, CA

Designed and directed hydrogeologic investigations for use with environmental remediation projects. Supervised field personnel installing groundwater monitoring wells, conducting aquifer tests & SVE pilot tests, reviewed reports and workplans, and conducted business development.

Conducted review of Alquist-Priolo active fault hazard reports as county geologist for Kern County.

1993 to 1998

Senior Geologist, Geoscience Team Leader and RI/FS Task Leader

LAW Engineering and Environmental Services, Inc., Sacramento, CA

As Geoscience Team Leader, responsible for career development, training and personnel management of ten employees. This group consisted of 3 senior-level geologists, 4 project level geologists and scientists, 2 junior level geologists and 1 technician.

As RI/FS Task Leader, responsible for the development of cost estimates/budgets, preparation of Work Plans and Sampling and Analysis Plans, management of field activities, data collection and documentation associated with the investigation of 15 Installation Restoration Program sites at Beale Air Force Base awarded under several Delivery Orders with combined project budgets of $18 million. Also responsible for aerial photographic interpretations associated with a basewide (23,000 acres), Preliminary Assessment, and preparation of a basewide Hydrogeologic Evaluation Report.

1990 to 1993

Senior Project Manger/General Manager
Earthtec, Ltd., Roseville, CA

Management of Environmental Department, business development, preparation of cost estimates and proposals, client and regulatory agency interface, supervision and training, report writing, technical review, budget management, and quality control. Initiated and supported the development of company's wetland and wildlife departments. Typical projects included preliminary site assessments, soil vapor studies, detailed hydrogeologic evaluations, waste plume delineations, and development of remediation alternatives associated with landfills, service stations, bulk oil facilities and other potentially contaminated sites.

1981 to 1990

Project Geologist
SHN Group, Inc. Eureka, CA

Managed project work directed toward solving environmental issues at variably contaminated sites and provided geotechnical information for land development and construction. Responsibilities included development of cost estimates/budgets, planned and supervised field operations, collected and interpreted subsurface information, evaluated areas traversed by Alquist-Priolo Special Studies Zones and sites subject to slope stability hazards. Typical projects included geotechnical evaluations and geologic hazard studies for major subdivisions, hospitals, schools, lumber companies, run-of-the-river hydroelectric projects, underground storage tank sites, and solid waste landfills.

1979 to 1981 **Geologist/Seismologic Technician**
Woodward-Clyde Consultants, San Francisco, CA

Designed and operated a laboratory model to study surface effects of thrust faulting in connection with seismic evaluation studies for the PG&E Humboldt Bay nuclear reactor. In addition, installed and operated field seismographs in the Humboldt Bay region.

DECLARATION OF
Sudath Edirisuriya

I, **Sudath Edirisuriya**, declare as follows:

1. I arn presently employed by **California Energy Commission** in the **Siting, Transmission and Environmental Protection Division** as an **Electrical Engineer**.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **Transmission System Engineering**, for the Hidden Hills Solar Electric Generating Station System, based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 10/30/2012 Signed: Sudath Edirisuriya

At: California Energy Commission.

Sudath Edirisuriya
1916 Ackleton Way
Roseville CA 95661 **Phone 916-654-4851**

EDUCATION:

Bachelor of Science in Electrical Engineering at California State University Fullerton

ATTAINMENTS:

Member of the Professional Engineers in California Government
Vice President Electrical Engineering Society-California State University Fullerton.

EXPERIENCE:

November-2001 to Present: - Electrical Engineer, System Assessment and Facilities Siting Division, California Energy Commission.

Working in the Transmission System Engineering unit on licensing generation projects. Work involves evaluating generation interconnection studies (SIS and FS), their reliability and environmental impacts on transmission system, preparing staff assessment reports, presenting testimony. Perform reliability studies and coordinating data and technical activities with utilities, California ISO and other agencies. Conduct and perform planning studies and contingency analysis including power flow, short-circuit, transient, and post-transient analysis to maintain reliable operation of the power system. Understanding of regulatory and reliability guidelines, WECC and NERC planning and operation criteria, CPUC and FERC requirements. Review technical analyses for WECC/CA ISO/PTO transmission systems and proposed system additions; and provide support for regulatory filings.

June-1998 to November-2001: - Project Electrical Engineer, Design Electrical Engineering Section, Department of Transportation, California.

Electrical Engineering knowledge and skills in the design, construction and maintenance of California state work projects involving all the public work areas; contract administration, construction management, plan checking, field engineering and provide liaison with consultants, developers, and contractors. Plan review in facility constructions, highway lighting, sign lighting, rest area lighting, preparation of project reports, cooperative agreements, review plans for compliance of construction and design guide lines for national electrical code, standards and ordinance. Review process included breaker relay coordination, detail wiring diagrams, layout details, service coordination, load, conductor sizes, derated ampacity, voltage drop calculations, harmonic and flicker determination.

June-1993 to May-1998:- Substation Electrical Engineer, City of Anaheim, California.

Performed protective relay system application, design and setting determination in Transmission & Distribution Substation. Understanding of principles of selective coordination system protection and controls for Electric Utility Equipment. Understanding of Power theory and Analysis of symmetrical components. Ability to review engineering plans, specifications, estimates and computation for Electrical

Utility Projects. Practices of Electrical Engineering design, to include application of Electro-mechanical and solid state relays in Electrical Power Systems. Software skills in RNPDC (Fuse Coordination Program), Capacitor Bank allocation program, and GE Power Flow Program. Design projects using CAD, Excel spread sheets including cost estimates, wiring diagrams, material specifications and field coordination.

Performed underground service design 12kV and 4kV duct banks; pole riser; getaway upgrade; voltage drop calculation, ampacity calculation and wiring diagrams. Design and maintenance of substations in City Electrical Utility System. Upgrade Station Light and power transformers; upgrade capacitor banks; replacement of 12kV-4kV power circuits; Breakers at Metal Clad Switchgear. Design one-line diagrams; three line diagrams; grounding circuits; schematics; coordination of relay settings; conduit and material list preparation. Calculation of derated ampacity; inrush current, short circuit current.

DECLARATION OF
Jeanine Hinde

I, Jeanine Hinde, declare as follows:

1. I am presently employed by the California Energy Commission in its Siting, Transmission and Environmental Protection Division as a Planner II.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on the **Alternatives Analysis** for the **Hidden Hills Solar Electric Generating System** Application for Certification (AFC), based on my independent analysis of the AFC, supplements, data, documents, analysis and testimony from other staff and reliable sources, and based upon my own professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: November 2, 2012 Signed: Jeanine Hinde

At: Sacramento, California

JEANINE M. HINDE

Professional Experience

Planner II — February 2010–Present

California Energy Commission, Sacramento, CA

Environmental Office of the Siting, Transmission, and Environmental Protection Division

Generalist skilled in research and analysis and preparing environmental assessments for siting of a variety of power plant projects filed with the Energy Commission. Analyzes project-related impacts on land use, agricultural resources, and visual resources. Evaluates project conformance with applicable laws, ordinances, regulations, and standards and recommends appropriate mitigation measures to reduce project effects on environmental resources. Prepared the alternatives analysis for a proposed 500-megawatt (MW) solar power tower project in the eastern Mojave Desert. Prepared the land use analyses for a 159-MW geothermal power plant in Imperial County and a 174-MW electrical generating plant in Ceres. Preparing the visual resources analysis for the Huntington Beach Energy Project, a 939-MW natural gas-fired plant that is proposed to replace the AES Huntington Beach Generating Station.

Environmental Analyst and Project Coordinator — 2004–2009

EDAW-AECOM, Sacramento, CA

Coordinated preparation of environmental studies to satisfy the California Environmental Quality Act (CEQA) and the National Environmental Policy Act and related permitting and regulatory requirements. Contributed to the preparation of regulatory compliance documents for projects addressing flood protection, wastewater management, water quality, habitat restoration, and urban development. As an assistant project manager, contributed to the preparation, technical review, and distribution of a variety of environmental compliance documents for projects that included a levee repair project on the Feather and Yuba Rivers, a levee seepage project on the San Joaquin River near the Sacramento-San Joaquin Delta (Delta), a wastewater treatment plant improvement project in Atwater, and a habitat restoration project adjacent to the middle Sacramento River. As an analyst, prepared environmental impact analyses for resource topics that included land use; agricultural resources; visual/aesthetic resources; public services, utilities and service systems; hazardous materials; recreation; and geology, soils, and mineral resources. Prepared mitigation monitoring and reporting program documents and assisted with fulfilling CEQA noticing and filing requirements.

Environmental Analyst, Independent Consultant — 2003–2004

Sackheim Consulting, Fair Oaks, CA

Researched and wrote the aesthetics analyses for the CEQA documents on related neighborhood electrical distribution projects in the Natomas and Elkhorn areas of Sacramento. Prepared a similar analysis for a project in Elk Grove. Assisted with the analyses addressing potential impacts on cultural resources and issues related to hazards and hazardous materials.

Environmental Specialist II — 1986–1997

Jones & Stokes Associates, Sacramento, CA

Evaluated impacts on land use, visual resources, and recreation for several state and federal projects, including a water supply management program in the East Bay, a project addressing long-term management of resources in the Delta and Suisun Marsh, and a military operations project at Camp Roberts. Provided technical review and coordinated preparation of report sections prepared by staff, and assisted with research and documentation of required federal, state, and local permits and approvals for inclusion in regulatory compliance plans.

Education

B.A. Geography, California State University, Chico

DECLARATION OF
Testimony of Joseph Douglas

I, **Joseph Douglas,** declare as follows:

1. I am presently employed by the California Energy Commission, Siting, Transmission and Environmental Protection Division.

2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.

3. I prepared the staff testimony on **General Conditions** for the **Hidden Hills Solar Electric Generating System Final Staff Assessment** based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.

5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: October 31, 2012 Signed: _____

At: Sacramento, California

Joseph Douglas

Experience

November 2008 – Present *State of California, California Energy Commission* *Sacramento, CA*

Siting, Transmission & Environmental Protection, Compliance Project Manager

- Coordinate and manage multi functional environmental and engineering team in reviewing and processing complex and controversial renewable energy facility projects.
- Review, edit, and evaluate regulatory/commission reports, testimony, briefs, and position papers.
- Publish project documents including Commission program reports, and Environmental Impact Reports and Initial Studies/Negative Declarations.
- Coordinate with Bureau of Land Management, U.S. Department of Energy, and U.S. Environmental Protection Agency to write and process Environmental Impact Statements for large renewable energy projects.
- Organize and conduct public workshops and meetings among energy staff, energy facility developers, regulatory agencies, government agencies, and the public to discuss siting concerns.
- Oversee the construction of licensed power plants.
- Plan and lead environmental and engineering team in the review of complex and controversial project amendments during construction.
- Represent staff at energy commission business meetings, make presentations, and answer questions from commissioners.

March 2003 – November 2008 *State of California, Department of Transportation* *Oakland, CA*

Office of Environmental Analysis, Environmental Project Manager

- Oversight of large transportation projects with state and federal involvement
- Writing and processing of environmental documents with specific time deadlines requirements
- Coordination with multiple agencies including: Federal Highway Administration, U.S. Fish and Wildlife Service, Army Corps of Engineers, EPA, State Historic Officer, Homeland Security, California Highway Patrol
- Partnership with local governments to implement growth/environmental strategies
- Organized multi-functional teams to determine project cost, scope, risk, impacts, and benefits in order to meet funding and programming deadlines
- Participated in Value Analysis studies and made recommendations regarding least environmentally damaging alternative
- Establish purpose and need of project to justify benefits of future capital cost expenditures
- Quality assurance and quality control for state and federal compliance of environmental regulations
- Participated in field studies to determine project impacts

May 2000 - March 2003 *State of California, Department of Transportation* *Oakland, CA*

Right of Way Office, Cost and Impact Estimation

- Determination of community impacts of large transportation projects
- Estimated costs, and time needed for acquisition of parcels, and relocation assistance
- Coordination with multiple disciplines within the Department including: engineering, survey, legal, and environmental to forecast cost
- Investigation of Assessors Parcel Numbers, Right of Way data maps, and property databases
- Research of city and county zoning codes, general plan, and property records
- Identified utility conflicts and estimated time and cost of relocation
- Property management services

APPENDIX RTC

The following letters were received during the Hidden Hills Solar Electric Generating System (11-AFC-2) Preliminary Staff Assessment (PSA, published May 24, 2012) comment period, and the Supplemental Staff Assessment (SSA, published June 15, 2012) comment period. These comment periods both concluded on July 23, 2012.

1	Inyo County
2	Bureau of Land Management
3	National Park Service
4	The Nature Conservancy
5	Amargosa Conservancy
6	Basin & Range Watch
7	Pahrump Paiute Tribe
8	Richard Arnold, Pahrump Piahute Tribe
9	Big Pine Tribe of Owens Valley
10	Intervenor Cindy MacDonald
11	Intervenor Center for Biological Diversity
12	Intervenor, Old Spanish Trail Association
13	Applicant, BrightSource Energy, Inc.

Following their submission, staff bracketed these letters in order to highlight the pertinent questions and issues for purposes of subsequent review and to provide "Response to Comment" in the Final Staff Assessment (FSA). For every technical section in this **FSA** where comments were received, there is an appendix or table that lists the Response to Comments.

All of the above letters follow in their "bracketed" form, except for those submitted by Intervenor Cindy MacDonald and Applicant, BrightSource Energy, Inc. Those two letters are not attached, as they were submitted in numbered format, precluding the need to manually bracket. They can be reviewed online here:

Cindy MacDonald (Comment Letter #10) along with all other PSA comment letters:
http://www.energy.ca.gov/sitingcases/hiddenhills/documents/others/psa_comments/

BrightSource Energy, Inc. (Comment letter #13):
http://www.energy.ca.gov/sitingcases/hiddenhills/documents/applicant/2012-07-23_Applicants_Comments_on_the_PSA_Set_2_TN-66319.pdf

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July 17, 2012

Commissioner Karen Douglas, Presiding Member
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814-5512

RE: Comments on the Hidden Hills Solar Energy Generating System Preliminary Staff Analysis and Resolution 2012-29 of the Inyo County Board of Supervisors

Dear Commissioner Douglas:

The County of Inyo (County) appreciates the opportunity to provide comments and indicate necessary changes to the Preliminary Staff Analysis (PSA) submitted by the California Energy Commission (CEC) staff for the Hidden Hills Solar Energy Generating System (HHSEGS) in order that the proposed project be consistent with Inyo County ordinances, regulations and standards ("LORS"). The County, as an active participant in the licensing process, is grateful to the CEC staff for addressing many of our concerns and attempting to bring the proposed project into conformance with the County's LORS, specifically its land use policies and Title 21 of the Inyo County Code governing renewable energy facilities.

Comment 1

Notwithstanding CEC staff's efforts, the PSA falls short in a number of areas including: (1) visual impacts, (2) proposed groundwater monitoring and reporting; (3) the impacts to County roads and a mechanism to enforce travel restrictions; (4) a detailed facility closure plan; (5) the lost opportunity cost impact of the project (both with and without the inclusion of proposed mitigation lands); and, (6) the socioeconomic impacts to County services. In addition to discussing each of these areas below, the County has submitted with this letter A *Resolution Of The Board Of Supervisors Of The County Of Inyo, State Of California, Adopting The Findings And Conditions Of Certification For The Proposed Hidden Hills Solar Electric Generating Station (California Energy Commission Application For Certification No. 11-AFC-2,*) ("Resolution 2012-29") which sets out the additional or modified Conditions of

Certification, to those recommended by CEC staff in the PSA and to those contained in the Gruen, Gruen + Associates report, attached hereto. These are conditions of certification that the County would impose on the project owners but for the exclusive jurisdiction granted to the Energy Commission under the provision of the Warren-Alquist Act (Pub. Resources Code § 25500). In addition to Resolution 2012-29, and also in order to assure compliance with the County's LORS pursuant to Public Resources Code section 25525, a matrix indicating the proposed project's compliance or non-compliance with the County's General Plan is attached.

It should be noted that on July 10, 2012, the Inyo County Board of Supervisors approved an agreement with the project applicant, BrightSource Energy, Inc., LLC (BSE) to process an application for the adoption of a general plan amendment and zoning reclassification. If the application is approved by Inyo County, the project would be consistent with the County of Inyo General Plan and Zoning Ordinance; however, approval of the application will not resolve the site control requirements set forth in the proposed conditions of certification or the other land use issues previously addressed by the County and referenced in the PSA, such as the merger of the numerous lots on which the project is proposed to be built and the abandonment of public roads.

Along with project conformance to the County's land use policies, there remain several areas of the PSA that continue to promote undue uncertainty for the County's welfare. Following are the primary areas of concern which are addressed by Resolution 2012-29 through additional or modified conditions of certification in order that the proposed project is deemed consistent with County LORS, in particular Title 21.

1. VISUAL IMPACTS

A chief unresolvable concern for the County and its residents is the visual impact of the proposed project on the adjacent residential community. Although the applicant maintained during the June 14, 2012 workshop in Pahrump, Nevada that the proposed project would not create a significant visual impact, such a claim is unfathomable. If the proposed project is licensed and constructed then residents will live as close as 600 feet from a heliostat field replete with approximately 170,000 mirrors encircling two, 750-foot, towers as their neighbor.

Comment 2

The County concurs with CEC staff that this significant visual impact cannot be mitigated. However, the County does not believe the proposed mitigation of an interpretative center is sufficient to off-set the vast changes being imposed on these residents. Since the impacts cannot be fully mitigated, the residents should reap some benefit from the project that they will live with daily. Title 21 requires for the mitigation of impacts to the County, including by compensating for the impact by replacing or providing substitute resources or environments. (See, Title 21, Section 21.08.040.) The County believes the idea of the interpretative center is a good start, but under Title 21 additional mitigation directed at reducing or off-setting the impacts to the local residents is required. To that end, Resolution 2012-29 requires the construction of a community center, for use by the local community and service providers. In addition, in this era of high speed communication, these residents live without reliable phone service or high-speed internet. The proposed project includes in its design a telecommunications tower and that tower should be made available to cellular telecommunication operators to bring cellular and internet service to the proposed project's neighbors. Every attempt should be made to alleviate the significant impact imposed on those residents through enhanced essential service delivery and basic amenities.

Comment 3

2. GROUNDWATER MONITORING AND REPORTING

The County has a long history of monitoring and managing the use of its groundwater resources. The County is dedicated to protecting this fragile resource and has enacted a number of ordinances to achieve that goal, including Title 21. When evaluating a proposed project's request to use groundwater, the County insists that the project proponent avoid impacts to not only the groundwater basin but also to the groundwater dependent biological resources. The County's unprecedented experience in this area has led to the establishment of detailed monitoring and mitigation plans designed specific to each proposed project. Addressed as a separate memo and attached to this comment letter is a memo addressing specific comments on the Water Supply sections of the PSA by Robert Harrington, Ph.D., R.G. of the Inyo County Water Department. Therein he outlines the requirements mandated under Title 21. The Water Supply conditions of certification should include the same level of monitoring as outlined in the Air Quality, Biological Resources and Cultural Resources portions of the PSA. In order to achieve that end and comply with Title 21, Resolution 2012-29 includes such as a condition of certification, together with other conditions necessary to bring the proposed project into compliance with the County's LORS.

Comment 4

Comment 5

On a related topic, the proposed project will trigger the groundwater monitoring and reporting requirements mandated by SBX7-6, adopted by the California Legislature in 2009 and Chaptered as Water Code section 10920 et seq. As detailed in the *Responses to the May 2012 "Socioeconomic and Fiscal Impacts of the Hidden Hills Solar Electric Generating System on Inyo County"* prepared by Gruen Gruen + Associates, absent a requirement that the proposed project owners and/or their operators report groundwater activities at the project site to the County it will result in the County failing to comply with the mandates of SBX7-6. According to the statutory provisions, failure to comply with the monitoring mandates results in a loss of grant funds. The County simply cannot risk forfeiting future grant funding. Resolution 2012 requires as a condition of certification that the project owner provide the groundwater pumping information necessary for the County to comply with Water Code section 10920 et seq.

Comment 6

3. *OLD SPANISH TRAIL AND ENFORCEMENT*

The County appreciates and supports the CEC staff's inclusion as a condition of certification the prohibition on the project owner and its contractor(s) and subcontractors from allowing truck traffic to access the project site by using Highway 127 and Old Spanish Trail. However, due to the extensive damage that use by even a few errant trucks would have on that route, the County is concerned that the condition contains no process by which the project owner would be fined. Again, Title 21 mandates that the County recover any costs caused by a project. For that reason, and to bring the proposed condition into compliance with Title 21, Resolution 2012-29 establishes a penalty for any errant truck and an obligation for the project owner to either repair damage caused by any errant truck using Old Spanish Trail and Highway 127 west of the project site or to reimburse the County for the costs of such repairs.

4. FACILITY CLOSURE PLAN

Title 21 of the Inyo County Code specifically requires the project owner to submit to the County a reclamation/revegetation plan and to post an adequate financial assurance, based on estimated costs, should the project owner fail to comply with the plan upon closure. (See, Inyo County Code, Sections 21.20.030 & 21.20.040.) Resolution 2012-29 requires both the plan and the financial assurances so as to protect its citizens from bearing the costs of dismantling a large scale renewable energy project should the project be abandoned after full and/or partial construction

and for reclaiming the underlying land. Similar requirements are required by the County in both the area of mining and telecommunication towers. In addition, for the reasons noted above, the Bureau of Land Management and a number of other counties impose similar requirements for large scale renewable facilities.

Comment 7

Resolution 2012-29 requires the submission of the reclamation plan and its estimated costs prior to the commencement of construction, in order to establish the amount of financial assurances required under Title 21 and under proposed Condition of Certification LAND-2. The provision of financial assurance is an important guarantee; without such assurance, there can be no expectation that a project owner will have either the interest or the funds to reclaim the proposed industrial site.

5. MITIGATION LANDS

Throughout the PSA, staff recommends biological and cultural mitigation in the form of the retirement of lands from economic use in perpetuity. Most of the requirements for the retirement of lands for mitigation fall within the Biological Resources (BIO) section of the PSA. However, it was noted at the July 2, 2012 PSA workshop in Sacramento by CEC staff members that the Cultural Resources analysts may include the retirement of lands to mitigate the cultural impacts caused by the project. In some instances, it appears that mitigation lands must be located within the State of California and, in at least one condition (BIO-22) the land is required to be located in California and in the Pahrump Valley. For the reasons stated below, the County objects to using any private lands within Inyo County for mitigation purposes.

Comment 8

Inyo County is unique in that less than 2% of its total land is privately owned, thus severely limiting its revenue base. The project applicant holds an option for nearly 10,000 acres of private land. The project site is 3,277 acres, leaving more than 6,000 acres subject to the project applicant's option. Should the full 10,000 acres under option be utilized as the project site and as mitigation, this single proposed project would encompass nearly 10% of the total private land holdings in the County. Moreover, even the CEC's Fiscal Consultant (Consultant) concedes that the proposed project will result in few financial benefits to the County due to its remote location and close proximity to larger services in the State of Nevada. In a County with so few opportunities to encourage the use of private lands for the economic benefit of the County and its residents, removing private lands in perpetuity for mitigation will result in a significant impact.

Comment 9

If private land within the County must be retired from beneficial use for mitigation purposes, Title 21 requires that the economic impact resulting from the removal of those lands be accounted for and further mitigated. The Consultant acknowledged at the June 27, 2012 PSA workshop that he did not include in his analysis the lost economic opportunity costs which the County would suffer as a result of the proposed mitigation lands. That analysis is essential should any of the mitigation occur on private lands in the County. Resolution 2012-29 requires that analysis as a condition of certification in order to comply with Title 21. Furthermore, if mitigation lands are to be identified after certification of the project, the resolution imposes as a condition of certification that the analysis be conducted prior to the selection of such lands for mitigation and, if such lands are selected, that appropriate mitigation be imposed to offset any identified adverse impacts to the County or to the environment.

6. SOCIOECONOMIC ANALYSIS

The *"Socioeconomic and Fiscal Impacts of the Hidden Hills Solar Electric Generating System on Inyo County "* report prepared by the Consultant fails to accurately or adequately analyze the socioeconomic impacts the County will experience should the proposed project be approved without inclusion of additional conditions. Although a thorough discussion of the Consultant's report and methodologies is included in the attached *Responses to the May 2012 "Socioeconomic and Fiscal Impacts of the Hidden Hills Solar Electric Generating System on Inyo County"*, prepared by Gruen Gruen + Associates and submitted as part of these comments, it is important to highlight the most glaring errors and why many of the Consultant's conclusions should not be accepted.

Comment 10

The Consultant's report begins on a false premise – that the construction workers, totaling nearly 1,100, will commute from their homes to the project site. The project applicant has stated a number of times that the project will likely be constructed under the terms of a project labor agreement as was Ivanpah. Under such an agreement, California union employees will be given a hiring preference. That preference will most certainly result in employees commuting from Southern California or the Inland Empire for the work week as happened with Ivanpah. Although the Consultant stated during the June 27, 2012 workshop that the analysis contained in his report would apply regardless of the residence of the actual employees (California vs. Nevada), that is simply untrue. Since the most direct route to the project site from the Inland Empire is through Inyo County, employees from

the Inland Empire would likely travel through Inyo County, rather than through Nevada. As a result, and unlike the Ivanpah project where workers traveling home to the Inland Empire do so using Interstate 15, workers traveling home to the Inland Empire or other parts of California from the HHSEGS jobsite will create demands for additional County services along the way. Service demands associated with this commuting workforce are likely to include but are certainly not limited to additional unstaffed public trash receptacles to minimize illegal dumping; enforcement of sewage discharge regulations from recreational vehicles; and traffic safety enforcement and response. In addition, the towns of Shoshone and Tecopa are both much closer to the Inland Empire than Pahrump, so a higher percentage of employees are likely to stay in Inyo County, with a correspondingly higher cost of services to be provided by the County.

Comment 11

The Consultant's analysis does not account for employee-related housing impacts and, in fact, extrapolates from its incorrect assumption that there is no basis for the County's anticipated increased service costs caused by construction-related housing. Had the Consultant more fully reviewed the potential impacts from anticipated construction-related housing he would have learned that during the construction of the Ivanpah project, Clark County, Nevada experienced a 30% increase in calls for service in Primm, where most of the Ivanpah employees resided during the work week. Moreover, had the Consultant actually visited the HHSEGS proposed project site, he would have discovered that unlike in Ivanpah, the HHSEGS proposed site is surrounded by privately owned property and that illegal "camping" on private land has at times been a problem in the area. The County maintains that it is not unreasonable to anticipate that a number of construction employees will engage in dry camping in the vicinity of the project site, or will elect to reside in the nearby communities of Tecopa or Shoshone, thereby increasing the number of employees residing in Inyo County as opposed to the State of Nevada. As shown by Clark County, there will be an increase in the demand for County services, in particular law enforcement services.

Comment 12

The County has provided an extensive estimate of the additional costs that will be incurred by the County if the project is approved. The Consultant discredits nearly every one of the anticipated impact costs provided by the County, thus substituting the Consultant's judgment for that of the County and that of its elected and appointed officials. The CEC should not disregard the judgment of the very elected and appointed officials charged with providing services to the project while accepting the conclusions of the Consultant which are based upon estimates from the project

Comment 13

proponent. When asked why he did not question the project applicant's estimate that 5% of the construction costs ($9.5 million) would be spent in Inyo County, in light of the remote location of the project and lack of retail establishments, the Consultant simply indicated that the number "seemed reasonable". It is disheartening to the County that the Consultant would not only substitute his judgment for the Inyo County Sheriff's, but would accept estimates from the project proponent that defy reality.

The fact is that the County is in the best position to estimate the potential impacts of the project to its provision of services. The County has experienced the ebbs and flows of mining, snowbirds and other events which have caused both temporary and seasonal growth in its most remote areas. This is not the first, nor the last, time the County will need to anticipate an increased need for services in its remote regions. For these reasons, the CEC should disregard the Consultant's analysis, and adopt the County's anticipated impact costs along with an annual inflationary escalator.

Comment 14

Regardless of which estimate of the impact costs of the project is utilized, the Consultant concludes that the County will be made whole through its receipt of sales and use tax derived from the project's construction. The Consultant assumes the project owner will enter into an agreement with the County to designate the project site as the point of sale for sales and use tax purposes. The Consultant states that the basis for this assumption is that the project owner entered into such an agreement with San Bernardino County on the Ivanpah project. There is no sales tax agreement regarding Ivanpah; the parties are just now negotiating that agreement and there is no reason to simply assume such an agreement between the County and applicant will be a certainty or will cover all of the County's costs. For Inyo County, realizing an increase in revenues to offset the increased costs resulting from the project is of vital importance. The people of Inyo County are not in a position to subsidize this project. In the absence of a CEC condition requiring a letter of credit or other financial assurance in the amount of $84.5 million dollars, the Consultant's assumption that those revenues will flow to the County is nothing short of cavalier.

Comment 15

The Consultant expresses uncertainty as to whether the project owner might seek an exclusion from sales and use tax through the California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA). However, the Consultant notes that the applicant claims that such an exclusion was not sought for

its Ivanpah project and thereby opines that such an exclusion would not be sought for HHSEGS. However, while it is true that CAEATFA's own legal analysis makes it doubtful that the project would qualify under the current criteria, as recently as February 2011 the CAEATFA Board, during a regularly scheduled meeting, discussed developing a sales and use tax exclusion program for renewable energy generation projects. BSE was in attendance and during the public comment period expressed their concern on proposed project caps of differing types and emphasized the need for such a program. Therefore it is neither inconceivable that this option would still be forthcoming through CAEATFA or that BSE's project operator(s) would be encouraged to take advantage of such a program thereby only elevating the need for a condition of certification that a form of financial assurance be provided for the direct government service costs incurred by the County during the life of the project. **Comment 16**

It would be irresponsible for Inyo County or the CEC to assume that the costs for service impacts caused by the proposed project will be addressed by a voluntary agreement that the project owner may or may not chose to execute or that such agreement would be sufficient to cover the County's costs. Title 21 of the Inyo County Code mandates that the County recover its increased costs for providing services to the proposed project. Therefore, Resolution 2012-29 requires as a condition of certification, that the project owner must require all applicable contractors and sub-contractors to exercise their option to obtain a State Board of Equalization sub-permit to designate the project site as the point of sale for purposes of allocating all sales and use taxes to the County of Inyo, and guarantee, through the use of a consultant with expertise in the area of sales and use tax, that the project owner and its contractor(s) and subcontractors take all necessary actions to ensure that this occurs through compliance with applicable rules and regulations. It is only through such a condition that the CEC will strive to ensure that the costs of the service impacts to the County may be recovered and conform to the economic impact requirements of Title 21. Furthermore, in support of such a condition, Resolution 2012-29 imposes a condition of certification that requires the project owner to establish financial assurances of $84.5 million that would guarantee that the County will directly receive the consultant's estimated sales and use tax during the period of construction. **Comment 17**

Lastly, while there were inconsistencies in the PSA, most could be resolved through adequate financial assurances, appropriate conditions of certification and proper monitoring of natural and cultural resources. We are confident that the CEC and its staff are working toward providing energy solutions that will sustain the state while balancing the need for adequate revenues for a subdivision of the state that is mandated to provide essential services.

Sincerely,

Supervisor Marty Fortney, Chairperson
Inyo County Board of Supervisors

Attachments(4):

1. Resolution No. 2012-29
2. General Plan Consistency Matrix
3. Memorandum from Dr. Robert F. Harrington, Ph.D., R.G.
4. Gruen Gruen + Associates Report

RESOLUTION NO. 2012-29

A RESOLUTION OF THE BOARD OF SUPERVISORS OF THE COUNTY OF INYO, STATE OF CALIFORNIA, ADOPTING FINDINGS AND CONDITIONS OF CERTIFICATION FOR THE PROPOSED HIDDEN HILLS SOLAR ELECTRIC GENERATING STATION (CALIFORNIA ENERGY COMMISSION APPLICATION FOR CERTIFICATION NO. 11-AFC-2)

WHEREAS, Inyo County supports and encourages the responsible utilization of its natural resources, including the development of its solar and wind resources for the generation and transmission of clean, renewable electric energy; and

WHEREAS, Inyo County encourages the increased use of solar radiation and wind to generate and transmit clean, renewable electric energy as a benefit not only to the citizens of Inyo County, but also to citizens of California and the United States; and

WHEREAS, the County has been participating in a variety of renewable energy planning efforts, including, but not limited to, the Renewable Energy Transmission Initiative (RETI), the Bureau of Land Management's (BLM) Transmission Corridor, Wind, Geothermal, and Solar Environmental Impact Statements, the Desert Renewable Energy Transmission Plan, the California Transmission Planning Group, and a variety of renewable energy initiatives in the neighboring State of Nevada; and

WHEREAS, on August 17, 2010 the Inyo County Board of Supervisors adopted Ordinance No. 1158, which amended the Inyo County Code by adding Title 21, the Inyo County Renewable Energy Ordinance, to encourage and regulate the development of renewable energy resources within Inyo County; and

WHEREAS, Title 21 regulates applicants that propose to construct and operate renewable energy facilities, and requires an Applicant to obtain a permit from the County or to enter into a development agreement with the County for the project; and

WHEREAS, Title 21 requires an Applicant to identify and mitigate impacts to the ecological environment of the County as well as impacts to the social, aesthetic and economic environment, including impacts to the quality of life within the County, that will result from the renewable energy project; and

WHEREAS, Title 21 requires an Applicant to mitigate impacts on the County's water resources which may be depleted by the use of water for cooling and other operational purposes which may affect vegetation, wildlife and habitat; and

WHEREAS, Title 21 requires the County to impose upon an Applicant with such reasonable and feasible mitigation measures as it finds to be necessary to protect the health, safety and welfare of the County's citizens and the County's environment, including its public trust resources, and to ensure that the County and its citizens do not bear an undue financial burden from the project; and

WHEREAS, Title 21 mitigation encompasses the following: (1) Avoiding the impact altogether by not taking a certain action or parts of an action; (2) Minimizing impacts by limiting the degree or magnitude of the action and its implementation; (3) Rectifying the impact by repairing, rehabilitating, or restoring the impacted environment; (4) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action, and; (5) Compensating for the impact by replacing or providing substitute resources or environments; and

WHEREAS, Title 21 requires any person who submits an application for a renewable energy permit to submit a plan for reclamation/revegetation of the site of the facility once the facility is decommissioned or otherwise ceases to be operational and to post financial assurances to ensure completion of reclamation; and

WHEREAS, the Warren-Alquist Act (Public Resources Code Section 25000 et seq.) vests the California Energy Commission (CEC) with exclusive certification jurisdiction over siting power generation plants greater than 50 megawatts (MW), amongst other powers; and

WHEREAS, on August 5, 2011, Hidden Hills Solar Holdings, LLC, submitted an Application for Certification to the CEC to construct and operate the Hidden Hills Solar Electric Generating System (HHSEGS), a solar thermal power plant greater than 50 MW, in Charleston View in Inyo County; and

WHEREAS, Inyo County would be the lead agency for the project if not for the CEC's exclusive jurisdiction; and

WHEREAS, the CEC transmitted a request for agency participation in its certification process for the proposed HHSEGS to Inyo County on August 19, 2011; and

WHEREAS, California Government Code Section 65300 et seq. indicates that the legislative body of each county shall adopt a comprehensive, long-term general plan for its physical development, including the following seven required elements: (1) land use, (2) circulation, (3) housing, (4) conservation, (5) open space, (6) noise, and (7) safety; and

WHEREAS, the proposed HHSEGS is on lands designated by the Inyo County General Plan Land Use Element as Open Space and Recreation (OSR) and Resort/Recreational (REC), and

WHEREAS, the OSR designation provides for public parks, ball fields, horse stables, greenbelts, and similar and compatible uses and the REC designation provides for a mixture of residential and recreational commercial uses, and the proposed HHSEGS is inconsistent with these designations; and

WHEREAS, General Plan GOAL GOV-10 (Energy Resources) and Policy Gov-10.1 (Development) indicate that development of energy resources on both public and private lands be encouraged with the policies of the County to develop these energy resources within the bounds of economic reason and sound environmental health, and therefore, the Board supports the following policies: (a) The sound development of any and all energy resources, including, but not limited to geothermal, wind, biomass, and solar, (b) The use of peer-reviewed science in the assessment of impacts related to energy resource development, (c) The development of adequate utility corridors necessary for the transmission of newly generated energy, (d) Maintenance of energy opportunities on state and federal lands maintaining and expanding access, (e) Treating renewable energy sources as natural resources, subject to County planning and environmental jurisdiction; (f) Considering, accounting for, and mitigating ecological, cultural, economic, and social impacts, as well as benefits, from development of renewable energy resources; and, (g) Considering development of environmental and zoning permitting processes to ensure efficient permitting of renewable energy projects while mitigating negative impacts to county services and citizens, with a goal of ensuring that citizens of the County benefit from renewable energy development in the County; and

WHEREAS, Inyo County staff, citizens, and elected officials have been participating in the CEC's certification process for the HHSEGS, including attending CEC meetings, hearings, and workshops on the following dates: September 26, 2011, October 28, 2012, November 3, 2011, November 18, 2011, January 12, 2012, January 18, 2012, January 24, 2012, February 22, 2012, April 3, 2012, April 26, 2012, May 9, 2012, June 4, 2012, June 14, 2012, June 27, 2012, July 2, 2012, and, July 9, 2012; and

WHEREAS, Inyo County representatives have provided written correspondence to the CEC and the applicant on numerous occasions providing input into the process and germane issues, including on November 29, 2011, February 16, 2012, February 23, 2012, February 27, 2012, and March 9, 2012; and

WHEREAS, the applicant attended the Inyo County Board of Supervisors meeting on March 13, 2012, presented the proposed project to the Board, and engaged in dialogue with the Board, including representing that an application for a General Plan Amendment (GPA) would be submitted; and

WHEREAS, CEC Staff issued a Preliminary Staff Assessment (PSA) on May 25, 2012 and a Supplemental PSA on June 15, 2012; and

WHEREAS, the PSA and Supplemental PSA do not adequately address the issues raised by Inyo County previously in the proceedings, or the provision of Title 21 of the Inyo County Code; and

WHEREAS, pursuant to Public Resources Code section 25523(d), following public hearing(s), the CEC must prepare a written decision which must include findings regarding the conformity of the proposed site with "...other applicable local, regional, state and federal standards, ordinances or laws"; and

WHEREAS, in this resolution, as required of it by Title 21 of the Inyo County Code, the Inyo County Board of Supervisors identifies the findings and conditions of certification (COC) that are in addition to, or supplement, those provided in the PSA and Supplemental PSA.

THEREFORE BE IT RESOLVED, that based on all of the information received to date including but not limited to the written and oral comments and input received at the March 13, 2012 and July 17, 2012 Board of Supervisors meetings, staff reports and presentations and the applicant's representations, the Inyo County Board of Supervisors makes the following findings and establishes conditions of certification upon the project, as required of it by Title 21 of the Inyo County Code, in addition to or in lieu of those provided in the PSA and Supplemental PSA.[1]

BE IT FURTHER RESOLVED that this Board of Supervisors therefore provides the CEC with the following findings and COCs for the proposed HHSEGS, that are in addition to or in lieu of those findings and COCs provided in the PSA and Supplemental PSA, for inclusion in the final staff assessment and final certification.

Comment 17

Biological Resources – New or Revised Findings of Fact

A. Add the following new finding: Less than two percent of Inyo County remains in private ownership, and every acre restricted for the purpose of compensatory mitigation results in a significant impact. Biology-related compensatory mitigation proposed for the project exceeds 6,000 acres, including requirements to encumber private lands in Inyo County with a conservation easement in perpetuity. If private lands within Inyo County are utilized for compensatory mitigation, there will be significant impacts to the economic environment in Inyo County.

[1] Modified text is indicated with ~~strikeout~~ and underline.

Comment 18

Biological Resources – New or Revised Conditions of Certification

A. Add the following new COC: The applicant and the CEC in coordination with the County shall investigate and implement means to enhance degraded public lands (including lands designated Wilderness), rather than utilizing private lands in Inyo County for biology-related compensatory mitigation, including investigating and advocating for means to quantify restoration activities on public lands in lieu of direct compensatory mitigation.

Comment 19 Revise COC BIO-22 subparagraph 1(a)(i) to read: Selection Criteria. Compensation lands for impacts to state waters shall meet the following criteria: i. Located in California and within the Pahrump Valley. If the project owner demonstrates that suitable compensation lands are not available within Pahrump Valley, lands may be acquired in California Valley, or the California portions of Sandy (Mesquite) Valley and Stewart Valley. The applicant and the CEC shall investigate means to enhance degraded public lands, including lands designated Wilderness as an alternative to utilizing private lands in Inyo County as compensatory mitigation.

Comment 20 Add the following new COC: If private lands within Inyo County are to be used as compensatory mitigation for impacts of the project, whether such lands are selected before or after certification of the project, prior to the selection of such lands, the CEC will conduct a study of the lost economic opportunity costs which the County would suffer as a result of the conversion of the private lands to mitigation lands and of the environmental impacts that would result from such conversion and, if any such lands are selected, the CEC will impose appropriate mitigation to fully offset any identified adverse impacts to the County and/or to the environment.

Comment 21 Revise BIO-18, subsection 6 to read: Compensate Local Agencies for Increased Weed Monitoring and Abatement. The project owner and the Inyo/Mono Agricultural Commissioner shall ~~coordinate with local agricultural commissioner(s) to~~ establish an amount for a fee to be paid annually by the project owner to the local agency(ies) for increased offsite monitoring and abatement costs resulting from the construction and operation of the project.

Comment 22 Revise BIO-23, subparagraph 2, to read: Definitions. ~~"Less-than-significant effect" shall be defined as less than 20 percent change from the baseline condition or values in any of the vegetation attributes monitored that indicates a decline in the health of the mesquite and other groundwater-dependent species~~. The "baseline" for groundwater levels shall be as defined in **WATER SUPPLY-6** and includes pre-project water levels and background trends. Baseline, or pre-project values for vegetation attributes shall be established at the GDE plots and offsite reference plots prior to the start of groundwater pumping. ~~A "statistically significant decline" in groundwater elevation shall be defined as a drawdown that exceeds the background decline by 0.5 feet as described in **WATER SUPPLY-6.**~~ "Normal seasonal variation" in vegetation attributes shall be established by comparing attributes in vegetation between the peak growing season and the hottest and driest time of year for Pahrump Valley to the baseline data.

Comment 23 Replace BIO-23 subparagraph 3, with the following: Based on the results of inventory of groundwater-dependent and groundwater-influenced habitat and resources produced under BIO-23, subparagraph 13, an amount of water table drawdown that would cause a significant impact to GDEs shall be identified. Using drawdown curves calculated using representative aquifer parameters applied to the Theis method, determine the maximum pumping rate that will not exceed the threshold of significant drawdown at GDEs over the life of the project. Using this pumping rate and these aquifer parameters, determine the maximum drawdown that could occur within each monitoring well located between the project and the GDEs without exceeding the threshold of significant drawdown for any GDE. If drawdown in any monitoring well exceeds the drawdown that corresponds to a threshold of significant drawdown for any GDE, the project owner shall have 90 days to provide evidence to the CPM that the drawdown is not a result of groundwater pumping by the project. If after reviewing the evidence provided by the project

Comment 23, cont'd

owner and other relevant evidence, the CPM, in consultation with BLM Nevada and California state leads for Soil, Water, Air and Riparian Programs, the BLM Southern Nevada District Hydrologist and Botanist and the Inyo County Water Department concludes that the drawdown is due to groundwater pumping by the project, the CPM shall notify the project owner that its groundwater pumping is to cease.

Subsequently, the project owner may resume pumping if the CPM, in consultation with BLM Nevada and California state leads for Soil, Water, Air and Riparian Programs, the BLM Southern Nevada District Hydrologist and Botanist and the Inyo County Water Department concludes that the exceedance of the drawdown trigger(s) was due to factors other than the project's pumping, and that the project's groundwater pumping did not contribute to the trigger exceedance, or the water table recovers to baseline levels.

Comment 24 Revise BIO-23, Subparagraph 13 to read: The Vegetation Monitoring Plan shall include an inventory of groundwater-dependent or groundwater-influenced habitat and resources that may be potentially affected by the Project. The inventory should identify and describe habitat and resources that are dependent on or influenced by groundwater, including spring flow, base flow to streams and rivers, phreatophytic meadows, phreatophytic scrub, and riparian areas. At a minimum, baseline data shall be collected at all monitoring sites and reference sites twice annually between project approval and the start of pumping. Vegetation data collected at the GDE plots within the first two years following the start of pumping may also be used to improve the baseline dataset if corresponding monitoring wells detect no statistically significant water table drawdown at those sites. Subject to approval by the CPM, in consultation with BLM Nevada and California state leads for Soil, Water, Air and Riparian Programs, ~~and~~ the BLM Southern Nevada District Hydrologist and Botanist and the Inyo County Water Department, if groundwater pumping ceases or is replaced by other water sources, vegetation monitoring shall continue until groundwater levels have returned to baseline levels.

Comment 25

H. Revise the first two paragraphs of BIO-24 to read: Thresholds for remedial a[illegible], as defined in **BIO-23** and **WATER SUPPLY-6**, are designed to avoid impacts to the mesquite woodlands and other groundwater-dependent ecosystems (GDEs) near the project before they result in a loss of resources, or a significant impact to habitat functions and value. ~~If monitoring detects project-related impacts to any groundwater dependent ecosystems (GDEs) that meet or exceed the thresholds, the project owner shall determine which project well(s) are the source of the impact and stop pumping, modify or reduce pumping at that well(s) as necessary to restore the groundwater elevation to pre-threshold levels~~. As provided in BIO-23, if drawdown in any monitoring well exceeds the drawdown that corresponds to threshold of significant drawdown for any GDE, the project owner shall have 90 days to provide evidence to the CPM that the drawdown is not a result of groundwater pumping by the project. If after reviewing the evidence provided by the project owner and other relevant evidence, the CPM, in consultation with BLM Nevada and California state leads for Soil, Water, Air and Riparian Programs, the BLM Southern Nevada District Hydrologist and Botanist and the Inyo County Water Department concludes that the drawdown is due to groundwater pumping by the project, the CPM shall notify the project owner that its groundwater pumping is to cease. ~~Pumping shall cease until the project owner has provided evidence, subject to approval by the CPM in consultation with the BLM Nevada and California state leads for Soil, Water, Air and Riparian Programs, and the BLM Southern Nevada District Hydrologist and Botanist, that a reduction or modification in pumping would restore the groundwater elevation to pre-threshold levels, as demonstrated by a statistical trend analysis, refined by the most recent annual monitoring data as described in **WATER SUPPLY-6**, that compares actual to predicted water level declines due to project pumping. This provision is not a replacement for the acquisition and retirement of water rights prescribed in **WATER SUPPLY-2** to offset the project's contribution to the basin imbalance.~~

Comment 25, cont'd

Subsequently, the project owner may resume pumping if the CPM, in consultation with BLM Nevada and California state leads for Soil, Water, Air and Riparian Programs, the BLM Southern Nevada District Hydrologist and Botanist and the Inyo County Water Department concludes that the exceedence of the drawdown trigger(s) was due to factors other than the project's pumping, and that the project's groundwater pumping did not contribute to the trigger exceedence or that modifying or reducing pumping will restore the groundwater elevation to pre-threshold levels.

Comment 26 Revise the first two paragraphs of BIO-24, Verification to read: ~~If monitoring data demonstrate that the threshold for remedial action is met or exceeded, the project owner shall stop pumping and notify the CPM within 48 hours of detection~~.

The project owner may resume pumping only if the CPM has reviewed and approved evidence, in consultation with the BLM Nevada and California state leads for Soil, Water, Air and Riparian Programs, ~~and~~ the BLM Southern Nevada District Hydrologist and Botanist and the Inyo County Water Department, that modifying or reducing pumping will restore the groundwater elevation to pre-threshold levels.

Comment 27 Revise BIO-26, Verification to read: At least 120 days prior to the start of any project-related site disturbance activities, the project owner shall submit to the CPM and to the Inyo County Planning Department a preliminary draft plan for review and approval. The project owner shall incorporate all required revisions and submit a final preliminary plan to the CPM no less than 60 days prior to the start of ground disturbing activities. At least 30 days prior to the start of ground disturbing activities, the project owner shall submit to the CPM and to Inyo County for review and approval evidence of a financial assurance mechanism (i.e. bond, letters of credit, trust funds, etc.) to ensure sufficient financial assurances are in place to fully restore the project site to pre-project conditions in accordance with the final preliminary plan.

At least one year prior to planned closure and decommissioning, the project owner shall submit to the CPM and to the Inyo County Planning Department for review and approval, ~~in consultation with the Inyo County Planning Department,~~ a draft final closure plan. The project owner shall incorporate all required revisions and submit a final plan to the CPM no less than 90 days prior to the start of ground disturbing activities associated with project closure and decommissioning activities. At least 90 days prior to the start of ground disturbing activities associated with project closure activities, the project owner shall submit to the CPM and to Inyo County for review and approval, evidence of a financial assurance mechanism (i.e. bond, letters of credit, trust funds, etc.) to ensure sufficient financial assurances are in place to fully restore the project site to pre-project conditions in accordance with the final plan.

Any modifications to the plan shall be made only after consultation and approval of the CPM and with the Inyo County Planning Department. The project owner shall notify the CPM and the Inyo County Planning Department no less than 90 days before implementing any proposed modifications to the plan.

Within 30 days after completion of project construction for each phase of development, the project owner shall provide to the CPM and the Inyo County Planning Department a written report identifying which items of the Closure, Revegetation and Reclamation Plan have been completed, a summary of all modifications to mitigation measures made during the project's construction phase, and which items are still outstanding.

Land Use – Revised Conclusions and Recommendations

Comment 28 Revise the last paragraph of the Conclusions and Recommendations section to read:
The applicant has responded to staff's data requests regarding land use inconsistencies by stating that they would work with Inyo County to determine appropriate land use entitlements. On July 10, 2012, the applicant submitted an application for a general plan amendment and

Comment 28, cont'd

zoning reclassification. If the application is approved by Inyo County, the project would be consistent with the County of Inyo General Plan and Zoning Ordinance; however, approval of the application will not resolve the issue of placing of project structures on public roads nor will it resolve the placing of project structures across lot lines or provide the required ~~To date the applicant has not submitted applications to the county in order for the county to provide input to staff for development of appropriate conditions of certification. Staff has recommended two conditions of certification related to the Subdivision Map Act and~~ financial assurances under Title 21, the Renewable Energy Ordinance.

Land Use – New or Revised Findings of Fact

Comment 29

A. Add the following new finding: The HHSEGS proposes placing structures within public roads, which are property rights held by the public, and across property lines.

B. Add the following new finding: The HHSEGS would not be consistent with the Inyo County Subdivision ordinance or California statutes without the proposed COCs.

C. Add the following new finding: The Inyo County Board of Supervisors holds exclusive authority to abandon public roads and the take land use actions, such as merging lots or reverting acreage.

Land Use – New or Revised Conditions of Certification

Comment 30

A. Revise LAND-2 to read: At least 30 days prior to the start of any project-related site disturbance activities, the project owner shall submit evidence of a financial assurance mechanism or ~~proposal~~ agreement to the CPM and Inyo County for review and approval (i.e. bond, letters of credit, trust funds, etc.) to ensure sufficient financial assurances are in place to fully restore the project site to pre-project conditions~~.~~ in accordance with the preliminary plan required by BIO-26. Additionally, at least 90 days prior to the start of ground disturbing activities associated with planned project closure activities in accordance with the final closure plan required by BIO-26, the project owner shall submit to the CPM and to Inyo County for review and approval, evidence of a financial assurance agreement (i.e. bond, letters of credit, trust funds, etc. to ensure sufficient financial assurances are in place to fully restore the project site to pre-project conditions in accordance with the final plan.

The agreement shall allow the CEC ~~Energy Commission~~ to use the decommissioning fund to restore the property to pre-project conditions in the event that the project owner, or its successors or assigns, do not properly decommission the project or restore the property to pre-project conditions within a reasonable time following the cessation of business operations or the abandonment of the project or property for whatever reason.

The agreement shall provide that the amount of the decommissioning fund shall be calculated to fully implement the decommissioning activities as described in the preliminary and the final closure plans for the HHSEGS project and the property. The project owner shall pay for the County to retain a third party expert to review the preliminary and final closure plans and confirm about the adequacy of the decommissioning fund. The decommissioning fund shall be adjusted for inflation (every three years) and for any updates to the ~~final~~ closure plans.

With regards to the inflationary adjustment, the agreement shall specify either a process or the most appropriate inflationary index(es) to capture the actual costs to perform the necessary decommissioning work. The agreement also shall provide that, in the event that the decommissioning fund is inadequate to fully decommission the project or restore the property, the project owner, its successors or assigns, shall be liable for any amount expended by the CEC or by the County over the decommissioning fund balance and shall provide for termination of the decommissioning fund upon the completion of implementation of the final closure plan.

Verification: At least 30 days prior to the start of construction and prior to any Notice to Proceed with construction issued by the CPM, the project owner shall provide the CPM with documentation of an approved financial assurance ~~or~~agreement satisfactory to Inyo County and CPM, and at least 90 days prior to the start of ground disturbing activities associated with planned project closure activities in accordance with the final closure plan required by BIO-26, the project owner shall provide the CPM with documentation of an approved financial assurance or agreement satisfactory to Inyo County and CPM.

Comment 31

B. Add the following new COC: The project owner shall comply with the provisions of Title 16, Subdivisions, Inyo County Code of Ordinances and Streets and Highway Code Section 8310 et seq. to ensure that public roads within the project site have been abandoned by the Inyo County Board of Supervisors.

Verification: At least 30 days prior to construction of the HHSEGS project, the project owner shall submit evidence to the CPM, indicating that the Inyo County Board of Supervisors has abandoned such public roads on the project site as necessary to allow construction of project facilities in the former public roads.

Socioeconomics – New or Revised Findings of Fact

Comment 32

Insert the following language and findings of fact: Staff concludes that HHSEGS would cause a significant adverse, direct, indirect, or cumulative socioeconomic impact to the County of Inyo as a result of the increased need to provide County services directly relating to the construction and operation of the proposed project, specifically the increased services necessary from the following County departments: Sheriff's Department, Health and Human Services, Integrated Waste Management, Motor Pool, Inyo/Mono Agriculture Commissioner, Water Department, Information Services, and Assessor, based on the following proposed findings of fact:

Comment 33

1. The HHSEGS is located more than 200 miles from the Owens Valley, the population center of the County and is expected to be constructed on approximately 3,200 acres of privately owned land in the Charleston View area of the County. The project applicant holds an option to lease the HHSEGS site and other privately owned lands adjacent to the site, which, when combined with the HHSEGS site, totals nearly 10,000 acres;

Comment 34

2. Less than two percent of Inyo County remains in private ownership, and every acre restricted for the purpose of compensatory mitigation results in a significant impact. Biology-related compensatory mitigation proposed for the project exceeds 6,000 acres, including requirements to encumber private lands in Inyo County with a conservation easement in perpetuity. If private lands within Inyo County are utilized for compensatory mitigation, there will be significant impacts to the economic environment in Inyo County.

Comment 35

3. The residential area commonly referred to as Charleston View, located directly south of the HHSEGS site across Old Spanish Trail, is occupied by approximately 65 residents;

Comment 36

4. The closest communities to the HHSEGS site within which the County of Inyo provides County services to residents and visitors are the communities of Tecopa and Shoshone, located approximately 30 miles west of the HHSEGS site;

Comment 37

5. Approximately 181 residents reside in the communities of Tecopa and Shoshone and Charleston View;

Comment 38

6. The County provides non-law enforcement services to the HHSEGS site with limited local staff, primarily staffed in Tecopa, and supplements those services with staff from the County offices located in Lone Pine, Independence and Bishop;

Comment 39

7. General law enforcement services are provided through the Inyo County Sheriff's Department through two resident deputies residing in Shoshone in County-owned housing. The patrol area for the deputies patrolling the HHSEGS site encompasses 3200 miles, consisting of both paved and unpaved roads.

Comment 40

8. During construction of the HHSEGS, additional County services will be required in order to address the service needs due to the anticipated construction workforce, which will peak at nearly 1,100 employees.

Comment 41

9. The HHSEGS is anticipated to be constructed under the terms and conditions of a project labor agreement with the Kern, Inyo and Mono Trades Council, which agreement would provide hiring preferences to union employees residing in Kern, Inyo and Mono counties. If the proposed project's construction workforce needs are not met by union employees in those counties, hiring preferences will be extended to union employees residing in California. Due to the remote location of the HHSEGS site and the fact that there is not a large California union labor pool residing within a two-hour commute of the HHSEGS site, the majority of the construction workforce will commute from areas within California remote from the project site.

Comment 42

10. The HHSEGS site's close proximity to the Nevada community of Pahrump and the city of Las Vegas will result in sufficient temporary housing stock for the construction workforce. Limited temporary housing is available in Inyo County in the communities of Tecopa and Shoshone, mostly in the form of campsites. In addition, the HHSEGS site is surrounded by numerous vacant privately owned parcels upon which illegal, onsite usage, or "squatting", has occurred in the past. The applicant estimates that five percent (5%) of the construction workforce, approximately 55 employees, will reside in Inyo County. That will result in a 30% increase in the total population in the communities surrounding the HHSEGS.

Comment 43

11. The temporary increase in population will result in an increase in County services to the south east portion of the County currently served with limited resources. Local law enforcement in Clark County Nevada, the agency responsible for general law enforcement in Primm, Nevada, experienced a 30% increase in service calls in Primm during the construction of the Ivanpah project. It is likely that similar increases will be seen in both Inyo County and neighboring counties in Nevada from the increase in residents resulting from temporary construction housing.

Comment 44

12. The County estimates that the increased cost for services resulting from the HHSEGS is $11,129,466 during the construction period and $1,713,735 during the operation of the project. Specifically, those costs are estimated, based on the information available to the County as of February 16, 2012, as follows:

Comment 45

Agency/Department	Initial/ Construction	Ongoing Annual
Health & Human Services		$188,115
Assessor	$120,000	$120,000
Sheriff	$2,130,666	$1,269,120
Public Works	$8,157,000	$78,500
Information Services	$237,600	
Agricultural	$150,000	$50,000
Waste Management	$156,000	
Motor Pool	$33,200	
Water Department	$145,000	$8,000
Total	**$11,129,466**	**$1,713,735**

Comment 46

The increased costs identified by the County will not be off-set by the estimated increase in property tax. In addition, due to the location of the HHSEGS in a remote area of the County and the HHSEGS site's close proximity to large communities in Nevada, the County is not expected to benefit from other economic benefits which generally flow from projects similar to the HHSEGS.

Comment 47

13. Title 21 of the Inyo County Code sets forth the policy and permitting requirements of the County for renewable energy facilities. Title 21 governs the siting, licensing and construction of the proposed project. Title 21 includes a definition of "environment" which exceeds that contained in the California Environmental Quality Act and includes economic environment of the County. One of the stated purposes of Title 21 is "to recover the costs of increased services" resulting from the construction of a facility such as the proposed project. Mitigation measures mandated by Title 21 include those necessary to "ensure that the County and its citizens do not bear an undue financial burden from the project."

Comment 48

14. The estimated cost of construction of the HHSEGS exceeds $5,000,000 and, as such, the local sales and use taxes from the construction contractors may be allocated to the local jurisdiction of the specific construction jobsite by the contractor and subcontractors. The designation of the HHSEGS jobsite for purposes of sales and use tax would result in the County receiving revenues to off-set the economic impacts resulting from the increased service costs caused by the HHSEGS.

Comment 49

15. The applicant indicated a willingness to maximize the tax benefits to the County. (Data Request Set 2-F, Response 194). In order to maximize such benefits it is necessary that the County retains a consultant with expertise in the area of sales and use tax, which consultant should be funded by the project owner, so as to assure the proper procedures and designations are met.

Comment 50

16. The May 12 Socioeconomic and Fiscal Impacts of the HHSEGS on Inyo County prepared by the CEC, has unequivocally stated that the County of Inyo will receive in excess of $84.5 million in sales and use tax during the three-year construction period for the HHSEGS.

Socioeconomics – New or Revised Conditions of Certification

Comment 51

A. Add the following new COC: SOCIO 2 (Local Sales and Use Tax)

1. The project owner shall require that all qualifying contractors and subcontractors exercise their option(s) to obtain a Board of Equalization sub-permit for the HHSEGS jobsite and allocate all eligible sales and use tax payments to the County of Inyo. Prior to commencement of any construction activity on-site, the project owner will require that the contractor or

Comment 51, cont'd

subcontractor provide to the County of Inyo a copy of the contractor's or subcontractor's State of California Board of Equalization (BOE) account number(s) and sub-permit(s), or a statement that use tax does not apply to their portion of the project. To accomplish this, project owner shall either cause its construction contractor to treat the project in accordance with Title 18 CCR Sections 1521(b)(2)(B), 1521(c)(13)(B) and 1826(b), for sales and use tax purposes or form a "Buying Company" as defined in the State of California BOE Regulation 1699(h), or take such other action as directed by the consultant and County. The project owner can adopt an alternate methodology to accomplish this goal if such methodology is approved by the County prior to commencement of construction.

Comment 52

2. The project owner shall be required to reimburse the County for all costs associated with any expenses it incurs for consultants with expertise in sales and use tax allocation, hired by the County, to assist the project owner and its contractor and subcontractors to complete and submit all documents necessary to register the HHSEGS project site as the source of all sales and use taxes in conformance with the laws and regulations of the BOE. The consultant may set out the necessary procedures which the project owner, its contractor and all qualifying subcontractors shall follow in order to maximize the County's receipt of sales tax.

Comment 53

3. If project owner receives an exclusion of applicable sales and use tax payable to the County under Senate Bill 71 under the State Public Resources Code (Section 26003 et seq.) and the California Alternative Energy and Advance Transportation Financing Authority (CAEATFA), project owner shall pay to the County of Inyo $84.5 million, which represents the estimated amount of the sales tax which would have been received if project owner had not obtained such exclusion, as set forth in the "Socioeconomic and Fiscal Impacts of the Hidden Hills Solar Electric Generating System on Inyo County" dated May 2012.

Comment 54

4. Within five (5) days of certification, project owner shall deliver to the County a letter of credit, which may be drawn upon as expressly set forth below. The amount of the letter of credit shall be $84.5 million.

Comment 55

5. The letter of credit may be reduced annually to an amount equal to the then amount of the letter of credit minus the then cumulative total amount of Local Sales and Use Tax attributable to construction of the proposed project that the BOE records indicate were allocated to the County of Inyo. Project owner may replace the existing letter of credit with a new letter of credit in an amount equal to the new amount required as determined using the calculation method described above.

Comment 56

6. Within 30 days after the completion of construction of the proposed project, the consultant, project owner and County shall review the BOE records to determine if the cumulative Local Sales and Use Tax attributable to construction of the proposed project and allocated by the BOE to the County is less than the estimated $84.5 million; if so, the project owner shall pay such difference within sixty (60) days of the date the County notifies the project owner of the deficiency. If the project owner fails to pay such difference within such time period, the County of Inyo may draw upon the letter of credit in an amount equal to the deficiency. Any disputes between project owner and the County shall be resolved by the CEC.

Comment 57

7. Upon payment in full of the amount of the $84.5 million (whether through allocations from the BOE, direct payments under this section, and/or draws upon the letter of credit), or upon abandonment of the proposed project, the letter of credit shall be returned to the project owner.

Comment 58

8. The letter of credit is intended as mitigation required under Title 21 of the Inyo County Code by way of requiring security to the County for the receipt by the County of Local Sales and Use Tax, which is anticipated to provide revenue necessary to the County to off-set the increased service costs caused by the proposed project when combined with the anticipated increase in property tax revenue from the project site. In the event the proposed project is not constructed, is only partially constructed, or is reduced in size, the letter of credit obligation and the obligation to pay the County of Inyo any deficiency with respect to the $84.5 million shall be reduced in size, the letter of credit obligation and the obligation to pay County any deficiency with respect to the $84.5 million shall be reduced accordingly through a revised estimate established by the consultant. Project owner shall provide the information needed by the consultant and County to make this revised estimate.

Verification: The project owner shall further provide proof of the establishment of the letter of credit in the amount of $84.5 million and shall further provide confirmation from Inyo County of the hiring of a consultant at project owners' expense.

Comment 59

B. Add the following new COC: SOCIO-3 (Economic Mitigation on Private Lands within Inyo County)

1. The applicant and the CEC, in coordination with the County, shall investigate and implement, means to enhance degraded public lands (including lands designated Wilderness), rather than use private lands in Inyo County for compensatory mitigation, including investigating and advocating for means to quantify restoration activities on public lands in lieu of direct compensatory mitigation.

Comment 60 If private lands within Inyo County are to be used as compensatory mitigation for impacts of the project, whether such lands are selected before or after certification of the project, prior to selection of such lands, the CEC should cause a study of the lost economic opportunity costs which the County would suffer as a result of the conversion of the private lands to mitigation lands and the environmental impacts what would result from such conversion and, if any such lands are selected, that the CEC impose appropriate mitigation, including economic mitigation mandated by Title 21 of the Inyo County Code of Ordinances, to fully offset any identified adverse impacts to the County and/or to the environment.

Traffic and Transportation – New or Revised Conditions of Certification

Comment 61

A. Revise COC TRANS-2 (Right-of-Way) as follows: Prior to any ground disturbance, improvements, or obstruction of traffic within any public road, the project owner shall dedicate to the County of Inyo 24 feet of right-of-way along Old Spanish Trail Highway for the length of HHSEGS site. The configuration of driveways into the HHSEGS site do not allow for rights-of-way for traffic transitions within the limits of the HHSEGS site. The drive locations shall be reconfigured to accommodate traffic transitions within the limits of the property boundaries or additional right-of-way beyond the HHSEGS site shall be acquired and dedicated to Inyo County along the Old Spanish Trail Highway.

Revise Verification: Prior to the start of construction, the project owner shall provide evidence to the CPM that the dedication of right-of-way to and accepted by Inyo County has been completed.

Comment 62 Add the following new COC TRANS-2A (Pavement Preparation/Widening) as follows: Prior to any ground disturbance, other improvements, or other obstruction of traffic within any public road, the project owner shall apply for and receive an encroachment permit from Inyo County for the construction and completion of construction of an asphalt concrete overlay on Old Spanish Trail Highway and pavement widening including transitions to accommodate the turning movements along Old Spanish Trail Highway into and out of the HHSEGS site.

Add Verification: Prior to the start of onsite construction, the project owner shall provide evidence to the CPM that the construction of asphalt concrete overlay and turn lanes into and out of the HHSEGS site have been accepted by Inyo County.

Comment 63

C. Revise Verification of COC TRANS-3 to read: Prior to the start of site mobilization, the project owner shall photograph or videotape all of the affected public roads, easements, right-of-way segment(s), and/or intersections (including the portion of the Old Spanish Trail located to the west of project). The project owner shall provide the photographs or videotape to the CPM and the affected jurisdictions (California Department of Transportation (Caltrans), Nevada Department of Transportation (NDOT), and Inyo County). The purpose of this notification is to request that these jurisdictions consider postponement of any planned public right-of-way repair or improvement activities in areas affected by project construction until construction is completed, and to coordinate any concurrent construction-related activities that cannot be postponed.

If damage to public roads, easements, or rights-of-way is identified by the project owner or the affected jurisdiction ~~occurs during construction~~, the project owner shall immediately notify the CPM and the affected jurisdiction(s) to identify the section of the public right-of-way to be repaired. At that time, the project owner shall apply for, receive and comply with all conditions of an encroachment permit from the affected jurisdiction and establish a schedule for completion and approval of the repairs. Following completion of any public right-of-way repairs, the project owner shall provide the CPM letters signed by the person authorized to accept the repairs in the affected jurisdiction(s) stating their satisfaction with the repairs. If, in the opinion of the affected jurisdiction(s), the project owner is not timely in completing the required repairs, the jurisdiction(s) can, at its discretion, complete the repairs with its own staff or contract with an independent contractor to complete the repairs at the expense of the project owner. The project owner will reimburse the affected agency(ies) for the expense of the repairs.

Comment 64

Revise COC TRANS-4 (Truck Route) as follows: The project owner shall require all construction truck traffic use State Route 160 for all access to and from the project site. Throughout the construction and operation of the project, the project owner shall document, that all trucks access the project site using Nevada State Route 160 and shall investigate, evaluate, and ~~attempt to~~ resolve all project truck-related complaints. The project owner or authorized agent shall:

- Use the Traffic Complaint Resolution Form (below), or a functionally equivalent procedure acceptable to the CPM, to document and respond to each traffic complaint;
- Attempt to contact the person(s) making the traffic complaint within 24 hours;
- Conduct an investigation to determine the transportation company in the complaint and;
- Submit a report documenting the complaint and actions taken.

The report shall include: a complaint summary, including the final resolution and, if obtainable, a signed statement by the complainant stating that the truck route problem has been resolved to the complainant's satisfaction.

The project owner will pay a $10,000 penalty to Inyo County for each truck that accesses the site using the portion of the Old Spanish Trail Highway to the west of the project. This penalty shall be in addition to the restoration of any damage to the portion of the Old Spanish Trail to the west of project caused and addressed in accordance with TRANS 3.

Verification: The project owner shall include this specific route in its contracts for truck deliveries and provide the CPM with a copy of the transmittal letter to the contractors specifying the truck route.

Comment 65 Revise COC TRANS-5 (Traffic Control Plan, Heavy Hauling Plan, and Parking/Staging Plan) as follows: Prior to the start of construction of the HHSEGS, the project owner shall prepare a Traffic Control Plan (TCP) for the HHSEGS's construction and operations traffic. The TCP shall address the movement of workers, vehicles, and materials, including arrival and departure schedules and designated workforce and delivery routes.

The project owner shall consult with the Department of Transportation (Caltrans) District 9 office, Nevada Department of Transportation (NDOT) and Inyo County in the preparation and implementation of the Traffic Control Plan (TCP). The project owner shall submit the proposed TCP to Caltrans District 9, NDOT, and Inyo County in sufficient time for review and comment, and to the CPM for review and approval prior to the proposed start of construction and implementation of the plan. The Traffic Control Plan (TCP) shall include:

- Provisions for redirection of construction traffic with a flag person as necessary to ensure traffic safety and minimize interruptions to non-construction related traffic flow;
- Placement of necessary signage, lighting, and traffic control devices at the project construction site and lay-down areas;
- A heavy-haul plan addressing the transport and delivery of heavy and oversized loads requiring permits from ~~the California Department of Transportation (~~Caltrans~~)~~, ~~Nevada Department of Transportation (~~NDOT~~)~~ other state or federal agencies, and/or the affected local jurisdictions;
- Location and details of construction along affected roadways at night, where permitted;
- Temporary closure of travel lanes or disruptions to street segments and intersections during construction activities;
- Traffic diversion plans (in coordination with Caltrans, the County of Inyo and NDOT) to ensure access during temporary lane/road closures;
- Access to residential and/or commercial property located near construction work and truck traffic routes;
- Insurance of access for emergency vehicles to the project site;
- Advance notification to residents, businesses, emergency providers and hospitals that would be affected when roads may be partially or completely closed;
- A plan for monitoring LOS during construction on SR 160 and Old Spanish Trail Highway. The applicant shall report LOS findings to the ~~Energy Commission~~CEC's CPM as necessary;
- Assessment and implementation, if needed, of coordinated work hours and arrival/departure times outside of peak traffic;
- A coordinated park-and-ride program or rideshare program designed to transport construction workers to the project site via a van or bus service.
- Identification of safety procedures for exiting and entering the site access gate;
- Parking/Staging Plan (PSP) for all phases of project construction and for project operation.

For any activity on public roads, the project owner shall apply for, receive and comply with all conditions of an encroachment permit from the affected jurisdiction.

Verification: At least 60 calendar days prior to the start of construction, the project owner shall submit the TCP to the applicable agencies for review and comment and to the CPM for review and approval. The project owner shall also provide the CPM with a copy of the transmittal letter to the agencies requesting review and comment, and a copy of the encroachment permit issued by the affected agency for any activities on a public road.

At least 30 calendar days prior to the start of construction, the project owner shall provide copies of any comment letters received from the agencies, along with any changes to the proposed development plan, to the CPM for review and approval.

Comment 66

Visual Resources – New or Revised Conditions of Certification

A. Add the following new COC: The applicant/project owner shall provide a community center with parking. A detailed plan shall be developed.

Verification: At least 120 days before project commencement a detailed plan shall be submitted to the CPM for review and approval, and to Inyo County, affected Tribes and other stakeholders for review and comment. Plan details shall include:

a.) Parking and visitor area surface treatments;

b.) Landscape planting and irrigation plan;

c.) Parking area plan indicating lighting, parking striping, ingress and egress;

d.) Structural elements material finishes and details.

(a-b-c-d above may all be incorporated into the landscape plan required in VIS-2 and lighting plan required in VIS-3).

Water Supply – New or Revised Findings of Fact

Add the following new finding: With the proposed COCs, the project will protect the County of Inyo's citizens and environment from impacts related to groundwater pumping.

Water Supply – New or Revised Conditions of Certification

Comment 67

A. Revise the first paragraph of WATER SUPPLY-6 to read: The project owner shall submit a Groundwater Level Monitoring, Mitigation, and Reporting Plan to the CPM and to the Inyo County Water Department for review and approval in advance of construction activities and prior to the operation of onsite groundwater supply wells. The Groundwater Level Monitoring, Mitigation, and Reporting Plan shall provide detailed methodology for monitoring background and site and off-site groundwater levels. The monitoring period shall include pre-construction, construction, and Project operation. The plan shall establish pre-construction and Project-related groundwater level trends that can be quantitatively compared against predicted trends near the Project pumping wells and near potentially impacted resources.

Comment 68

B. Revise WATER SUPPLY-6, A.1 to read: A well reconnaissance shall be conducted to investigate and document the condition of existing water supply wells located within 3 miles of the project site, provided that access is granted by the well owners. The reconnaissance shall include sending notices by registered mail to all property owners within a 3 mile radius of the project area., shall identify the owner of each well, and shall include the location, depth, screened interval, pump depth, static water level, pumping water level, and capacity of each well. The plan should include, as feasible, agreements from the owner of each well approving monitoring activities.

Comment 69

Revise the first paragraph of WATER SUPPLY-8 to read: The project owner shall submit a Groundwater Level Monitoring, Mitigation, and Reporting Plan to the CPM and to the Inyo County Water Department for review and approval in advance of construction activities and prior to the operation of onsite groundwater supply wells. The Groundwater Level Monitoring, Mitigation, and Reporting Plan shall provide detailed methodology for monitoring background and site and off-site groundwater levels. The monitoring period shall include pre-construction, construction, and Project operation. The plan shall establish pre-construction and Project-related groundwater level trends that can be quantitatively compared against predicted trends near the Project pumping wells and near potentially impacted resources. The plan shall include a model for predicting changes in the groundwater flow system resulting from the Project which

Comment 69, cont'd

has the capability to assess changes in hydraulic head, flow rate, flow direction, and water budget and shall include model runs which predict effects of the planned groundwater pumping by the Project on GDEs and predictions of the level of groundwater pumping that will cause significant impacts on such habitats and resources. The Project Owner shall also use the model to provide an evaluation of the sustainability of the water supply for the life of the project, including the cumulative sustainability when considered with other pumping occurring or projected to occur in the groundwater basin.

~~This condition proposes a threshold for significant impacts to groundwater-dependent vegetation caused by water level decline due to Project groundwater pumping. This condition also proposes mitigation that would, if initiated, reduce the impact to a level that is less than significant.~~

The plan shall also include:

i. Provisions for initiation of water level monitoring as soon as wells are available and results will be publicly available;

ii. A plan for logging and aquifer testing of all new production wells;

iii. A plan for verifying the predictive tools described above and for revising or recalibrating the tools as necessary.

iv. A plan for revising thresholds as dictated by new data concerning system response to Project operation.

v. In cooperation with U.S. BLM and if permission is granted by BLM, the applicant shall fund and construct a monitoring well approximately ½ mile west of the Stump Springs ACEC for inclusion in the monitoring well network.

vi. An enforceable commitment based on monitoring data and significance thresholds, to implement mitigation measures as necessary.

Comment 70 Revise WATER SUPPLY-6.C.4 and WATER SUPPLY 8.C.5 to read: ~~After the first five-year operational and monitoring period the CPM shall evaluate the data and determine if the monitoring program for water level measurements should be revised or eliminated. Revision or elimination of any monitoring program elements shall be based on the consistency of the data collected. The determination of whether the monitoring program should be revised or eliminated shall be made by the CPM.~~ Groundwater elevations shall be measured throughout the life of the project at least twice per year, and reported to the CPM and to the Inyo County Water Department. The County will report these data to the California Department of Water Resources as part of the California Groundwater Elevation Monitoring Program.

Comment 71 Revise the Verification section of WATER SUPPLY-8 in each instance where a report or information is to be submitted to the CPM to read: ...to the CPM and to the Inyo County Water Department.

NOW, THEREFORE, BE IT FURTHER RESOLVED that, based on the information available to date and with incorporation of the findings and COCs delineated above, this Board of Supervisors finds that that the proposed HHSEGS minimizes potential social, economic, and environmental impacts to the extent feasible, and that the reclamation plan, financial assurances, and other conditions incorporated herein adequately safeguard the health, safety, and welfare of the County's citizens, the County's environment (including its public trust resources), and the County's financial well-being.

BE IT FURTHER RESOLVED that, based on the information available to date and with the incorporation of the findings and COCs delineated above, along with the findings and COCs set out in the PSA, this project would comply with Title 21 of the Inyo County Code.

PASSED AND ADOPTED this 17th day of July, 2012 by the following vote of the Inyo County Board of Supervisors:

AYES: Supervisors Arcularius, Cash, Pucci, Fortney and Cervantes
NOES: -0-
ABSTAIN: -0-
ABSENT: -0-

Chair, Inyo County Board of Supervisors

ATTEST: Kevin Carunchio
Clerk of the Board

By _____
Patricia Gunsolley, Assistant

Comparison of the Hidden Hills Solar Energy System to Applicable Goals & Policies of the Inyo County General Plan

Inyo County General Plan Goal or Policy	Analysis of Proposed Project's Consistency as Condition in PSA	Identified by PSA as LORS?
GOVERNMENT ELEMENT		
Goal GOV-1: Work with Agencies, Utilities, and Native American Tribes to promote consistency with the County's General Plan **AND** **Policy GOV-1.1/Plans for Agencies, Districts, Utilities, and Native American Tribes:** The County shall work with federal and state agencies, local districts, utilities (e.g., LADWP), and Native American tribes to ensure that they are aware of the contents of the County's General Plan and work with them to ensure that their plans are consistent with the County's General Plan to the greatest extent possible.	**Consistency:** Compliant. A number of public hearings on the project have been held in 2011-2012.	No.
Goal GOV-2: To ensure planning decisions are done in a collaborative environment and to provide opportunities of early and consistent input by Inyo County and its citizens into the planning processes of other agencies, districts, and utilities.	**Consistency:** Compliant. A number of public hearings on the project have been held in 2011-2012.	No.
Policy GOV-2.2/Public Participation: The County shall work with federal and state agencies, local districts, utilities (e.g., LADWP), and Native American tribes to ensure that the County and the public are involved early in any planning processes and that routine feedback and public input is requested.	**Consistency:** Compliant. A number of public hearings on the project have been held in 2011-2012.	No.
Policy GOV-3.1/No Net Loss: The County shall work with federal and state agencies, local districts, utilities (e.g., LADWP) and Native American tribes to ensure that land exchanges do not result in a net loss to the	**Consistency: Non-compliant.** Preliminary assessment of the project suggests mitigation in the form of acquisition of off-site lands for habitat/habitat enhancement. However,	No.

Inyo County General Plan Goal or Policy	Analysis of Proposed Project's Consistency as Conditioned in PSA	Identified by PSA as LORS?
County's tax base or revenues.	such mitigation would result in a net loss of County land. Compliance could be met based on the addition of the County's Conditions of Certification.	
Policy GOV-3.2/Private Land Increase: The County shall work with federal and state agencies, local districts, and utilities to find opportunities to expand private land ownership in the County through land transfers and other mechanisms.	**Consistency: Non-compliant.** Preliminary assessment of the project suggests mitigation in the form of easements on off-site lands for habitat/habitat enhancement. However, such mitigation would result in a net loss of private land. Compliance could be met based on the addition of the County's Conditions of Certification.	No.
Goal GOV-4.1/Federal Land Disposition & Acquisitions: It is the policy of the Board that the design and development of all federal and state land dispositions and acquisitions, including land adjustments and exchanges, be carried out to the benefit of the citizens of the planning area to ensure the following: a. That the County property tax base shall be maintained unless the Board determines there is an overriding benefit to the County. b. That the private property interests including, but not limited to, land patents, drilling rights, mining claims, easements, rights-of-way and forage rights are protected and enhanced. c. That residents within the planning area shall suffer no adverse aggregate economic impacts. d. That incentives be developed to provide an increase in local economic development by increasing, where possible, the amount of private and non-federal and non-state land within the planning area. e. That private use of federal and/or state controlled land within the planning area be increased in order to enhance opportunities for local economic development. f. That federal and/or state land agencies are discouraged from acquiring any private lands or rights in private lands within the planning area without first coordinating with the County. g. That federally and/or state managed lands that are difficult to manage or which lie in isolated tracts, or that could contribute to orderly expansion of existing communities	**Consistency: Non-compliant.** Comment 72 Preliminary assessment of the project suggests mitigation in the form of easements off-site lands for habitat/habitat enhancement. However such mitigation would result in a net loss of County land. Compliance could be met based on the addition of the County's Conditions of Certification.	

Inyo County General Plan Goal or Policy	Analysis of Proposed Project's Consistency as Conditioned in PSA	Identified by PSA as LORS?
should be considered for exchange or sale to private ownership. h. That the County be notified of, consulted about, and otherwise involved in all federal and state land adjustments in the planning area. The Board may review all proposed changes to determine if the proposals are in the best interest of the County. i. The Board may review and make recommendations on proposed public land withdrawals for hazardous and non-hazardous waste storage as well as the types of such waste. j. That before federal and state agencies change land uses, impact studies on land uses are conducted at the expense of the agency proposing the change and necessary mitigation measures adopted in coordination with the County. Impact studies should address community stability, local custom and culture, flood prone areas, access, or any other issue identified as a concern to the County. k. Due to the extensive state and federal ownership in the County, it is noted that the management of these areas should include: provision for continued and improved access through and within the County; continued provision of public recreational facilities and access; multi-use management where applicable; and interconnection or coordination of state, federal, and local facilities and programs when possible.		
Goal GOV-5/Protection & Development of Water Resources **AND** **Policy GOV-5.1/Water Management:** It is the policy of the County to be part of the planning, development and management of its water resources in coordination with federal, state, and any water managing districts. Resolution 99-43 sets forth the County policy on extraction and use of its water resources. That policy is to protect the County's environment, citizens and economy from adverse effects caused by activities relating to the extraction and use of water resources and to seek mitigation of any existing or future	**Consistency: Non-compliant.** Preliminary assessment of the project indicates that the project could exacerbate overdraft conditions, contribute to water level decline for groundwater dependent vegetation, and substantially lower water levels in neighboring domestic wells. However, with implementation of mitigation measures designed to ensure adequate water availability - to include acquiring and retiring water rights and a structured program of water level monitoring – such potential impacts to water resources should be maintained at less than significant levels. Compliance could be met based on the addition of the County's Conditions of Certification.	No.

Inyo County General Plan Goal or Policy	Analysis of Proposed Project's Consistency as Conditioned in PSA	Identified by PSA as LORS?
adverse effects resulting from such activities.	Comment 73	
Goal GOV-7/Provide for Recreational Activities	**Consistency:** Unknown. The County has prepared a socio-economic study to document the likely impacts and needs created by the project's influx of construction workers (+1,000 workers) and subsequent solar plant workers. It is unresolved how the project proposes to subsidize facilities such as parks/recreation facilities that such a large and temporary increase in population will require.	No.
Goal GOV-8/Wildlife & Fisheries **AND** **Policy 8.1/Management of Wildlife & Fisheries:** Management of wildlife, including fish, game animals, non-game animals, predatory animals and Threatened, Endangered, Sensitive, Candidate or Management Indicator Species, under all jurisdictions, must be grounded in peer-reviewed science and local input. Wildlife management plans should identify and plan for mitigation of negative impacts to the project area's economy and environment and to private property interests and customary usage rights of its citizens. Therefore, the following are the policies of the County: a. The County should cooperate with federal and state agencies who oversee the protection and recovery of federal and state listed threatened, endangered, sensitive or candidate species and their habitat. b. The County may adopt local recovery plans as allowed under the Endangered Species Act. c. Federal and state agencies shall prepare a plan in coordination with the County before the introduction or re-introduction of any species onto public or private land that is likely to impact the planning area. d. The County supports wildlife management that: 1. Enhances populations of game and non-game species native to the project area. 2. Recognizes that enhancing non-native game and non-game species may negatively impact	**Consistency:** Compliant. Preliminary assessment indicates the project will have significant impacts on a number of species. However, mitigation has been developed for the project that will decrease impacts to less than significant levels and satisfy regulating agencies such as Bureau of Land Management (BLM) and Department of Fish & Game (DFG). However, such mitigation measures include off-site mitigation, which at this time is still being investigated. Should such mitigation prove unworkable, then impacts may be significant and immitigable.	No.

Inyo County General Plan Goal or Policy	Analysis of Proposed Project's Consistency as Conditioned in PSA	Identified by PSA as LORS?
native species and rangeland ecosystems. 3. Increase wildlife numbers where practicable that is not in conflict with existing economic uses or ecosystem health. 4. Recognizes that large game animals compete for forage and water with other economic uses. 5. Supports the need for a private property compensation program for certain wildlife damages.		
Goal GOV-10/Energy Resources **AND** **Policy GOV-10.1/Development:** Development of energy resources on both public and private lands be encouraged with the policies of the County to develop these energy resources within the bounds of economic reason and sound environmental health. Therefore, the Board supports the following policies. a. The sound development of any and all energy resources, including, but not limited to geothermal, wind, biomass, and solar. b. The use of peer-reviewed science in the assessment of impacts related to energy resource development. c. The development of adequate utility corridors necessary for the transmission of newly generated energy. d. Maintain energy opportunities on state and federal lands maintaining and expanding access e. Treat renewable energy sources as natural resources, subject to County planning and environmental jurisdiction. Consider, account for, and mitigate ecological, cultural, economic, and social impacts, as well as benefits, from development of renewable energy resources. Consider developing environmental and zoning permitting processes to ensure efficient permitting of renewable energy projects while mitigating negative impacts to county services and citizens, with a goal to ensuring that citizens of the County benefit from renewable energy development in the County.	**Consistency:** Unknown. The project is a renewable energy project that makes use of the County's abundant solar resources. However, the tie-in structure of the electrical and gas pipeline components of the project are such that no additional electricity or gas from the project would be available within the immediate area of the project site, but would be diverted to the east to sub-stations where it will be dispersed to wider areas within Nevada and California. Preliminary assessment of the project indicates that provision of such additional electrical and gas resources could have growth-inducing impacts within the larger Pahrump Valley/ Charleston View area or other development in more distant parts of Nevada and California, resulting in economic and social impacts. As a result, the project appears non-compliant with subsection e. of this policy. Compliance could be met based on the addition of the County's Conditions of Certification.	Yes.

Inyo County General Plan Goal or Policy	Analysis of Proposed Project's Consistency as Conditioned in PSA	Identified by PSA as LORS?
Goal GOV-11/Access & Transportation **AND** **Policy GOV-11.1/Balanced Transportation:** It is the policy of the County to develop and maintain a transportation system that optimizes accessibility and that minimizes the cost of movement within the planning area and connecting corridors consistent with County, state and federal roadways and travel ways; therefore, it is the policy of the County that: a. Any and all proposed route closures should be coordinated with the County and be highlighted in the appropriate environmental document. b. Most railroad rights of way have been abandoned. Any remaining railroad right of way being considered for conversion to a different use should be reviewed by the County to determine that the use is temporary and not preclude future railroad use or that it is not viable for future railroad or other transportation use. c. All routes causing no actual resource damage should remain open. d. All off-road closure policies must contain adequate exemptions for administrative, management and public functions. These should include but not be limited to: 1. Agency administration. 2. Livestock management. 3. Scientific research. e. Interagency Notification – The County, when affected by land use planning on public lands, shall be consulted and coordinated with in accordance with all applicable state and federal laws. Federal and state agencies shall coordinate with the County for the purpose of planning and managing lands within the geographic boundaries of the planning area or within the socio-economic sphere of the County.	**Consistency:** Unknown. Preliminary assessment of the project's likely transportation impacts has resulted in the development of a number of mitigation measures designed to decrease project impacts to less than significant levels. However, the project proposes to develop within public roads and mitigation is proposed to close public roads.	No.
LAND USE ELEMENT		
General Plan Land Use Designations: The project site is designated both as Resort/Recreational (REC), which is	**Consistency: Non-compliant.** The proposed use of the site for a renewable energy project (solar plant) is not an	Yes.

Inyo County General Plan Goal or Policy	Analysis of Proposed Project's Consistency as Conditioned in PSA	Identified by PSA as LORS?
described in Policy LU-3.4 as providing "for a mixture of residential and recreational commercial uses," and as Open Space & Recreation (OSR), which is described in Policy LU-5.1 as providing for "existing and planned uses such a public parks, ball fields, horse stables, greenbelts, and similar and compatible uses."	allowed use under either of these land use designations.	
Goal LU-1/General Land Use: Create opportunities for the reasonable expansion of communities in a logical and contiguous manner that minimizes environmental impacts, minimizes public infrastructure and service costs, and furthers the countywide economic development goals. Guide high-density population growth to those areas where services (community water and sewer systems, schools, commercial centers, etc.) are available or can be created through new land development, while providing and protecting open space areas.	**Consistency: Non-compliant**. The project – particularly the 29 months of the construction phase – will result in increased population in the area that will create a need for services and infrastructure that the area currently cannot provide and the County cannot fund. Compliance could be met based on the addition of the County's Conditions of Certification. Comment 74	No.
Policy LU-1.1/Community Expansion: The County shall encourage community expansion to occur in a logical and orderly manner.	**Consistency: Non-compliant**. The project's construction phase will last up to 29 months and, at its peak, include more than 1,000 workers, which will result in need for services and infrastructure that the nearest community of Charleston View cannot absorb or provide, and which the County cannot fund. Compliance could be met based on the addition of the County's Conditions of Certification.	No.
Policy LU-1.2/New Growth: The County shall plan to concentrate new growth within and contiguous to existing communities (e.g., Bishop, Big Pine, Independence, Lone Pine) and expand infrastructure as needed to serve these areas. As a secondary priority, the County shall plan to accommodate new growth in existing rural residential communities (e.g., Olancha, Charleston View, Mustang Mesa, Starlite Estates) and ensure the appropriate expansion of existing infrastructure as needed to serve these areas.	**Consistency: Non-compliant**. The project proposes development adjacent to the community of Charleston View, with a peak influx of over 1,000 construction workers, followed by a new population of workers at the solar plant. It is unresolved how the project proposes to subsidize the housing, services and infrastructure such a large and temporary increase in population will require. Compliance could be met based on the addition of the County's Conditions of Certification. Comment 75	
Policy LU-1.3/Southeast Area Growth: The County shall consider the economic impact on County resources of projects in the southeast	**Consistency: Non-compliant**. The County has prepared a socio-economic study to document the likely impacts and	No.

Inyo County General Plan Goal or Policy	Analysis of Proposed Project's Consistency as Conditioned in PSA	Identified by PSA as LORS?
part of the County along the Nevada border. Such growth may require additional fiscal analysis by applicants for subdivisions to demonstrate the level of fiscal impact. Such growth shall not require extensive County subsides in providing necessary services.	needs created by the project's influx of construction workers and subsequent solar plant workers. It is unresolved how the project proposes to subsidize the housing, services and infrastructure such a large and temporary increase in population will require. Compliance could be met based on the addition of the County's Conditions of Certification.	
Policy LU-1.5/Pahrump Valley Growth: The County shall consider the economic impacts on County resources of projects in the Pahrump Valley. Such growth may require additional fiscal analysis by applicants for subdivision to demonstrate the level of fiscal impact. Such growth shall not require extensive County subsidies in providing necessary services.	**Consistency: Non-compliant**. The County has prepared a socio-economic study to document the likely impacts and needs created by the project's large influx of temporary construction workers and subsequent permanent solar plant workers. It is unresolved how the project proposes to subsidize the housing, services and infrastructure such a large and temporary increase in population will require. Compliance could be met based on the addition of the County's Conditions of Certification.	No.
Policy LU-1.14/Buffers: As part of new development review, the County shall require that residential development/districts are protected from non-residential uses by use of buffers or other devices. Landscaping, walls, building/facility placement, and other similar aesthetically pleasing devices are acceptable for this purpose. This does not include residential in mixed-use commercial designations.	**Consistency: Non-compliant.** Preliminary review has indicated that additional setbacks may be required for the project from the adjacent residential community of Charleston View. The current designation and zoning of the site does not allow for the use of a solar plant (i.e., designations of Open Space Recreation (OSR) & Resort/Recreation (REC), and zoning of Open Space, 40-acre minimum (OS-40)). The applicant has submitted an application to bring the project into compliance with the General Plan and zoning. Compliance could be met based on the addition of the County's Conditions of Certification.	No. Comment 75a
Goal LU-3: Provide Commercial land uses that adequately serve the existing and anticipated future needs of the community and surrounding environs.	**Consistency: Non-compliant.** The current designation and zoning of the site does not allow for the use of a solar plant (i.e., designations of Open Space Recreation (OSR) & Resort/Recreation (REC), and zoning of Open Space, 40-acre minimum (OS-40)). The applicant has submitted an application to bring the project into compliance with the General Plan and zoning. Compliance could be	Yes.

Inyo County General Plan Goal or Policy	Analysis of Proposed Project's Consistency as Conditioned in PSA	Identified by PSA as LORS?
	met based on the addition of the County's Conditions of Certification.	
Policy LU-3.4/Resort/Recreational Designation (REC): This designation provides for a mixture of residential and recreational commercial uses, such as resorts, recreational facilities, motels, campgrounds, trailer parks, restaurants, general stores, service stations, and similar and compatible uses. This designation is oriented toward tourist use, however, it also permits permanent residential use and public and quasi-public uses. The FAR shall not exceed 0.40. The base residential density shall be 1 du/2.5 acres. Clustering of residential units is encouraged, with density of developed areas allowed up to 24 du/net acres.	**Consistency: Non-compliant**. The current designation and zoning of the site does not allow for the use of a solar plant (i.e., designations of Open Space Recreation (OSR) & Resort/Recreation (REC), and zoning of Open Space, 40-acre minimum (OS-40)). Compliance could be met if the County approves a General Plan Amendment.	Yes.
Policy LU-4.8/Planned Development: The County shall encourage planned development and other flexible development techniques for any large or general industrial development.	**Consistency: Non-compliant**. Preliminary review has indicated that additional setbacks may be required for the project from the adjacent residential community of Charleston View. The current designation and zoning of the site does not allow for the use of a solar plant (i.e., designations of Open Space Recreation (OSR) & Resort/Recreation (REC), and zoning of Open Space, 40-acre minimum (OS-40). The applicant has submitted an application to bring the project into compliance with the General Plan and zoning. Compliance could be met based on the addition of the County's Conditions of Certification.	No.
Policy LU-4.9/Landscaping: The County shall require landscaping to screen uses where necessary.	**Consistency:** Compliant. Preliminary assessment of project impacts is such that landscaping around power plant structures has been developed as a mitigation measure. However, even with mitigation measures, the height of the solar power towers is such that the project inherently changes the landscape in the vicinity of the project site and results in a significant and unavoidable aesthetic impact.	Yes.
Goal LU-5: Provide adequate public facilities and services for the existing and/or future needs of communities and their surrounding environs, and to conserve natural and managed resources.	**Consistency: Non-compliant**. The project is a renewable energy project that makes use of the County's abundant solar resources. However, the tie-in structure of the electrical and gas pipeline	Yes.

Inyo County General Plan Goal or Policy	Analysis of Proposed Project's Consistency as Conditioned in PSA	Identified by PSA as LORS?
	components of the project are such that no additional electricity or gas from the project would be available within the immediate area of the project site, but would be diverted to the east to sub-stations where it will be dispersed to wider areas within Nevada and Califor[illegible] Comment 76 Preliminary assessment of the project indicated that provision of such additional electrical and gas resources could have growth-inducing impacts within the larger Pahrump Valley/Charleston View area or other development in more distant parts of Nevada and California. The project will result in increased demands for public services and facilities that have not been adequately addressed. Compliance could be met based on the addition of the County's Conditions of Certification.	
Policy LU-5.1/Open Space & Recreation Designation (OSR): This designation provides for existing and planned public parks, ball fields, horse stables, greenbelts, and similar and compatible uses. The FAR shall not exceed 0.20. The minimum parcel size is generally 40 acres.	**Consistency: Non-compliant.** The current designation and zoning of the site does not allow for the use of a solar plant (i.e., designations of Open Space Recreation (OSR) & Resort/Recreation (REC), and zoning of Open Space, 40-acre minimum (OS-40)). Compliance could be met if the County approves a General Plan Amendment.	Yes.
Goal PSU-1/General Public Services & Utilities: To ensure the timely development of public facilities and the maintenance of adequate service levels for these facilities to meet the needs of existing and future County residents.	**Consistency: Non-compliant.** The project has not yet demonstrated how it will fund the increase in services that project's construction workers and subsequent solar plant workers will require. Compliance could be met based on the addition of the County's Conditions of Certification.	No.
Policy PSU-1.1/Facilities & Services for New Development: The County shall ensure through the development review process that public facilities and services will be developed, operational, and available to serve new development. The County shall not approve new development where existing facilities are inadequate unless the applicant can demonstrate that all necessary public facilities will be installed or adequately financed and maintained (through fees or other means).	**Consistency: Non-compliant.** The project has not yet demonstrated how it will fund the increase in facilities and services that the project's temporary construction workers and subsequent permanent solar plant workers will require. Compliance could be met based on the addition of the County's Conditions of Certification.	No.

Inyo County General Plan Goal or Policy	Analysis of Proposed Project's Consistency as Conditioned in PSA	Identified by PSA as LORS?
Policy PSU-1.2/On-Site Infrastructure: The County shall require all new development, including major modifications to existing development, to construct necessary on-site infrastructure to serve the project in accordance with County standards.	**Consistency: Non-compliant**. The project proposes adequate on-site infrastructure for the solar plant project, but it is not clear if adequate funding for services or infrastructure will be provided. Compliance could be met based on the addition of the County's Conditions of Certification.	No.
Policy PSU-1.5/Review for Land Use Changes: When reviewing applications for land use designation changes (i.e., zone change, General Plan Amendment, specific plan amendment), the County shall thoroughly analyze the impacts of the proposed changes on all aspects of the infrastructure system within the County, and require mitigation as appropriate. This shall include consultation with service providers who have infrastructure within the County.	**Consistency: Non-compliant**. The current designation and zoning of the site does not allow for the use of a solar plant (i.e., designations of Open Space Recreation (OSR) & Resort/Recreation (REC), and zoning of Open Space, 40-acre minimum (OS-40)). The project will not provide adequate infrastructures and services. Compliance could be met based on the addition of the County's Conditions of Certification.	No.
Policy PSU-1.6/Coordination: The County shall require that the provision of streets, sewer, water, drainage, and other needed infrastructure be coordinated in a logical manner between adjacent developments so as to reduce design, construction and maintenance costs.	**Consistency: Non-compliant**. The applicant has taken into consideration existing infrastructure such as roadways, and adjacent development such as the St. Therese Mission and the Charleston View community. However, impacts to streets may be significant. Compliance could be met based on the addition of the County's Conditions of Certification.	No.
Policy PSU-1.7/Undergrounding Utilities: The County shall require undergrounding of utility lines in new development areas and as areas are redeveloped, except where infeasible for operational or financial reasons. The County will also work with utility providers to proactively place utilities underground as part of the utilities' ongoing maintenance program.	**Consistency:** Compliant. Transmission lines and gas pipelines exit the site at the east boundary, at the California-Nevada border, and will thus exist within Nevada.	Yes.
Goal PSU-2/Funding: To ensure that adequate facility and service standards are achieved and maintained through the use of equitable funding methods.	**Consistency: Non-compliant**. It has not yet been demonstrated how the project proposes to fund the increased need for, and impacts to, facilities and services which the large influx of temporary construction workers, and then permanent solar plant workers, will bring. Compliance could be met based on the addition of the County's Conditions of Certification.	No.
Policy PSU-2.2/Fair Share of Costs: The County shall require that new development	**Consistency: Non-compliant**. The project will not pay its fair share of the	No.

Comment 77

Inyo County General Plan Goal or Policy	Analysis of Proposed Project's Consistency as Conditioned in PSA	Identified by PSA as LORS?
pays its fair share of the cost of developing new facilities and services and upgrading existing public facilities and services. Exceptions may be made when new development generates significant public benefits (e.g., low income housing) or when alternative sources of funding can be identified to offset foregone revenues.	cost of developing and upgrading new facilities and services resulting from it. Compliance could be met based on the addition of the County's Conditions of Certification.	
Policy PSU-2.3/Public Financing Plans: The County shall require a public financing plan be in place prior to the start of construction of new development to ensure that all required public improvements are adequately funded and provided in a timely manner.	**Consistency: Non-compliant**. The project does not include a public financing plan to ensure that required public improvements are adequately funded and provided in a timely manner, nor is there assurance that such improvements will be provided. Compliance could be met based on the addition of the County's Conditions of Certification.	No.
Policy PSU-2.4/Allocation of Costs: The County shall allocate the cost of public improvements to all benefiting properties and, to the extent that a landowner is required to pay for facility oversizing, the County shall utilize reimbursement mechanisms to maintain equity among all benefiting property owners.	**Consistency:** Unknown. It is unclear if the development will provide for its services or infrastructure.	No.
Goal PSU-3/Water: To ensure that there will be a safe and reliable water supply sufficient to meet the future needs of the County.	**Consistency: Non-compliant**. Preliminary assessments indicate the project will have significant impacts to area water resources. Compliance could be met based on the addition of the County's Conditions of Certification.	No.
Policy PSU-3.1/Efficient Water Use: The County shall promote efficient water use and reduced water demand.	**Consistency: Non-compliant**. Preliminary assessments indicate the project will have significant impacts to area water. Compliance could be met based on the addition of the County's Conditions of Certification.	Yes.
Goal PSU-4/Wastewater: To ensure adequate wastewater collection, treatment, and disposal.	**Consistency:** Compliant. The project proposes adequate wastewater management for the project site.	No.
Goal PSU-5/Stormwater Drainage: To collect and dispose of stormwater in a manner that minimizes inconvenience to the public, minimizes potential water-related damage, and enhances the environment.	**Consistency:** Compliant. The project proposes adequate stormwater drainage for the project site.	No.
Goal PSU-6/Solid Waste Facilities: To ensure the safe and efficient disposal or recycling of solid waste generated in Inyo	**Consistency: Non-compliant**. Although the applicant will participate in the County's Monitoring & Diversion of	No.

Comment 78

Comment 79

Inyo County General Plan Goal or Policy	Analysis of Proposed Project's Consistency as Conditioned in PSA	Identified by PSA as LORS?
County.	Comment 80 Construction & Demolition Debris Program, waste will be disposed of in Nevada, as the County's Tecopa Landfill does not have the personnel or infrastructure to handle the quantity of waste that construction of the project will yield. The County has assessed the likely waste-related costs and impacts of the large influx of construction workers expected for the project. Compliance could be met based on the addition of the County's Conditions of Certification.	
Goal PSU-8/Fire Protection: To protect the residents of and visitors to Inyo County from injury and loss of life and to protect property from fires. **AND** **Implementation Measure 10.0:** The County shall work with the California Department of Forestry & Fire Protection, local fire protection districts, and federal agencies involved in fire protection activities to maximize the use of resources to develop functional and/or operational consolidations and standardization of services and to maximize the efficient use of fire protection resources.	**Consistency:** Unknown. Although adequate fire protection is proposed for the project site, preliminary assessments indicate that the project itself increases the risk of fire within the project area. As a result of this potential increased risk of off-site impacts, the Southern Inyo Fire District (SIFD) are working with the applicant on funding for such increased impacts to County fire protection services, and this issue is as yet unresolved.	No.
Policy PSU-8.1/Fire Protection for New Development: Prior to the approval of development projects, the County shall determine the need for fire protection services. New development in unincorporated areas of the County shall not be approved unless adequate fire protection facilities can be provided.	**Consistency:** Unknown. Although adequate fire protection is proposed for the project site, preliminary assessments indicate that the project itself increases the risk of fire within the project area. As a result of this potential increased risk of off-site impacts, the Southern Inyo Fire Protection District is working with the applicant on funding for such increased impacts to fire protection services, and this issue is as yet unresolved.	No.
Goal PSU-9/Law Enforcement: To provide adequate law enforcement services to deter crime and to meet the growing demand for services associated with increasing populations and commercial/industrial development in the County.	**Consistency: Non-compliant.** Preliminary assessments indicate that the project's expected influx of construction workers will have significant impacts on the County's law enforcement services. The County is currently still working with the applicant on funding for such impacts to County services, and the issue is as yet	No.

Inyo County General Plan Goal or Policy	Analysis of Proposed Project's Consistency as Conditioned in PSA	Identified by PSA as LORS?
	unresolved. Compliance could be met based on the addition of the County's Conditions of Certification.	
Goal PSU-10/Gas & Electrical Facilities: To provide efficient and cost-effective utilities that serves the existing and future needs of people in the unincorporated areas of the County.	**Consistency:** Compliant. The project is a renewable energy project that makes use of the County's abundant solar resources. However, the tie-in structure of the electrical and gas pipeline components of the project are such that no additional electricity or gas from the project would be available within the immediate area of the project site, but would be diverted to the east to sub-stations where it will be dispersed to wider areas within Nevada and California. Preliminary assessment of the project indicated that provision of such additional electrical and gas resources could have growth-inducing impacts within the larger Pahrump Valley/Charleston View area or other development in more distant parts of Nevada and California. **Comment 81**	No.
Policy PSU-10.1/Expansion of Services: The County shall work with local electric utility companies to design and locate appropriate expansion of electric systems, while minimizing impacts to agriculture and minimizing noise, electromagnetic, visual, and other impacts on existing and future residents.	**Consistency:** Compliant. The project is a renewable energy project that makes use of the County's abundant solar resources. However, the tie-in structure of the electrical and gas pipeline components of the project are such that no additional electricity or gas from the project would be available within the immediate area of the project site, but would be diverted to the east to sub-stations where it will be dispersed to wider areas within Nevada and California. Preliminary assessment of the project indicated that provision of such additional electrical and gas resources could have growth-inducing impacts within the larger Pahrump Valley/Charleston View area or other development in more distant parts of Nevada and California.	Yes.
Goal PSU-11/Schools: To ensure that adequate school facilities are available and appropriately located to meet the needs of Inyo County residents.	**Consistency:** Unknown. Preliminary assessments indicate that the project's expected influx of construction workers will have significant impacts on school facilities and services in the County. It is unclear if the CEC and the applicant have consulted with local school officials, and	No.

Inyo County General Plan Goal or Policy	Analysis of Proposed Project's Consistency as Conditioned in PSA	Identified by PSA as LORS?
	the issue is as yet unresolved.	
ECONOMIC DEVELOPMENT ELEMENT		
Goal ED-1: Promote increased capacity to serve tourists within the County's established urbanized areas, and in those areas with established tourist attractions. **AND** **Implementation Measure 16.0:** Encourage the telecommunications industry to install and maintain state of the art high speed high capacity service throughout the County so that established businesses, public agencies, and home businesses may overcome any distance to market competitive disadvantage they currently have.	**Consistency: Non-compliant.** The project is a renewable energy project that makes use of the County's abundant solar resources. However, the tie-in structure of the electrical and gas pipeline components of the project are such that no additional electricity or gas from the project would be available within the immediate area of the project site, but would be diverted to the east to sub-stations where it will be dispersed to wider areas within Nevada and California. Preliminary assessment of the project indicated that provision of such additional electrical and gas resources could have growth-inducing impacts within the larger Pahrump Valley/Charleston View area or other development in more distant parts of Nevada and California. The project could hinder economic development in the area, impact public services and facilities, and result in lost opportunity costs. Compliance could be met based on the addition of the County's Conditions of Certification.	No.
Goal ED-4/Resource Based & Industrial Land Uses: Actively encourage the expansion of existing industry of all types (including resource industries, manufacturing and service industries), and actively recruit new businesses that will bring new jobs to the County.	**Consistency:** Compliant. The project is a renewable energy project that makes use of the County's abundant solar resources and assists the State of California in meeting its targeted goals for its renewable energy portfolio.	No.
HOUSING ELEMENT		
Goal HE-2: To provide adequate sites for residential development.	**Consistency:** Unknown. The project displaces lands available for housing. The Preliminary Staff Assessment (PSA) prepared by the California Energy Commission (CEC) does not address this impact.	No.
Goal HE-3: Encourage the adequate provision of housing by location, type of unit, and price, to meet the existing and future needs of Inyo County residents.	**Consistency:** Unknown. The project displaces lands available for housing. The Preliminary Staff Assessment (PSA) prepared by the California Energy Commission (CEC) does not address this impact.	No.
Policy HE-3.1/Variety of Housing: In	**Consistency:** Unknown. The project	No.

Inyo County General Plan Goal or Policy	Analysis of Proposed Project's Consistency as Conditioned in PSA	Identified by PSA as LORS?
consultation with federal, state, and local agencies, the County shall continue to identify and evaluate the best approaches to providing a variety of residential development opportunities in the County, including single-family homes, mobile homes, second units, and apartments to fulfill regional housing needs. **AND** **Implementation Measure 3.1.1:** The County will explore an Employer Assisted Housing Program by forming a working group with major employers in the area to discuss how the County can assist in the development of employer-assisted housing in Inyo County, including housing for lower- and moderate-income households, such as those with teachers, police officers and sheriff's deputies, nurses, etc.	displaces lands available for housing. The Preliminary Staff Assessment (PSA) prepared by the California Energy Commission (CEC) does not address this impact.	
Policy HE-3.3/Second Units: Encourage the development of second units as another way to promote housing opportunities for lower-income households.	**Consistency:** Unknown. The project displaces lands available for housing. The Preliminary Staff Assessment (PSA) prepared by the California Energy Commission (CEC) does not address this impact.	No.
Policy HE-3.4/Manufactured and Mobile Homes: The County will continue to promote the utilization of manufactured housing and mobile home purchase and placement as an affordable homeownership opportunity.	**Consistency:** Unknown. The project displaces lands available for housing. The Preliminary Staff Assessment (PSA) prepared by the California Energy Commission (CEC) does not address this impact.	No.
Policy HE-5.3/Infrastructure: The County will work to provide adequate infrastructure to accommodate residential development in all areas of the unincorporated county. **AND** **Implementation Measure 5.3.1:** The County will work to provide adequate infrastructure to accommodate residential development in all areas of the unincorporated county.	**Consistency: Non-compliant.** The project will result in public service and infrastructure deficiencies that could hinder residential development. Compliance could be met based on the addition of the County's Conditions of Certification.	No.
CIRCULATION ELEMENT		
Goal RH-1: A transportation system that is safe, efficient, and comfortable, which meets the needs of people and goods and enhances	**Consistency: Non-compliant.** Preliminary assessment of the project's likely transportation impacts has resulted	No.

Inyo County General Plan Goal or Policy	Analysis of Proposed Project's Consistency as Conditioned in PSA	Identified by PSA as LORS?
the lifestyle of the County's residents.	in the development of a number of mitigation measures designed to decrease project impacts to less than significant levels. In particular, Old Spanish Trail Highway/Tecopa Road has an existing paved width of just 22 feet. Preliminary assessments indicate that impacts to the roadway during the construction of the project would require mitigation in the form of a traffic control plan, which would be necessary for the roadway to continue to operate at a Level of Service (LOS) of C or better. However, damage to the roadway could result from heavy truck traffic during the construction phase of the project, and mitigation in the form of restoration of the roadway may be necessary. Compliance could be met based on the addition of the County's Conditions of Certification.	Comment 82
Policy RH-1.4/Level of Service: Maintain a minimum level of service (LOS) "C" on all roadways in the County. For highways within the County, LOS "C" should be maintained except where roadways expansions or reconfigurations will adversely impact the small community character and economic viability of designated Central Business Districts.	**Consistency:** Unknown. Preliminary assessment of the project's likely transportation impacts has resulted in the development of a number of mitigation measures designed to decrease project impacts to less than significant levels. Under such mitigation measures, a Traffic Control Plan is prepared and LOS shall be monitored, but mitigation measure language does not state specifically that a minimum LOS of "C" or better shall be maintained.	Yes.
Policy RH-1.5/Proper Access: Provide proper access to residential, commercial, and industrial areas.	**Consistency:** Compliant. Preliminary assessment of the project's likely transportation impacts has resulted in the development of a number of mitigation measures designed to decrease project impacts to less than significant levels.	Yes.
Policy RH-1.6/Minimize Environmental Impacts: Insure that all transportation projects minimize adverse effects on the environment of the County.	**Consistency:** Unknown. Preliminary assessment indicates that, even with mitigation measures, the height of the solar power towers is such that the project inherently changes the landscape in the vicinity of the project site and results in a significant and unavoidable aesthetic impact. In particular, assessments identify the Old Spanish Trail as a scenic resource that will be substantially	Yes.

Inyo County General Plan Goal or Policy	Analysis of Proposed Project's Consistency as Conditioned in PSA	Identified by PSA as LORS?
	disrupted by the project.	
Policy SH-1.1/Protect the Natural Qualities of Designated Scenic Routes: The natural qualities of designated scenic routes should be protected.	**Consistency:** Unknown. Preliminary assessment indicates that, even with mitigation measures, the height of the solar power towers is such that the project inherently changes the landscape in the vicinity of the project site and results in a significant and unavoidable aesthetic impact.	Yes.
Goal CPT-1: To ensure that regional conveyance systems are designed and located to serve Inyo County residents while not significantly impacting communities or regional viewsheds.	**Consistency:** Unknown. The tie-in structure of the electrical and gas pipeline components of the project are such that no additional electricity or gas from the project would be available within the immediate area of the project site, but would be diverted to the east to sub-stations where it will be dispersed to wider areas within Nevada and California. Preliminary assessment of the project indicated that provision of such additional electrical and gas resources could have growth-inducing impacts within the larger Pahrump Valley/Charleston View area or other development in more distant parts of Nevada and California. In addition, Preliminary assessment indicates that, even with mitigation measures, the height of the solar power towers is such that the project inherently changes the landscape in the vicinity of the project site and results in significant and unavoidable aesthetic impacts.	No.
Policy CPT-1.1/Placement of Corridors: The County shall consider the visual and environmental impacts associated with placement of regional conveyance corridors.	**Consistency:** Unknown. Preliminary assessment indicates that, even with mitigation measures incorporated, the large size of the project and the height of the solar power towers is such that the project inherently changes the landscape and scenic vistas within the greater Pahrump Valley and results in a significant and unavoidable aesthetic impacts. Environmental impacts, such as to water resources and biological resources, are also assessed to be significant, although mitigation developed for the project will	Yes.

Inyo County General Plan Goal or Policy	Analysis of Proposed Project's Consistency as Conditioned in PSA	Identified by PSA as LORS?
	decrease such impacts to less than significant levels.	
CONSERVATION/OPEN SPACE		
Goal WR-1: Provide an adequate and high quality water supply to all users within the County.	**Consistency: Non-compliant.** Preliminary assessment of the project indicates that the project could exacerbate overdraft conditions, contribute to water level decline for groundwater dependent vegetation, and substantially lower water levels in neighboring domestic wells. Compliance could be met based on the addition of the County's Conditions of Certification.	No.
Policy WR-1.1/Water Provisions: The County shall review development proposals to ensure adequate water is available to accommodate projected growth.	**Consistency: Non-compliant.** Pump tests performed for the project were subject to irregularities in execution, and were discontinued prematurely, and the results were inconclusive. Despite these issues, preliminary assessment of the project indicates that the project could exacerbate overdraft conditions, contribute to water level decline for groundwater dependent vegetation, and substantially lower water levels in neighboring domestic wells. Compliance could be met based on the addition of the County's Conditions of Certification.	No.
Policy WR-1.3/Domestic Groundwater: Support sustainable groundwater extraction for domestic use in rural areas. **AND** **Implementation Measure 2.0:** The County shall review any new development proposals that involve a withdrawal of groundwater that is not regulated by the County's Groundwater Ordinance (Ordinance 1004) or the Inyo County/Los Angeles Water Agreement to ensure that with the proposed use, there will be an adequate, safe, and economically viable supply of groundwater to supply all existing users of the groundwater as well as the future users under the proposed development. **AND** **Implementation Measure 3.0:** The County	**Consistency: Non-compliant.** Preliminary assessment of the project indicates that the project could exacerbate overdraft conditions, contribute to water level decline for groundwater dependent vegetation, and substantially lower water levels in neighboring domestic wells. Compliance could be met based on the addition of the County's Conditions of Certification. **Comment 83**	No.

Inyo County General Plan Goal or Policy	Analysis of Proposed Project's Consistency as Conditioned in PSA	Identified by PSA as LORS?
shall work with private industries to support the development of reclaimed water systems for non- potable uses. These efforts may include obtaining funding for subsidizing reclaimed water systems.		
Policy WR-2.2/Watercourse Alterations: Encourage the preservation of existing conditions of watercourses when considering flood control projects.	**Consistency:** Compliant. Preliminary assessments indicate that the majority of the project site would maintain the original grades and natural drainage features and require no added storm drainage control.	No.
Goal WR-3: Protect and restore environmental resources from the effects of export and withdrawal of water resources.	**Consistency: Non-compliant**. Pump tests performed for the project were subject to irregularities in execution, and were discontinued prematurely, and the results were inconclusive. Despite these issues, preliminary assessment of the project indicates that the project could exacerbate overdraft conditions, contribute to water level decline for groundwater dependent vegetation, and substantially lower water levels in neighboring domestic wells. Other natural and human resources in the County could be impacted. Compliance could be met based on the addition of the County's Conditions of Certification.	No.
Policy WR-3.2/Sustainable Groundwater Withdrawal: The County shall manage the groundwater resources within the County through ordinances, project approvals and agreements, ensure an adequate, safe and economically viable groundwater supply for existing and future development within the County, protect existing groundwater users, maintain and enhance the natural environment, protect the overall economy of the County, and protect groundwater and surface water quality and quantity.	**Consistency: Non-compliant**. Pump tests performed for the project were subject to irregularities in execution, and were discontinued prematurely, and the results were inconclusive. Despite these issues, preliminary assessment of the project indicates that the project could exacerbate overdraft conditions, contribute to water level decline for groundwater dependent vegetation, and substantially lower water levels in neighboring domestic wells. Compliance could be met based on the addition of the County's Conditions of Certification. **Comment 84**	No.
Policy BIO-1.1/Regulatory Compliance: The County shall review development proposals to determine impacts to sensitive natural communities, of both local and regional concern, and special-status species. Appropriate mitigation measures will be	**Consistency:** Compliant. Extensive biological surveys have been prepared for the project, together with mitigation for identified impacts.	No.

Inyo County General Plan Goal or Policy	Analysis of Proposed Project's Consistency as Conditioned in PSA	Identified by PSA as LORS?
incorporated into each project, as necessary.		
Policy BIO-1.2/Preservation of Riparian Habitat & Wetlands: Important riparian areas & wetlands, as identified by the County, shall be preserved and protected for biological resource value.	**Consistency: Non-compliant.** Preliminary assessment indicates the project will have significant impacts on groundwater dependent areas such as riparian habitats and Areas of Critical Environmental Concern such as Stump Springs. Preliminary assessment of the project indicates that the project could exacerbate overdraft conditions and contribute to water level decline for groundwater dependent vegetation. Compliance could be met based on the addition of the County's Conditions of Certification.	No.
Policy BIO-1.5/Develop Outside of Habitat Areas: Work with regulatory agencies and private developers to direct development into less significant habitat areas. Discourage urban development in areas containing sensitive natural communities or known to contain special-status species.	**Consistency:** Compliant. Preliminary assessment indicates the project will have significant impacts on a number of species. However, mitigation has been developed for the project that will decrease impacts to less than significant levels and satisfy regulating agencies such as Bureau of Land Management (BLM) and Department of Fish & Game (DFG). However, such mitigation measures include off-site mitigation, which at this time is still being investigated. Should such mitigation prove unworkable, then impacts may be significant and immitigable.	No. Comment 85
Goal CUL-1: Preserve and promote the historic and prehistoric cultural heritage of the County.	**Consistency:** Unknown. Preliminary assessment indicates the project will result in significant impacts to various cultural resources (notably three ethnographic landscapes and the Old Spanish Trail-Mormon Road Northern Corridor), and that there is no way that the project, as currently proposed, could be mitigated to minimize such significant impacts.	No.
Policy CUL-1.3/Protection of Cultural Resources: Preserve and protect key resources that have contributed to the social, political, and economic history and prehistory of the area, unless overriding circumstances are warranted.	**Consistency:** Unknown. Preliminary assessment indicates the project will result in significant impacts to various cultural resources (notably three ethnographic landscapes and the Old Spanish Trail-Mormon Road Northern Corridor), and that there is no way that the project, as currently proposed, could	Yes.

Inyo County General Plan Goal or Policy	Analysis of Proposed Project's Consistency as Conditioned in PSA	Identified by PSA as LORS?
	be mitigated to minimize such significant impacts.	
Policy CUL-1.4/Regulatory Compliance: Development and/or demolition proposals shall be reviewed in accordance with the requirements of CEQA and the National Historic Preservation Act.	**Consistency:** Unknown. The project has been so reviewed. However, preliminary assessment indicates the project will result in significant impacts to various cultural resources (notably three ethnographic landscapes and the Old Spanish Trail-Mormon Road Northern Corridor), and that there is no way that the project, as currently proposed, could be mitigated to minimize such significant impacts.	No.
Policy CUL-1.5/Native American Consultation: The County and private organizations shall work with appropriate Native American groups when potential Native American resources could be affected by development proposals.	**Consistency:** Compliant. Tribal representatives have met extensively with project representatives and have contributed directly and significantly to the preliminary assessment of the significant and immitigable impacts the project would have on various cultural resources.	No. **Comment 86**
Chapter 8.8/Visual Resources: Critical identified visual resource issues include: • Maintaining the small town character of towns in Inyo County • Preserving panoramic views • Maintaining the open, natural character of the County • Maintaining visual resources of scenic corridors, highways, and roadways	**Consistency:** Unknown. Preliminary assessment indicates that, even with mitigation measures, the height of the solar power towers is such that the project inherently changes the landscape in the vicinity of the project site and results in a significant and unavoidable aesthetic impact.	Yes.
Goal VIS-1: Preserve and protect resources throughout the County that contribute to a unique visual experience for visitors and quality of life for County residents.	**Consistency:** Unknown. Preliminary assessment indicates that, even with mitigation measures, the height of the solar power towers is such that the project inherently changes the landscape in the vicinity of the project site and results in a significant and unavoidable aesthetic impact.	Yes.
Goal VIS-1.1/Historical Character: The County shall preserve and maintain the historic character of communities within the County.	**Consistency:** Unknown. Preliminary assessment indicates that, even with mitigation measures, the height of the solar power towers is such that the project inherently changes the landscape in the vicinity of the project site and results in a significant and unavoidable aesthetic impact. In particular, assessments identify the Old Spanish Trail as a scenic resource that will be substantially	No. Comment 86a

Inyo County General Plan Goal or Policy	Analysis of Proposed Project's Consistency as Conditioned in PSA	Identified by PSA as LORS?
	disrupted by the project.	
Policy VIS-1.4/Equipment Screening: Within communities, building equipment shall be screened from public view.	**Consistency:** Unknown. Preliminary assessment of project impacts is such that landscaping around power plant structures has been developed as a mitigation measure. However, even with mitigation measures, the height of the solar power towers is such that the project inherently changes the landscape in the vicinity of the project site and results in a significant and unavoidable aesthetic impact.	Yes.
Policy VIS-1.6/Control of Light & Glare: The County shall require that all outdoor light fixtures including street lighting, externally illuminated signs, advertising displays, and billboards use low-energy, shielded light fixtures which direct light downward (i.e., lighting shall not emit higher than a horizontal level) and which are fully shielded. Where public safety would not be compromised, the County shall encourage the use of low-pressure sodium lighting for all outdoor light fixtures.	**Consistency:** Unknown. Preliminary assessment of project impacts is such that mitigation for control of light and glare has been developed. However, even with mitigation measures, the height of the solar power towers is such that the project inherently changes the landscape in the vicinity of the project site and results in a significant and unavoidable aesthetic impact.	Yes.
Policy VIS-1.7/Street Lighting: Street lighting shall only be utilized where needed to protect public safety related to traffic movement.	**Consistency:** Unknown. Preliminary assessment of project impacts is such that mitigation for control of light and glare has been developed. However, even with mitigation measures, the height of the solar power towers is such that the project inherently changes the landscape in the vicinity of the project site and results in a significant and unavoidable aesthetic impacts.	Yes.
Policy REC-1.2/Recreational Opportunities on Federal, State, and LADWP Lands: Encourage the continued management of existing recreational areas and open space, and appropriate expansion of new recreational opportunities on federal, state, and LADWP lands.	**Consistency:** Unknown. It is not yet clear the impacts that use by the increased numbers of construction workers will have on such Federal, State, and LADWP lands, or whether/how the agencies responsible for such lands will expand opportunities for use to the increased population brought by the project.	No.
PUBLIC SAFETY ELEMENT		Comment 87
Goal AQ-1: Provide good air quality for Inyo County to reduce impacts to human health and the economy.	**Consistency:** Compliant. Mitigation has been developed for impacts to air quality that will decrease them to less than significant levels.	No.
Policy AQ-1.2/Attainment Programs: Participate in the GBUAPCD's attainment	**Consistency:** Compliant. Mitigation has been developed for impacts to air quality	No.

Inyo County General Plan Goal or Policy	Analysis of Proposed Project's Consistency as Conditioned in PSA	Identified by PSA as LORS?
programs.	that will decrease them to less than significant levels.	
Policy AQ-1.3/Dust Suppression During Construction: Require dust-suppression measures for grading activities.	**Consistency:** Compliant. Mitigation has been developed for impacts to air quality that will decrease them to less than significant levels. **Comment 88**	No.
Policy AQ-1.5/Monitor Regional Development: Publicly object to development proposals within the region that do not adequately address and mitigate air quality impacts, especially fugitive dust.	**Consistency:** Compliant. Mitigation has been developed for impacts to air quality that will decrease them to less than significant levels. **Comment 89**	No.
Goal WF-1: Prevent wildfires and provide public safety from wildfire hazards.	**Consistency:** Unknown. Although adequate fire protection is proposed for the project site, preliminary assessments indicate that the project itself increases the risk of fire within the project area. As a result of this potential increased risk of off-site impacts, the County and the Southern Inyo Fire District (SIFD) are working with the applicant on funding for such increased impacts to County fire protection services, and this issue is as yet unresolved.	No.
Policy WF-1.1/Fire Protection Agencies: Support expansion of fire protection agencies and volunteer fire departments, and continue to cooperate with federal, state, local agencies and private landowners to provide greater fire protection for the County.	**Consistency:** Unknown. Although adequate fire protection is proposed for the project site, preliminary assessments indicate that the project itself increases the risk of fire within the project area. As a result of this potential increased risk of off-site impacts, the County and the Southern Inyo Fire District (SIFD) are working with the applicant on funding for such increased impacts to County fire protection services, and this issue is as yet unresolved.	No.
Policy WF-1.2/Limitations in Fire Hazard Zones: Discourage development within high fire hazard severity zones.	**Consistency:** Compliant. The project is located within a "Moderate," not a "High," fire hazard severity zone, as is most of Inyo County.	No.
Policy WF-1.3/Fuel Modification: Require fuel modification for structures within fire hazard zones.	**Consistency:** Compliant. The project will manage fuel/vegetation within the project boundaries and has developed fire protection mitigation measures for the project site.	No.
Policy WF-1.5/Emergency Access: All County public roads shall be developed and maintained at adequate standards to provide safe circulation for emergency equipment.	**Consistency:** Unknown. Although adequate fire protection is proposed for the project site, preliminary assessment indicate that the project itself increases **Comment 90**	No.

Inyo County General Plan Goal or Policy	Analysis of Proposed Project's Consistency as Conditioned in PSA	Identified by PSA as LORS?
AND **Implementation Measure 2.0:** The County shall work with local fire districts and volunteer fire departments to develop community fire plans to identify the desired level of service and methods to obtain such services.	the risk of fire within the project area. As a result of this potential increased risk of off-site impacts, the County and the Southern Inyo Fire District (SIFD) are working with the applicant on funding for such increased impacts to County fire protection services, and this issue is as yet unresolved.	
Goal GEO-1: Minimize exposure to hazards and structural damage from geologic and seismic conditions.	**Consistency:** Compliant. Although preliminary assessment of the site indicates it could be subject to strong levels of earthquake-related ground shaking due to area earthquake faults, as well as subject to soil failure due to hydrocollapse, soil fissure formations, and dynamic compaction, mitigation measures have been developed for the project that would keep impacts to less than significant levels.	Yes.
Goal NOI-1: Prevent incompatible land uses, by reason of excessive noise levels, from occurring in the future. This includes protecting sensitive land uses from exposure to excessive noise and to protect the economic base of County by preventing the encroachment of incompatible land uses with areas affected by existing or planned noise-producing uses.	**Consistency:** Compliant. The solar plant itself should not create excessive noise levels for the adjacent residential community of Charleston View. **Comment 91**	Yes.

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COUNTY OF INYO
WATER DEPARTMENT

July 19, 2012

TO: Mike Monasmith, Project Manager
Siting, Transmission, and Environmental Protection Division
California Energy Commission
1516 Ninth Street, MS-2000
Sacramento, California 95814

FROM: Robert Harrington, Ph.D, R.G.
Director, Inyo County Water Department

SUBJECT: Comments on Preliminary Staff Assessment for the Hidden Hills Solar Energy Generating System

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Thank you for the opportunity to comment on the Hidden Hills Solar Energy Generating System (HHSEGS) Preliminary Staff Assessment (PSA). The CEC is to be commended for the thorough, transparent, and accessible public process conducted for this project. The following comments pertain to Section 4.15 (Water Supply) and parts of Section 4.2 (Biological Resources) that pertain to groundwater-dependent vegetation. The County of Inyo Board of Supervisors has adopted a resolution titled "*A Resolution of the Board of Supervisors of the County of Inyo, State of California, Adopting the findings and Conditions of Certification for the Proposed Hidden Hills Solar Electric Generating Station in Charleston View in Inyo County (California Energy Commission Application for Certification No. 11-AFC-2).*" In that resolution, the Board of Supervisors makes a number of findings and establishes conditions of certification related to many sections of the PSA, including Biological Resources and Water Supply. The comments given below provide the rationale for a number of the findings and conditions in the Board Resolution related to Biological Resources and Water Supply.

Comment #1: Hydrologic analysis. The emphasis of the conditions of certification associated with groundwater extraction should be on monitoring to detect off-site changes in groundwater elevation. In response to data request #141, the applicant reported on an aquifer performance test (APT) to observe the groundwater system's response to pumping. The PSA, as well as discussions at status conferences and public workshops, have placed considerable emphasis on the results of APT. The applicant has used the APT results to argue that the project will have no off-site impacts to the groundwater system; CEC staff argues in the P5A that the applicant has misinterpreted the ATP results; and other parties have criticized the conduct of the APT. The applicant and CEC staff presented a number of interpretations of the APT results, all of which necessarily simplify the hydrogeologic system; however, there is insufficient

data to settle on one single interpretation as the correct rendition of the hydrologic system. In general, the simple analytical models such as used by the applicant and CEC staff to interpret the APT results do not provide a single, uniquely correct interpretation of the aquifer system; multiple interpretations may fit the test results equally well. We agree with CEC staff's analysis that stabilization of the Orchard Well's cone of depression was probably due to leakage from an unidentified source. There is insufficient information to determine whether the leakage is from an underlying, overlying, or adjacent aquifer. The applicant further argues that the regional gradient stabilized the cone of depression. In general, a developing cone of depression is additively superimposed on a regional gradient according to the principal of superposition that is applicable to all linear systems (Bear, 1979), and therefore; the transient effects resulting from a pumping well are over-printed on, separable from, and unaffected by the presence of a regional gradient. There is insufficient evidence in the record to show that this general feature of groundwater systems is, for some reason, not applicable to the project site, so we disagree with the applicant's contention. We do agree that there is a regional gradient implying flow from the Spring Mountains toward the project site, and the presence of a regional gradient does implies that groundwater flowing through the site is in transit to a down-gradient point of discharge, possibly the Amargosa River. We think it is important to establish the nature of groundwater flow from the Pahrump Valley to California Valley, Stewart Valley, Middle Amargosa Valley, and Chicago Valley. Further, we agree with CEC staff's contention that partial penetration of the APT monitoring wells may have affected the test results, and was not accounted for in any APT analysis.

The APT provided useful information related to conditions near the pumped wells, but extrapolating results from a test that spanned a few days into an assessment of impacts over the life of the project is inherently uncertain. Additional testing for a week or a month will not eliminate this uncertainty, so the CEC is faced with developing its final staff assessment based on inconclusive data. A high level of hydrogeologic uncertainty is not unique to this project; rather, it is typical when making hydrogeologic predictions involving new stresses on an aquifer system. For example, not far to the north of the project area, billions of dollars have been spent evaluating the Yucca Mountain Nuclear Waste Repository, yet great uncertainty still remains as to the likelihood of radionuclides escaping the repository via the groundwater system. For HHSEGS, because the assessment of impacts is inconclusive, the most viable way for the project to proceed is to require monitoring that will allow tracking of impacts to the groundwater system as they develop during the life of the project, so that mitigation can be implemented if it becomes apparent that groundwater dependent resources will be impacted. This approach is reasonable and feasible for HHSEGS. The applicant predicts that the modest amount of pumping proposed for this project will have negligible off-site effects; therefore, from a hydrogeologic perspective, all that is required is monitoring sufficient to verify the applicant's contention, and mitigation measures that become active if monitoring shows that the applicant's contention was wrong.

We support the provisions of WATER SUPPLY – 6A and 8A and for a monitoring well network, and recommend that conditions of certification WATER SUPPLY – 6A and 8A be modified to include the following:

> In cooperation with USBLM, the applicant shall fund and construct a monitoring well approximately ½ mile west of the Stump Springs ACEC for inclusions in the monitoring well network.

Comment #2: Triggers for mitigation actions. We do not see in the PSA a mechanism to avoid impacts by tracking groundwater level changes and taking action to reduce or stop pumping before negative impacts occur. Mitigation measures Bio – 23 and Water Supply – 8C do not require that action be taken until vegetation vigor has declined by 20%, which may be well past the point where moderating

pumping would avoid impacts. Groundwater level declines necessarily precede pumping-induced declines in soil moisture and vegetation condition; therefore, observations of water level change can be used to anticipate negative impacts and manage pumping to avoid them.

Vegetation conditions are affected by numerous factors. Our experience in Owens Valley has been that using vegetation condition as a trigger to control pumping is less reliable than using groundwater levels, because (1) groundwater levels necessarily respond sooner to pumping than vegetation conditions, and (2) vegetation conditions are affected by a greater variety and number of factors than groundwater levels. We recommend that mitigation actions be triggered by changes in groundwater levels, and vegetation monitoring be used as a check to evaluate the effectiveness of the triggering mechanism, so that the water-level based triggering mechanism can be modified if the vegetation monitoring shows that vegetation conditions are declining due to water table withdrawal.

Concerning the statement made on page 4.2-144 that "*Long-term study in the Owens Valley suggests that a change in water table elevation of as little as 0.3 feet could affect a major change in plant life form and species composition, if, In fact, the plants survive*," the threshold of 0.3 feet of drawdown seems arbitrary. We have seen no evidence in Owens Valley that such small changes in groundwater level measurably affect phreatophytic grass-dominated communities that have rooting zones around 2 meters. The literature supports this observation, and also indicates that deep-rooted species are generally more tolerant of changes in water table depth than shallow-rooted species (Elmore et. al., 2002; Patten et al., 2008; Cooper et al., 2006; Horton et al., 2001; Horton and Clark, 2001; Segelquist et al., 1993; Amlin and Rood, 2002; Horton et al., 2003; Lite and Stromberg, 2005; Stromberg et al., 1996; Amlin and Rood, 2003; Shafroth et al., 2000; Scott et al., 2000). None of these studies suggest that a 0.3 foot water table decline equates to a 20% or greater decline in measures of vegetation health in deep-rooted phreatophytes. We recommend that CEC staff conduct a more thorough review of peer-reviewed literature and existing data related to tolerance of the extant vegetation communities to water table drawdown, and, based on that review, set a threshold of water table drawdown that defines a significant impact. That threshold can then be applied to a drawdown-based mechanism for controlling project pumping as described below.

The well network should be used as an early warning system, and that action be taken based on observed declines in groundwater levels to avoid significant impacts. Action levels can be determined using predictive hydrologic modeling tools to associate observed water level changes in monitoring wells with quantitative measures of significant impact at groundwater dependent resources. In groundwater systems where pumping continues for long periods of time and large areas are affected, groundwater levels at sensitive resources may continue to decline even after pumping has stopped; therefore, special care should be given to account for delayed water table recovery at sensitive resources. To this end, BIO-23.3 should be replaced with the following:

> Based on the results of inventory of groundwater-dependent and groundwater-influenced habitat and resources produced under BIO-23, subparagraph 13, an amount of water table drawdown that would cause a significant impact to GDEs shall be identified. Using drawdown curves calculated using representative aquifer parameters applied to the Theis method, determine the maximum pumping rate that will not exceed the threshold of significant drawdown at GDEs over the life of the project. Using this pumping rate and these aquifer parameters, determine the maximum drawdown that could occur within each monitoring well located between the project and the GDEs without exceeding the threshold of significant drawdown for any GDE. If drawdown in any monitoring well exceeds the drawdown that corresponds to a threshold of significant drawdown for any GDE, the project owner shall have

90 days to provide evidence to the CPM that the drawdown is not a result of groundwater pumping by the project. If after reviewing the evidence provided by the project owner and other relevant evidence, the CPM, in consultation with BLM Nevada and California state leads for Soil, Water, Air and Riparian Programs, the BLM Southern Nevada District Hydrologist and Botanist and the Inyo County Water Department concludes that the drawdown is due to groundwater pumping by the project, the CPM shall notify the project owner that its groundwater pumping is to cease.

Subsequently, the project owner may resume pumping if the CPM, in consultation with BLM Nevada and California state leads for Soil, Water, Air and Riparian Programs, the BLM Southern Nevada District Hydrologist and Botanist and the Inyo County Water Department concludes that the exceedence of the drawdown trigger(s) was due to factors other than the project's pumping, and that the project's groundwater pumping did not contribute to the trigger exceedence, or the water table recovers to baseline levels.

Comment 91a

Condition of certification BIO-23 is unclear as to what measure of vegetation condition will be used to determine if action is necessary. On page 4.2-234, a significant impact is described as "decline in health of any groundwater-dependent species of 20 percent or more." Elsewhere, a less than significant impact is defined as "less than 20 percent change from the baseline condition" (p. 4.2-233), "20 percent above baseline" (p. 4.2-235), and on pages 4.15-43 – 44, one of the criteria given for reducing pumping is given as "the significance threshold for decline in plant vigor is reached." Nowhere are specific variables or methods identified to define the threshold of significant impact to vegetation. This mitigation measure and related water supply mitigation measures should clearly define what methods and variables will be used to assess vegetation health or vegetation vigor, and use consistent terminology throughout.

Comment 91b

BIO-23 discusses whether changes are correlated solely to regional drought conditions. It is unclear whether the correlation with drought conditions is applied to vegetation conditions, hydrologic conditions, or both. This concept should be broadened to allow the applicant to resume pumping if the applicant can show that the trigger exceedence was caused by some other factor than the applicant's pumping.

BIO-23.9 requires that offsite reference plots have similar species assemblages, depth to groundwater, and lithology to sites of concern. Other considerations in identifying valid reference sites are similarity in climate, geomorphic position, soils, elevation, potential evapotranspiration, runoff/runon status, depth to water variability, site disturbance, and water quality. If reference plots are used, numerous control sites should be monitored in order to reduce the effect of monitoring site idiosyncrasies on management decisions. In Owens Valley, we have found that locating truly valid control plots is challenging because of the many factors that may invalidate a plot, and that the validity of plots needs to be reassessed as time goes on and plots are subject to later disturbances.

Comment 91c

<u>Comment #3: Water-related compliance with Inyo County Code Title 21.</u> The CEC should use Inyo County Code Title 21 as a framework for analyzing groundwater-related impacts. PSA page 4.15-3 lists local laws, ordinances, regulations, and standards related to groundwater use by the project. Inyo County Code Title 21, Renewable Energy Development, was omitted from this list. Were it not for the CEC's sole permitting authority over the HHSEGS, this project would be subject to Title 21. Title 21 provides that:

As a condition to the issuance of a renewable energy impact determination or a renewable energy permit, the county planning commission may, in the case of a renewable energy impact determination, incorporate, and in the case of a renewable energy permit, impose such reasonable and feasible mitigation measures as it finds to be necessary to protect the health, safety and welfare of the county's citizens, the county's environment, including its public trust resources, and to ensure that the county and its citizens do not bear an undue financial burden from the project. (Ord. 1158 § 3, 2010.)

To implement Title 21, County staff would develop and recommend mitigation measures for consideration by the Planning Commission. To protect the County's citizens and environment from impacts related to groundwater pumping, staff would develop and recommend a mitigation plan according to this outline:

1) The Project Owner shall cooperate with the County to complete an inventory of non-project wells potentially affected by the Project that identifies the owner of each well and includes the location, depth, screened interval, pump depth, static water level, pumping water level, and capacity of each well. For each such well, the Project Owner shall assess any projected impact of the Project on the well and shall develop and submit a plan for monitoring and mitigating any adverse effects on the well, including thresholds where mitigation activities would be undertaken. The plan should include, as feasible, agreements from the owner of each well approving monitoring activities. Monitoring should include both groundwater elevation and water quality. Mitigations should include deepening or replacing wells that become inoperable due to Project pumping, monetary compensation for additional pump lift incurred by Project pumping, and mitigation for impacts to water quality.

Comment 91d

2) The Project Owner shall complete and provide to the County an inventory of groundwater-dependent or groundwater-influenced habitat and resources that may be potentially affected by the Project. The inventory should identify and describe habitat and resources dependent on or influenced by groundwater, including spring flow, baseflow to streams and rivers, phreatophytic meadows, phreatophytic scrub, and riparian areas. For each habitat or resource identified, quantitative measures of what constitutes a significant impact to such habitats and resources should be identified and associated with corresponding amounts of water table drawdown, a monitoring program should be developed that is sufficient to assess potential impacts to the habitats and resources, and mitigation measures should be identified that will be implemented if significant impacts to such habitats and resources should occur. The preferred form of mitigation is avoidance of adverse effects on habitat and resources by modifying, reducing, or ceasing groundwater pumping by the Project if adverse impacts are projected as a result of prior evaluations and monitoring results.

3) The Project Owner shall develop a model for predicting changes in the groundwater flow system resulting from the Project which has the capability to assess changes in hydraulic head, flow rate, flow direction, and water budget. The Project Owner shall also provide to the County model runs which predict effects of the planned groundwater pumping by the Project on the habitats and resources described above and predictions of the level of groundwater pumping that will cause significant impacts on such habitats and resources. The Project Owner shall also use the model to provide an evaluation of the sustainability of the water supply for the life of the project, including the cumulative sustainability when considered with other pumping occurring or projected to occur in the groundwater basin.

4) The Project Owner shall develop and provide to the County the following:

   a. A plan for a network of monitoring wells (either existing or to be constructed) to be regularly monitored together with a schedule for reporting water levels in the wells to the County by the Project Owner. Construction of production and monitoring wells (water level monitoring should be initiated as soon as wells are available and results will be publicly available);

   b. A plan for logging and aquifer testing of all new production wells;

   c. A plan for monitoring and reporting on the impacts of the Project on private wells and on habitats and resources described above.

   d. A plan for verifying the predictive tools described above and for revising or recalibrating the tools during project operation.

   e. A plan for revising thresholds as dictated by new data concerning system response to Project operation.

   f. An enforceable commitment based on monitoring data and significance thresholds, to implement mitigation measures as necessary.

Comment # 4: Water Use Offset Plan (page 4.15-32). Condition of Certification Water Supply – 1 requires that the Project Owner shall submit a plan "showing that it will replace 4,900 acre-feet or 163 AFY and the [Project Owner] shall undertake one or more of the activities identified below to mitigate project overdraft impacts..." In this section, it is unclear what types of activities are contemplated. Activities such as retirement of water rights, development of artificial recharge, or salvage of phreatophyte transpiration could each be thought of as activities that replace water in an overdrafted aquifer, but these activities each have differing environmental and economic considerations. This condition of certification should be more specific regarding what activities it encompasses.

If acquisition and retirement of water rights in Pahrump Valley is approved under this condition of certification, the CEC should require that the retired rights are currently being exercised. Since the amount of permitted groundwater rights in Pahrump Valley is far greater than actual pumpage, it is clear that there are permitted rights to pump groundwater that are currently unexercised. If rights are acquired and retired that are currently not being used, there would not be an actual reduction in groundwater extraction. Retirement of water rights is effective as mitigation only if the retirement results in an actual reduction in pumping, and even then, it is only mitigation for basin-wide overdraft. Water rights retirement does not in any way mitigate for any impacts that might occur to groundwater dependent resources affected by project pumping unless the retirement results in the water table rising in the affected area. This is unlikely to happen unless the retired water rights are located approximately equidistant to the affected area as the project is to the affected area.

This condition should require that the applicant provide records showing that any water rights retired for the purpose of satisfying this condition of certification were actually being exercised. When determining how much water use offset should be credited to a water right, the offset should be based on consumptive use of groundwater, not the total water right or the total amount of water pumped. For example, if a water right that was being used for irrigation is acquired for water offset, the offset should be for the amount of water lost to evapotranspiration, not the amount permitted or the amount pumped.

Comment #5: Compliance with California mandates for groundwater elevation monitoring. This project hampers Inyo County's ability to comply with state-mandated groundwater monitoring requirements. The State of California enacted legislation in 2009 (SBX7-6, Statutes of 2009, Seventh Extraordinary Session, chaptered as Water Code 10920 et seq.) that requires all groundwater basins and subbasins delineated in *California's Groundwater*, the Department of Water Resources' (DWR) Bulletin 118-2003 (DWR, 2003), to be monitored for seasonal and long-term trends in groundwater elevation. The data collected is required to be reported to DWR who will in turn compile the data in an online system that is accessible to the public. The law identifies numerous entities such as counties, cities, water districts, and groundwater monitoring cooperatives that may assume responsibility for the monitoring. Notably, state, tribal, and federal agencies are not among the eligible monitoring entities.

To fulfill the requirements of the legislation, DWR initiated the California Statewide Groundwater Elevation Monitoring Program (CASGEM). Participation in CASGEM by local entities is voluntary; however, if no eligible local party volunteers to become the designated monitoring entity, DWR may undertake the groundwater elevation monitoring. If DWR assumes responsibility for the groundwater monitoring, nonparticipating eligible monitoring entities may lose eligibility for water grants and loans awarded or administered by the state. Naturally, Inyo County is concerned about the potential for losing eligibility for these grant funds, and wishes to comply with the requirements of CASGEM. No funding was provided in the legislation for local entities to implement this new state program.

SBX7-6 does not allow for exceptions to its requirement that groundwater elevations be monitored in all groundwater basins. In many remote desert basins in Inyo County, designation as federal wilderness or military uses render it impossible to construct monitoring wells, and additionally, many other basins have no significant groundwater pumping. To address these flaws in the SBX7-6 legislation, in August 2011, legislation passed (AB 1152) amending Water Code Sections 10927, 10932, and 10933, and authorizing that a monitoring entity may report groundwater elevations using specified alternate monitoring techniques for certain groundwater basins and subbasins meeting prescribed conditions. AB 1152 allows that, at DWR's discretion, a monitoring entity may use alternative monitoring techniques to assess whether groundwater conditions in a basin are changing. Alternative monitoring techniques may be approved by DWR if groundwater elevations are unaffected by land use activities or planned land use activities.

Approval of HHSEGS will invalidate any argument by Inyo County that the California portion of Pahrump Valley, California Valley, and Middle Amargosa Valley are unaffected by land use activities; therefore, the County will be required to either develop a program for reporting groundwater elevations to DWR, or be ineligible for state water grants and loans. In order to comply with CASGEM requirements, the County could use the groundwater elevation monitoring data proposed in condition of certification Water Supply – 6.C.4 and Water Supply – 8.C.5 if those data are made available to the County. To that end, we request that the conditions of certification be modified to require that:

> Groundwater elevations shall be measured throughout the life of the project at least twice per year, and reported to the CPM and to the Inyo County Water Department. The County will report these data to the California Department of Water Resources as part of the California Groundwater Elevation Monitoring Program.

Comment # 6: Water Level Monitoring for Neighboring Wells, Mitigation, and Reporting (Pages 4.15-36 – 4.15-40). Concerning section A.2, we understand from discussion with CEC staff that the well network will include at a minimum one well at the *southern* end of the site. Development of water level maps within the Pahrump Valley, as required by A.4, will require a network of more than the one well

indicated in A.2. Section C.3 requires that an owner provide documentation of the well location, construction, and pump intake depth. Some well owners may not have all of this information available, particularly pump intake depth. The Project Owner should be required to assist well owners with developing this information if the information is not readily available to the well owner. Concerning section C.5, monetary compensation should be on an annual basis only so that this payment transfers to any new owner of the land.

Comment # 7: Corrections. On page 4.15-11, Table 2, there appears to be an error in determining the median value. The Stateline well has a trend of -0.237, but the overall median is given as -0.273 at the bottom of the table and in the text at the bottom of page 4.15-10.

The language in WATER SUPPLY 8.C.6 appears to be more applicable to domestic wells. Likewise for the language at the top of page 4.15-45.

On page 4.15-13, in the definition of the variables for Equation 2, time should be lowercase t.

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REPONSES TO THE MAY, 2012 "SOCIOECONOMIC AND FISCAL IMPACTS OF THE HIDDEN HILLS SOLAR ELECTRIC GENERATING SYSTEM ON INYO COUNTY"

Presented to

THE COUNTY OF INYO, CALIFORNIA

by

GRUEN GRUEN + ASSOCIATES

July 20, 2012

C1299.1

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CHAPTER 1

SYNTHESIS AND RECOMMENDATIONS

We have reproduced below Table ES-1 from the May, 2012 "Socioeconomic and Fiscal Impacts of the Hidden Hills Solar Electric Generating System [HHSEGS] on Inyo County" prepared for the California Energy Commission (CEC). All of the revenue forecasts shown on that table for the construction period and the annual operating period are those of the report's authors. The expenditures shown in that table were prepared by the departments and consultants of the County of Inyo, a political subdivision of the State of California. The CEC analysis utilizes the present value calculation as a way of summing up or blending the estimates prepared by the authors of the CEC analysis.

Table ES-1. Net Fiscal Impacts on Inyo County: 28 Years, Scenario 1

	Construction (3 Year Total)	Operation (Annual)	Net Present Value
Revenues	$86,500,000	$1,100,000	**$92,200,000**
Expenditures	$11,100,000	$1,700,000	**$31,000,000**
Net Impact	$75,400,000	($650,000)	**$61,100,000**

In this response to that analysis, Chapter 2 considers the revenue forecasts contained in the May CEC report and finds them to be uncertain and significantly overstated. The estimate of $86,500,000 revenues to the County for the 3-year construction period is so large that if it were accurate, the County could invest that money in safe government bonds at 3 percent per year and earn more than $2.5 million per year. Even though, as discussed in Chapter 3 of this response, the CEC report's prediction of the County expenditures is understated, the earnings from the more than $80 million would probably cover the annual operating deficits identified by the County.

Unfortunately, as we discuss in Chapter 2, the best guess, and we admit it is a guess, of what the revenues to the County will be during the 3-year construction period, is likely to be somewhat in excess of $10 million. But even if the revenue coming to the County during the project's construction were to reach $12 million, investing that amount in 3% bonds earning $360,000 **and** assuming that the CEC report's forecast that the County would obtain $1,100,000 per year during the project's operation was correct, there would still be a 15% gap between what the project costs the County and what it pays the County in taxes and fees.

The combined effect of overstated and highly uncertain revenue forecasts in the CEC

analysis threatens the fiscal health of Inyo County, and this effect is further compounded by the discounting of the legitimate costs the County is likely to incur.

Comment 92

As this response discusses in Chapter 3, many of the deductions from the County departments' original estimates of the costs they will have to pay in order provide services to the proposed project are unwarranted. There are, however, opportunities, to reduce County costs. For example, if the applicant takes steps to improve and utilize alternative routes and cooperate with a system to keep project traffic off the road that requires an overlay to handle anticipated traffic, some moneys could also be cut from the estimated roadway improvement and maintenance costs.

However, even reducing the County's likely expenditures is not going to avoid imposing severe fiscal stress on the County, unless the uncertainties that currently apply to the CEC's analysis of potential revenues to the County's treasury can be made more certain by the following conditions of project approval:

Comment 93

1. The project sponsor shall require that all qualifying contractors and subcontractors exercise their option(s) to obtain a Board of Equalization sub-permit for the Hidden Hills SEGS jobsite and allocate all eligible sales and use tax payments to the County of Inyo.

1. That the project sponsor be required to reimburse the County for all costs associated with a consultant with expertise in sales and use tax allocation, hired by the County, to assist the project sponsor and its contractors to complete and submit all documents necessary to register the jobsite as the source of all sales and use taxes, and then work proactively with contractors and subcontractors of the project to identify and properly document all purchases in conformity with the laws and regulations of the Board of Equalization so as to maximize the amount of sales and use tax captured and allocated to the County.

Comment 94

In addition, in order to encourage economic development in the County, the CEC is asked to request that the applicant design and operate the interpretive center so as to promote and take full advantage of the potential for expanded tourism that the project has the potential of inducing. We would also point out that such an interpretive center could be developed and programmed as a multi-purpose building providing police and fire facilities, as well as a community center and emergency shelter identified as necessary to mitigate other socioeconomic and public safety impacts. Doing so will provide the developer with certain economies of scale in addressing this suite of impacts.

CHAPTER 2
EXPECTED FISCAL AND ECONOMIC BENEFITS

The revenues or fiscal benefits, as well as the jobs, income and output or economic benefits to Inyo County of HHSEGS are discussed in several sections of the May, 2012 Socioeconomic and Fiscal Impacts report issued by the CEC. Below, we first discuss the County's response to the assumptions and resulting forecasts of fiscal benefits presented in several sections of the May CEC document. Next, we consider the economic impacts forecast in the May CEC document. The third section of this response discusses the benefits foreclosed, or opportunity costs of the project, as well a likely positive economic and fiscal benefit ignored in the CEC document. The final section will make a recommendation to mitigate the uncertainties discussed in the aforementioned three sections. As discussed in Chapter 1 to this response, which reaches conclusions based on an evaluation of both the benefits discussed in this chapter and the forecasts of County expenditures discussed in the next, failure to deal with the uncertainties discussed in this chapter will cause the proposed HHSEGS to pose a serious threat to the future fiscal health of the County.

Expected Sales and Property Tax Receipts

Sales and Use Tax

Because of the long-term relationships between County expenditures to provide the services likely to be induced by the project and likely on-going revenues to the County from the operations and maintenance of the project, determining the amount of sales and use taxes likely to be garnered by the County during the 29-month construction phase is critical. To remain fiscally solvent in providing services to the project during its operations phase, those sales taxes will have to provide the County with an investment corpus large enough to fund likely annual deficits induced by the project during its years of operations and maintenance.

Page 24 of the Socioeconomic and Fiscal Impact report cited the following quotation from the BrightSource (BSE) sponsored Application for Certification (07-AFC-05C): "BrightSource worked with the County of San Bernardino to maximize sales and use tax allocated to the unincorporated San Bernardino County stemming from construction of the Ivanpah SEGS project." The CEC report continues:

> "This indicates that it will likely follow through with its intentions and do the same for Inyo County. Furthermore, BrightSource noted that even if it designated the 'point of sale' as nearby Pahrump, Nevada, it would still be subject to use tax in Inyo County.
>
> Based on these assumptions presented by the proponents, the County government could receive $84.5 million in its local shares of sales and use tax over the 29-month

construction period based on the assumptions presented in this report. During operation, however, sales tax revenues from the project will be negligible, because non-payroll O&M expenditures spent in the County amount to only $540,000 annually. Of this amount collected, only $2,900 would go to the County." (page 24; Socioeconomic and Fiscal Impacts of the HHSEGS on Inyo County)

Comment 95

The Executive Summary of the CEC impact report states, "The proposed project is expected to cost in the range of $2.9 billion in total to construct, with direct material costs of roughly $2.5 billion, based on publicly available estimates for each of the technologies." (page 1; Socioeconomic and Fiscal Impacts of the HHSEGS on Inyo County) This estimate is not otherwise substantiated, and seems to be contradicted by the following statement in Section 5.3.1 of the same report. "In addition, the assessed value of the plant facilities would be $2.18 billion for the project." (page 22) The questionable credibility of these basic assumptions concerning project costs also calls into question the entire revenue analysis, which, as we read the report, is based largely on the aforementioned cost numbers.

The CEC report goes on to assert that the project will generate sales tax revenues for the County because newly employed local workers will be spending some of their additional disposable income locally on various goods, such as food, appliances and clothing. During the 29 months, direct and indirect income suggested by the JEDI model is expected to generate $2 million from the purchases of employees, whereas during the assumed 25-year operating period, the 19 forecast direct and indirect jobs assumed to be locally employed are projected to generate nearly $43,000 annually during the 25-year operation period.

We will comment in the next section of this chapter on the credibility of the assumptions forecast from the JEDI model output for employee generated sales tax revenue. However, here we express our concern that the County place any possible reliance on the statement expressed in the CEC impact report that the County government could receive $84.5 million in "its local share of sales and use tax over the 29-month construction period." All but the very small amount of the retail sales likely to result from the direct and induced expenditures in Inyo County by construction related workers will come from the purchase of tangible personal property by the project's construction contractors and subcontractors, upon which sales tax has not been collected by a retailer. However, this potential will be maximized if, and only if, the developer of the project has exercised the option of requiring its contractors and sub-contractors to register the construction jobsite as the point of sale for all such purchases, **and institutes a very proactive program of implementing the procedures needed to properly document these purchases.**

We found that a Fair Share Contribution Agreement between San Bernardino County and the Ivanpah developer was signed on December 9, 2010. Presumably, this is the mechanism that BSE referred to when it wrote in its Application for Certification (07-AFC-05C): "BrightSource worked with the County of San Bernardino to maximize sales and use tax

allocated to the unincorporated San Bernardino County stemming from construction of the Ivanpah SEGS project." This agreement stated that $377,000 would be paid to the County annually for fire protection and emergency responsive services for the Ivanpah Solar Electric Generating Complex. However, the system put in place in San Bernardino County in order to bring sales and use tax receipts from the project during and after construction does not suggest that anything close to the $84.5 million in sales and use tax receipts that the authors of the CEC analysis claim will flow into the County of Inyo coffers, or that that the County will ever see close to the more than 3 percent of the sales and use tax that appears to be suggested by the narrative describing Table 5.5, "Sales and Use Tax Fund Distribution." (page 23 Socioeconomic and Fiscal Impacts of the HHSEGS on Inyo County)

Comment 96

Based on conversations with apposite San Bernardino officials and consultants, we believe that San Bernardino County will receive approximately $7.2 million in sales and use tax receipts from the construction of the Ivanpah project, and very little, if any, sales-tax-related receipts from the operation of the solar generating facility. The $7.2 million represents construction expenditures of tangible personal property of a little over $82 million, from which all local and county governmental agencies and districts in the county are likely to receive about $7.2 million after the deduction of a $205,000 credit to BSE. Most importantly, this amount of sales and use tax dollars will accrue to San Bernardino County only because BSE has been cooperating with an attorney specializing in sales and use tax allocations, in order to track all significant purchases to their source and assure that the complex documentation required under State law and Board of Equalization rules is provided by the vendors all over the world who sell and lease tangible personal property to project construction contractors and subcontractors.

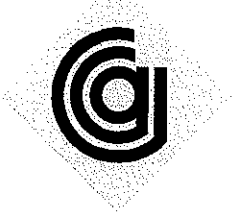
In no way do we mean to imply by our criticism of the sales and use tax forecasts in the CEC impact report that the task of predicting such taxes is easy. Even after construction has started, adjustments are going to have to be made in the cost of purchases and in the list of items purchased and leased. Furthermore, some personal property purchased during the construction period will not cost enough to qualify for a sub-contractor to obtain a sub-permit for the jobsite since there is a $5 million minimum, or justify having the contractor doing the work necessary to capture the tax. While certainly this will not eliminate all uncertainties, we believe the best way to forecast the amount of sales and use tax likely to be collected **under the assumption that point of sale options are exercised and the current and future owners of the project cooperate fully in the complex task associated with capturing the taxes for the County**, would be to utilize the experience of San Bernardino County on this matter as a comparable. As we understand it, Ivanpah is being built to generate 370 megawatts (mw) of power, while the HHSEGS project will be built to generate 35 percent more electric power, or 500 mw. Thus, under the heroic assumption that output will be correlated with construction costs and produces an estimate of $10 million in sales and use tax receipts to the County, the County captures 1 percent of the sales and use taxes paid by the project during construction. As we will repeat in the

recommendations section at the conclusion of this chapter, unless BSE cooperates in requiring its construction contractor and sub-contractors to maximize sales tax accruing to the County of Inyo, and Inyo County engages the services of an expert in the allocation of sales and use tax to work consistently with all BSE contractors and subcontractors to make sure that the not insignificant amount of paperwork required to capture these taxes is properly filled out, can anything close to the estimated $10 million flow into the coffers of Inyo County.

The property tax revenue (discussed below) and much of the sales and use tax revenue projected to accrue to the County of Inyo in the CEC analysis is discretionary General Fund revenue available to the Inyo County Board of Supervisors to budget as it deems appropriate but which, for the purposes of the Socioeconomic and Fiscal Impacts analysis, the CEC assumes will be used to mitigate project induced impacts that could otherwise be funded through project specific conditions of approval, which would most likely be required by the County of Inyo if not for the CEC's sole permitting authority. However, even if the CEC's premise that these funds would be available to fund the cost to County programs and services impacted by the construction and operation of the HHSEGS is accepted, it should be noted that the intended, allowable, and sometimes required uses of portions of the sales and use tax monies relied upon in the CEC analysis is restricted by State and local regulations. For example, the 1.06% in the Local Revenue Fund 2011 does not go into the County's General Fund. Under Section 6051.15, this revenue is distributed by the State Controller for expenses incurred by counties for the realignment of law enforcement costs previously paid by the state. The amount in the Local Revenue Fund is distributed to counties based on formulas specified in 2011's AB 118 regardless of the jurisdiction in which the tax is collected. Similarly the .5% for the Local Public Safety Fund and the .5% for the Local Human and Health Services Fund are specifically designated and do not go into the County's General Fund. Additionally, there is no analysis or assurance in the CEC report that restricted portions of the sales taxes, such as the examples provided above, will match-up with the service and program needs identified by the County. For example, the County is not arguing that the HHSEGS project will generate significantly increased costs that it is responsible for under criminal justice realignment, yet a large portion of the sales tax is reserved for costs specific to criminal justice realignment.

Property Tax

In Section 5.3.1 of the May CEC Impact study, the proposed solar project is estimated to generate approximately $3.5 million in property taxes annually. Given the 1 percent property tax rate, this forecast assumes a base year $350 million property tax assessment for the project. This forecast is arrived at by assuming the cost of the entire facility will be $2.18 billion, of which approximately 45 percent will be taxable non-solar property, of which 38 percent will be classified as dual-use, and thus taxable at 25 percent of full value, and 7 percent will be fully taxable. We believe it is significant to note that the effective base of this



forecast is that the project will be valued at its cost of construction. Unless an agreement is made that the present and future owners of the solar plant will accept this base year forecast and not request a reassessment throughout the life of the project, this foundational assumption is highly questionable.

Comment 97

Whatever the final assessed value is, the County will only receive a little less than 30 percent of the annual tax based on this assessment. School districts in Inyo County will receive approximately 62.5 percent; and the special districts a little under 7 percent.

Mr. Eric Endler, an appraiser in the San Bernardino County Assessor's Office, told Dr. Gruen in a telephone conversation, the final construction cost of the Ivanpah project was approximately $500 million. However, after the provisions of Revenue & Taxation Code Section 73 were considered, the actual base year for Ivanpah was approximately $250 million, suggesting annual potential revenue from property taxes of $2,750,000, given the San Bernardino County property tax rate of .011 percent. However, after allocations were made to all property tax recipients in San Bernardino County, it is estimated that, assuming the base year remains uncontested, the County of San Bernardino will receive $300,000. While the scale of the two projects, when measured in terms of their electric output (370 MW for Ivanpah, and 500 MW for HHSEGS) is that the completed Ivanpah project is 26 percent smaller than the HHSEGS project, the actual property tax expected from Ivanpah is 70 percent less than what has been forecast in the CEC report to apply to the HHSEGS project, assuming that reassessments are not requested in either County.

Neither the appraiser we spoke with in San Bernardino County, nor the past experience of the Inyo County Assessor with regard to other alternative energy projects, would lead one to assume that the initial and future owners of the proposed project in Inyo County will not seek downward reassessments of the base. As is discussed in the following chapter in the subsection that deals with the forecast of Assessor's expense, that Office should assume that a project whose costs have been heavily subsidized by exemptions and assurances, at both the state and federal levels, will most likely seek to have their base year property tax lowered below construction costs, for many of the same reasons they pointed to as necessitating the receipt of federal and state subsidies.

Economic Benefits and Opportunity Costs

The regional economic model, JEDI, was used to estimate the economic benefits of both the construction and ongoing impacts of the project during operation. Important inputs to the model included estimates that during the construction phase, thirty-two (32) jobs would be created in the County directly from construction activity, and then the model was used to forecast that another seventy-seven (77) jobs would be induced through increased activity in the County. This means that during construction, total earnings by County residents would increase by $12.1 million, while the output of the Inyo County economy would increase by

$73.8 million in the full 29-month period, or about $30.5 million per year.

The model was also used to look at the effect of assuming that six (6) jobs out of a total of 120 jobs during the operation period would be filled by local residents. These jobs were forecast to "multiply" to create an additional fourteen (14) jobs, with total annual earnings of $1.1 million, with $2.3 million in output. While these contributions to the County economy are relatively small compared to the previously discussed effect of taxable construction spending and increases in the property tax base forecast, they are nevertheless quite questionable because of the JEDI model's failure to take cognizance of the geographic distribution of economic activity within Inyo County.

"Small area analysis is notorious for over-estimating local impacts." This comment was made by Prof. Geoffrey J.D. Hewings, the Director of the Regional Economic Applications Laboratory at the University of Illinois, an internationally-respected expert in regional economic analysis. Hewings' comment reflects the reality that economic activity is never spread evenly through space, but concentrated within differentiated agglomerations. Simply put, in those cases where a proposed new economic activity or construction project is located near other activity centers, input-output models such as JEDI can be reasonably depended upon, even when they deal with areas as small as a single county. However, given the sparseness of economic activity near the proposed site but within Inyo County, models such as JEDI can be quite misleading.

The area around the proposed project has very little to offer in terms of economic activity, but is close to much larger and more attractive activity in Nevada. Sixty-five percent of Inyo County's taxable sales are made in the incorporated City of Bishop. Bishop is 241 miles and, according to Mapquest, a 4-hour and 13-minute drive from Tecopa. Tecopa, again according to Mapquest, is 26 miles and 39 minutes driving time to Pahrump, while Las Vegas, NV is 82 miles and 1 hour and 38 minutes driving time.

The implicit assumptions of the generalizations of the JEDI model, which are built on an economic model which was first proposed by Nobel Laureate Wassily Leontief in the late 1930s, was preceded by Reilly's Law of Retail Gravitation to predict the area from which customers will come to various retail outlets. Reilly's Law noted that the attraction of retail outlets increased with their size and decreased with their distance from potential customers. The use of the JEDI model to estimate the indirect jobs and output that will be induced by local residents of the County working at the site violates Reilly's law, which neither Leontief nor any other economist has ever rejected. While it's impossible to make a sure-footed forecast of how many local residents will work at the project during its construction or operation, the JEDI's estimate of their multiplier effect within the County is very likely to be over optimistic.

Opportunity Costs and Potential Visitor Benefits Ignored

Comment 98

The May CEC Socioeconomic and Fiscal Impact study shrugs off the opportunity costs of taking close to 10,000 acres of Inyo County's very limited land for private development for the foreseeable future with the following sentence on page 11: "No economic losses from reduced agricultural activity are projected as the reasonably foreseeable impact is negligible. As discussed in AFC Section 5.6 Land Use, there are currently no agricultural uses within the HHSEGS site." As the County has pointed out in numerous meetings and communications, and as the County's economic consultants, Gruen Gruen + Associates, pointed out to the representatives of CH2MHill who wrote the AFC, much of the land being taken by the project is already plotted for residential use, and as County Planning Director Joshua Hart has pointed out, the long-range planning vision for the area affected by the project includes a variety of non-agricultural uses, including not only residential but eco-resort, visitor-serving uses and possibly commercial activities, as well.

The affected area, including the approximately 6,000 acres around the project that are set aside as a potential mitigation area, is approximately 9,000 acres. For a county with so little private land available for development, the loss of future opportunities for development on this amount of acreage is significant.

Comment 99

Surprisingly, the project planners and the socioeconomic report seem to have ignored the potential the project would offer for the attraction of tourists to the area. Not only does this oversight represent a gap in the CEC Socioeconomic report, it also raises the concern that the interpretive center the project plans to build will not be built and operated in a way that captures the tourism attracting potential of the project.

The June 17, 2012 issue of the New York Times Magazine featured an article entitled, "The Beauty of the Largest Solar Farm in the World." The black and white photographic visuals were stunning. This type of PR is likely to encourage visitation to the proposed Charleston View site. Those visitors who strongly support solutions to global warming are the most likely to visit the BSE solar farms.

A comprehensive study of visitors to Death Valley National Park (DVNP),[1] the nation's largest park, included the results of a visitor survey conducted in DVNP in the summer of 2010. The survey revealed that 55% of the visitors to DVNP in the summer were tourists from foreign countries, most of whom came to the park after visiting Las Vegas. Forty-five percent of these foreign visitors originated from Western Europe. There is a strong crossover between these Western European visitor respondents and their response to the question, "Should the government allocate more resources to global warming?" Over 52% of those surveyed in this DVNP summer survey felt the government should allocate more

[1] Gruen Gruen + Associates, "A County at Risk: The Socio-Economic Impacts of the Proposed Yucca Mountain High-Level Nuclear Waste Repository on Inyo County, California" Appendix C, September 29, 2010

resources. Another 19% said maybe, 14% did not offer a response, while only 15% stated no.

Comment 100

What these survey results suggest is that many of these summer visitors, along with visitors from the northwest, who also hold strong environmental values, may consider including HHSEGS in their visit to DVNP if made aware of the solar project and, as shown on Figure 1, that HHSEGS could easily be included on trips from Las Vegas to DVNP. How many visitors to DVNP traveling from Las Vegas would include both sites is a question to which we do not have an answer. To the extent they do, additional nearby lodging might be induced. In time, additional eating establishments that cater to these visitors would be induced.

It is important to point out that our 2010 DVNP sample underrepresented tour groups. Only 2.4% of our sample was part of a tour group. Most of the visitors on the tours had relatively limited to no English speaking skills, which may have been the primary reason they elected to take a tour in the first place. Most of the foreign visitors who were not on tour had at least adequate English skills. Should tour groups elect to add HHSEGS to their route, it is likely to add considerably to the wear and tear on the existing roads, but also likely to increase the demand for nearby food services.

Recommendations

In order to reduce the uncertainties that both these responses and the CEC Impact study agree exist with regard to the forecasts of revenues induced by the project that flow to the County, and maximize the potential that much of these revenues, particularly those potentially induced by the construction period, we would strongly recommend that the CEC meet the following conditions of approval:

Comment 101

1. The project sponsor shall require that all qualifying contractors and subcontractors exercise their option(s) to obtain a Board of Equalization sub-permit for the Hidden Hills SEGS jobsite and allocate all eligible sales and use tax payments to the County of Inyo.

2. That the project sponsor be required to reimburse the County for all costs associated with a consultant with expertise in sales and use tax allocation, hired by the County, to assist the project sponsor and its contractors to complete and submit all documents necessary to register the jobsite as the source of all sales and use taxes, and then work proactively with contractors and subcontractors of the project to identify and properly document all purchases in conformity with the laws and regulations of the Board of Equalization so as to maximize the amount of sales and use tax captured and allocated to the County.

Comment 102

3. That the interpretive center be designed and operated so as to promote and take full advantage of the potential for expanded tourism visitation to the project and other visitor attractions in Inyo County. As previously pointed out in Chapter I, the interpretive center could be developed and programmed as a multi-purpose building providing police and fire facilities, as well as a community center and the emergency shelter identified as necessary to mitigate other socioeconomic and public safety impacts.

Comment 103

CHAPTER 3

FORECAST OF PROJECT-INDUCED COUNTY EXPENDITURES

Introduction

In February of 2012, the departments in Inyo County considered the scale, location and activity of the proposed project, and estimated the costs from serving the demands for service likely to be induced by the initial construction and ongoing annual operation and maintenance of the project. Table III.1 reproduces those cost estimates, along with comments. The May Socioeconomic and Fiscal Impact Analysis authored by Richard McCann, presenting CEC staff recommendations, disputed these costs, seeking to eliminate the annual Health and Human Services costs with the comment that, "These costs would not create a significant environmental impact and are beyond the regulatory purview of the Commission." However, these costs are not beyond the regulatory purview of Title 21 of the Inyo County Code, and would be fully evaluated and mitigated by Inyo County if not for the sole permitting authority of the CEC. The failure of the Socioeconomic and Fiscal Impacts of the Hidden Hills Solar Electric Generating System [HHSEGS] on Inyo County report to undertake as thorough and rigorous analysis of the socioeconomic impacts of the HHSEGS project as would be carried out by the County – relying on staff experts in the delivery of County services rather than the self-serving interests of a project applicant and consultants with no municipal experience – under Title 21 calls into question the validity and accuracy of the entire CEC Socioeconomic and Fiscal Impacts analysis.

Table III.1
Forecasts of Departmental Costs Induced by Construction and Operation of HHSEGS

Departments	Initial/ Construction	Ongoing Annual*	Comments
Health & Human Services		$188,115	
Assessor	$120,000	$120,000	Specialized appraisal requiring the retention of expert appraiser and tax counsel.
Sheriff	$2,130,666	$1,269,120	Closest substation is 34 miles away, and current staff serves 3,200 square miles west of the substation.
Public Works	$8,157,000	$78,500	Reconstruction of Spanish Trail and annual maintenance
Information Services	$237,600		Assumes 30 months of high speed data communications system
Agricultural	$150,000	$50,000	Monitoring and control project targeted against introduction of invasive weeds
Waste Management	$156,000		Waste collection for 3 years from Tecopa RV Park and Charleston View area

Table III.1
Forecasts of Departmental Costs Induced by Construction and Operation of HHSEGS

Departments	Initial/ Construction	Ongoing Annual*	Comments
Motor Pool	$33,200		Lower of two estimates of trips during construction. May be as high as $66,000
Water Department	$145,000	$8,000	Estimate for creation of monitoring program and ongoing monitoring costs.
Total	**$11,129,466**	**$1,713,735**	

*Annual costs shown are for the first year. They are estimated to increase at 5% per year.

Source: Information on the project's characteristics provided by the BSE AFC and additional information provided by CH2MHill in response to questions by Gruen Gruen + Associates

In the following section of this chapter, we present a response from the Health and Human Services Department, indicating the nature, extent and rationale behind the costs that they feel will be induced upon them by the impacts of the project on health and human services. The May CEC Socioeconomic report also argued that the Assessor's estimate should be reduced from $120,000 to $50,000. A significant part of the contention between the two cost estimates results from the Assessor's belief that appeals for reassessment are likely. As discussed in more detail below, the estimated expenses outlined by the Assessor are reasonably foreseeable and properly included when determining the overall economic impact to the County resulting from the proposed project.

The May report also called for very significant reductions in the cost estimates of both the Sheriff's office and Public Works. In the following pages of this section, additional evidence in support of the original estimates is presented. The May impact report from CEC rejects all of the Agricultural Commissioner's cost estimates, contending that the required work will be accomplished by HHSEGS. Our responses to that comment, as well as projections in the cost of Waste Management, Motor Pool, and Water Department estimates, are presented in the following sections of this report.

Generalizations – Difference

The CEC report describes a general methodology for estimating costs, which we believe is flawed because it ignores the unique geographic, demographic and economic condition of the Charleston View area. Thus, the fundamental methodology or point of view that the CEC report utilizes to estimate the size of induced expenditures is inappropriate.

The general perspective that the CEC report takes to the forecasting of the County expenditures likely to be induced is expressed by the following quotation:

"From an economic perspective, it is the "marginal costs" that are created by

> economic or population growth that must be examined to determine whether or not a new project produces additional public sector costs. That is, a large portion of public service expenditures are fixed — they cannot be changed quickly. In many cases capital-related costs are sized with extra, or flexible, capacity. Other costs, such as staffing, may vary with demand and funding, but also can be "lumpy," that is, an employee is hired after a threshold level of demand or funding is added.
>
> Fixed costs such as school classrooms, fire stations, and roads will generally not be affected by a small increase in demand. For example, a dozen or more students can typically be added to a school with 500 students without creating a need to enlarge the facility. Similarly, two to three additional calls a year to the fire and police departments will not create the need for a new fire station, or even another officer. However, an additional student, or extra police visit, will result in additional costs associated with supplies, transportation, and other operating expenses. A series of such small incremental increases or a single large project can reach a cumulative threshold where a new school or fire station would be required." (page 12)

As suggested by the example used in the first line of the second paragraph above, the fact that "fixed costs such as school classrooms, fire stations and roads will generally not be affected by a small increase in demand" is, in fact, generally true. But, unfortunately, the situation in Charleston View and Inyo County is such that all too often, the needed first fire station and the capacity of the existing roads do not currently exist. Thus, we are not in the classic situation taught in the classroom where average costs decline as production is ramped up through increases in variable costs without any additions to capacity. This is a great model for a classroom, general understanding of economic realities. But applying that same model to the situation in Charleston View would be similar to having told Henry Ford that in order to build automobiles, all he had to do was move some additional workers to the River Rouge and not worry about either building a new plant or having enough workers to efficiently man the first production line. The CEC report's methodology of consistently assuming the appropriateness of employing a marginal cost approach to projecting the costs of induced County revenues versus the County's approach of actually considering the fixed capital costs and increase in staff capacities required may well account for a significant portion of the large differences between the expenditure estimates projected by the two entities. The total cost estimated by the County is over $11 million during the construction period, and $1.7 a year million thereafter, while the CEC analysis comes up with just under $2.8 million during the construction period and just under $390,000 on an annual basis.

Health and Human Services

The second paragraph on page 7 discusses the rationale behind the staff conclusion that the construction and operation of the project will not cause any additional workers to move into the local area. On page 15, the opinion of BSE and Bechtel with regard to the Ivanpah

SEGS project is expressed as follows:

> "All workers would reside within commuting distance of the proposed ISEGS site, and therefore would not need to move into the area. Therefore, no construction or operation-related impacts are expected on the local housing supply availability or demand."

Comment 104

The report goes on to point out that the HHSEGS site is located within an hour of the suburbs of Las Vegas, NV, and that Pahrump, NV is less than 15 minutes away. The last paragraph on page 15 refers to a December 12, 2011 letter from Inyo that refers to the possibility of workers living in Southeast Inyo near the project on lots or in trucks with camper shells, in order to obtain inexpensive housing. However, this letter was amended with one dated January 5, 2012, that was emailed to Mr. Monasmith on February 29, 2012. The January 5 letter suggested that, "We expect that even if a minimal number of BrightSource employees reside in Inyo County, at least some of them can be expected to require some level of HHS services, simply based on residency." The letter goes on to explain the kinds of services that would require travel to the Tecopa office by members of the County of Inyo Health and Human Services staff.

Given the differences between conditions around the HHSEGS site and the Ivanpah Solar Energy Generating Station, it does appear reasonable that some of the workers will seek to locate in Southeast Inyo County during the construction period, and possibly even during the operations period.

Health and Human Services can likely absorb any additional caseloads that result from a very small number of workers relocating to southeastern Inyo County. As stated at the bottom of page 15:

> "It is likely that the operational workforce of 120 would be largely drawn from the local population and if not, this increase would not represent a substantial increase in demand on services. In addition, *this population is likely to be employed and of working age* so demands on social services should be less than the average experienced in the region."

We agree with this assessment. However, if the assumptions are incorrect and the demand for services increases, we present in Table III.2 the thresholds for different programs that would trigger the need to hire additional staff -- either paraprofessional staff to facilitate connections to services in Tecopa, or professional staff based in Bishop or Tecopa to provide direct service.

As explained in the Health and Human Services memo dated January 5, 2012, staffing ratios to persons served can vary from 1:6 to 1:150, depending on the program. The huge variance

in staffing ratios, combined with the uncertainty around the number of new residents who may be qualified for and seek services from HHS, make it very difficult to estimate the impact to the department.

Proposed Condition: Provide funding to hire additional HHS staff in the Tecopa office or to contract with appropriate service providers, should HHS caseloads significantly increase due to an increase in project-related population.

As identified on page 4.4-5 of the Preliminary Staff Assessment (PSA):

> "Electricity generated by HHSEGS would be sent to substations 10 or 64 miles from the project site, depending on which option is implemented. The electricity would be connected to the California ISO-controlled grid and would come back into other parts of California. Natural gas used to augment the solar operation at HHSEGS would use all the natural gas provided by the 12-to-16-inch gas pipeline. Alternatively, given the fact that the 36-inch gas line would be only nine miles from the California border, it is possible that gas could be available for future development in the local area (Charleston View, Shoshone, and Tecopa). However, the scarcity of local groundwater resources and the existing land use designations are serious constraints to economic development."

Comment 105

Despite the scarcity of groundwater resources, bringing gas and electric lines to the project site could spur population growth. If so, non-project related population increases could have a larger potential impact to Health and Human Services, given that the needs of the new population would likely mirror the needs of the current population. In other words, an increase in non-project related population would have a greater, and ongoing, impact to the Department of Health and Human Services than the population growth related strictly to the project. Please refer to Table III.1 for current HHS caseload and capacity information.

Proposed Condition: Provide funding to hire additional HHS staff in the Tecopa office or to contract with appropriate service providers, should HHS caseloads significantly increase due to growth-inducing impacts.

The PSA sets forth a proposed condition requiring BSE to develop an Evacuation Procedure on page 4.5-17. In Inyo County, the HHS Social Services division is responsible for providing evacuation centers and shelter care during local disasters that result in evacuation. HHS is concerned that inadequate shelter space is available in the southeastern portion of Inyo County, in case a disaster closes evacuation routes to the east or south of the solar project.

Proposed Condition: Coordinate with Inyo County to identify and, if necessary, fund suitable shelter options should a disaster necessitate evacuation of the construction site.

Health and Human Services continues to hope that there will be a number of positions (10% of project workforce) reserved for local employable adults who reside in Inyo County. Further, the Department hopes that the developer will work with the Health and Human Services Employment and Eligibility division to include work experience and training slots reserved for CalWORKs and WIA participants.

- Table III.2 presents the current HHS caseload and staffing thresholds. We believe the above and the information contained in Table III.2 more than substantiate the estimated ongoing costs of $188,115 per year for the Department of Health and Human Services. This cost is likely to escalate in the course of inflation.

Table III.2 Current HHS Caseload and Staffing Thresholds

Division	Approximate Caseload	How Caseload is Covered Now	How Many Additional Cases Can Be Absorbed	At what threshold do we need a new employee	If adding staff, what classification
Behavioral Health	Substance Use Disorders (SUD): 1 Drinking Driver Program (DDP): 3 Mental Health: 8	SUD, DDP, and mental health contacts by videoconferencing, plus Psychiatric Nurse travels to the area bi-monthly to provide outreach. Four consumers receive counseling services from a contract provider in Pahrump.	Approximately twice the current caseload	If there is consistently more than five people required to attend DDP classes, may need an additional class (class enrollment limited to 12 people), requiring additional part-time Addictions Counselor	One part-time Addictions Counselor
Social Services-Employ-ment and Eligibility	CalWORKs: 8 County Medical Services Program: 5 Food Stamps: 17 MediCal: 14 General Assistance: 0	Occasional travel required from northern Inyo. Most applications are processed by phone, online, or by mail. Tecopa-based staff verify residency for programs, if required; collect required documentation; and do the fingerprinting, when necessary.	A small caseload increase could easily be absorbed by current staff in Bishop.	If caseload doubles, would need an additional HHS Specialist to facilitate application process.	One part-time of full-time HHS Specialist (para-professional)

Table III.2 (cont.) Current HHS Caseload and Staffing Thresholds

Division	Approximate Caseload	How Caseload is Covered Now	How many additional cases can be absorbed?	At what threshold do we need a new employee?	If adding staff, what classification?
Social Services-Adult and Children's Services	Child Welfare (CPS): 1/quarter Adult Protective Services (APS): 1-2/quarter In-Home Supportive Services (IHSS): 12 Area Agency on Aging (AAA): avg. 85 for meals.	IHSS staff travels about once every two months for client assessments. CPS/APS responds as mandated 1-2 times/quarter. We rarely have cases in APS or CPS in southeastern Inyo, but did recently have to remove a child from a home out there and that case required travel more than once per month to facilitate visits with the parent. W utilized Tecopa-based staff to transport the parent half-way to minimize total travel time.	2 CPS and/or APS investigations per month would significantly strain the current staff.	2-4 investigations per month for CPS or APS that result in services would require a full time Social Worker in Tecopa. That worker would respond to investigations, provide appropriate services, and perform IHSS assessments. This would also require regular on-site supervision (probably a Bishop-based Social Worker Supervisor who travels regularly to Tecopa plus provides daily telephone contact).	One full time Social Worker in Tecopa plus one part-time Social Worker Supervisor in Bishop.

Public Health	CA Children's Services: 2-3/yr. Clinic Services: limited Women Infants & Children: avg. 1-2 cases Medical Marijuana ID Card (MMIC): 4	For clinical and immunization services: Professional staff travel to Tecopa area twice/yr. Clinic services provided by contractor in Furnace Creek. CCS: Case management provided by phone from Bishop on average once/mo./client. MMIC: Applications collected by Tecopa staff approx...4/year and processed in Bishop. WIC: quarterly contact with clients by phone or mail from Bishop.		**Public Health-** Not likely needed. **CCS and WIC** caseload would have to increase sizably to impact staffing patterns.	

Table III.2 (cont.) Current HHS Caseload and Staffing Thresholds

Division	Approximate Caseload	How Caseload is Covered Now	How many additional cases can be absorbed?	At what threshold do we need a new employee?	If adding staff, what classification?
Tecopa	Residence verification for services; Transportation to services; Prevention/education direct services (Senior meals for AAA); Collect application paperwork and coordinate contact with professional staff.	Weekly trips (mileage for round-trip) to: Charleston View (55 mi); Pahrump (85 mi); Shoshone (16 mi). Travel to Stovepipe Wells as needed for meal pick-up (184 mi. round-trip) Travel to Bishop bi-monthly (480 mi. round trip).	A very small increase, especially in Employment and Eligibility program applications, could be absorbed.	Any increase in direct service, transportation, or resident verification would require additional staff in the Tecopa office.	One part-time of full-time HHS Specialist (para-professional)

Assessor

The County had estimated that the additional costs to the Assessor's Office during the first year and during the operational period will be $120,000 per year. As stated on page 16 of the May CEC impact report to which we are responding, Gruen Gruen + Associates had previously pointed out that ongoing annual legal costs alone to the Assessor's Office could be $50,000 (CEC-2012.D). The May CEC report rejects these costs by writing the following:

> "However, given that the majority of these costs are for adversarial legal proceedings, it would be presumptive to require BSE to pay the County's legal fees prior to the determination of the outcomes of proceedings that may not even occur." (page 16)

The historic experience that Inyo County has had in battling with geothermal energy producers amply documents the costs of litigation that are likely to be induced. Moreover, the suggestion that BSE should not be required to "pay" for the County's legal expenses misses the point of the required socioeconomic analysis. In order to determine the impacts to the County and whether such impacts will be covered by the project's anticipated economic benefits, all reasonably foreseeable costs are properly included in the calculation. Moreover, the decreased property tax revenues received by the County as a result of Revenue and Taxation Code section 73, a benefit not enjoyed by the geothermal energy producer, is also included in the calculation. The question then becomes whether the economic benefits derived from the project are sufficient to cover the economic impacts to the County.
It is ironic that the same paragraph on page 16 contains the following:

> "The staff also believes that Inyo County can generate substantial savings by sharing information and resources with neighboring San Bernardino County, which will be assessing the virtually identical Ivanpah Solar Energy Generating Station."

Dr. Claude Gruen called officials in the Assessor's Office and the Department of Public Works, in order to obtain the benefit of their experience. Mr. Eric Endler, an appraiser in the Assessor's Office, was very familiar with the property tax assessment of the Ivanpah property. He indicated that San Bernardino would hope no reassessment is requested; however, they would not be surprised should such requests be presented to them in the future, and are already taking prudent steps to prepare themselves for that possibility.

What we have learned from San Bernardino does lend further credence to the County's estimate of costs likely to be faced by the Assessor's Office as the project is assessed.

Sheriff

On page 16, the consultant's report concluded in the first sentence under Sheriff, "Reviewing the Energy Commission's staff assessment for 16 remote solar and natural gas fired power plants, project related increase in property damage and theft were not identified as issues that would substantially increase demands on police protection services. For the project reviewed, law enforcement response times ranged from three minutes to one hour." Yet on page 4.9-19 of the May, 2012 socioeconomic portion of the PSA, authored by Steven Kerr, it states that, "As such, response time to an emergency on the project site ranges between 30 minutes to 4 hours. Depending on the type of assistance needed and the geographic location of the other deputies, response time for any additional or specialized assistance could be an added 3 to 4 hours on top of the 30 minutes to 4 hours initial response time." Among other things, the differences in time between 3 minutes to 1 hour, and 30 minutes to 4 hours, would refute the validity of drawing conclusions about the demand for police protective services in and around the HHSEGS, with evidence drawn from the 16 remote solar and gas fired power plants sited by the Energy Commission staff assessment. What is not mentioned in the analysis is that the San Bernardino Sheriff has a well staffed substation in Baker, California, which is less than 51 miles (or about a 45 minute drive) from the site of the Ivanpah project now under construction.

Comment 106

The report continues,

> "Discussions with San Bernardino County Sheriff's Departments have indicated that the Ivanpah, Kramer Junction, Daggett, and Harper Dry Lake Solar Energy Generating Systems have not increased the number of incidents requiring responses by the Sheriff's Department." (page 17)

Nowhere in any of the documents has any evidence been presented that the access, proximity to other activities, level of vandalism and other types of criminal activity, that pertain to the site considered by those interviewed and data presented is similar to such conditions at the proposed HHSEGS. In addition, the report fails to report increases in call for service in Primm, Nevada, where the Ivanpah lahor force resided during construction. According to a conversation between Lt. Jeff Hollowell and the Clark County Sheriff's Department, calls for service in Primm, Nevada increased by 30% during the timeframe when the Ivanpah facility was being constructed. Unlike Ivanpah, the HHSEGS project site is surrounded by private land where intermittent squatting and illegal "camping" already sometimes occurs. Given the statements by BSE that the proposed project will be constructed under the terms of a project labor agreement, a fact completely disregarded by Dr. McCann, an increase in the local population during construction is reasonably foreseeable and, as experienced in Primm, a corresponding increase in calls for service will most certainly follow. The statements made in support of the lower demand for police services, the drastically reduced estimates of additional resident deputies, the conclusion that

Comment 107

an additional substation building would be unnecessary, simply don't stand up. Further, using the U.S. Bureau of Justice Statistics national data to estimate the average tenure of sworn officers assigned to the Charleston View area of Inyo County ignores the unique quality of life factors associated with serving long stints assigned to Charleston View. None of the evidence presented in the preliminary staff report raises to the level of validly refuting the locally-based experience and police data presented by Sheriff Lutze.

In continuing support of his estimate of $2,130,966 during construction and annual costs of $1,269,120 in normative dollars, Sheriff Lutze and Lt. Jeff Hollowell have submitted a letter and comments on the Preliminary Staff Assessment (PSA) and the impact analysis authored by Dr. McCann. These comments are attached hereto as Appendix A.

Public Works

The CEC report reduces the one-time construction costs of $8,157,000, presented in writing and testimony by Doug Wilson, the Interim Director of Inyo County's Public Works Department, by $6,944,000, suggesting that the required overlay can be compensated for. Perhaps Mr. McCann was under the mistaken impression that the County proposed a total reconstruction of the road. This is not the case. If the roadway is to sustain the traffic, and Mr. Wilson certainly did not mean one or two trucks, it must be improved with an overlay at about the price estimated by the County. To totally reconstruct the road would cost much more.

The CEC staff report also seems to suggest that Mr. Wilson believes even one truck per day would require an overlay. This is also not the case. What Mr. Wilson has contended, and we believe would be supported by an outside expert on this matter, is that even if 5 percent of the truck traffic were to go west, the overlay would be required. In Mr. Wilson's own words, "If 100% requires an overlay, then it does not follow that 50% requires 50% of an overlay."

Comment 108

If we are reading the report correctly, the estimate of traffic conditions presented is based merely on the BSE statements, which the report argues are confirmed by Doug Wilson's testimony at the May 9 workshop, that "The County was unlikely to incur large costs on Old Spanish Trail west of plant site (CEC 201D)." The report continues that this would only be the case if there were a mechanism in place to assure that traffic does not use that route. Nowhere in the report is there any indication that such a mechanism has been set up by the California Energy Commission, or that funds have been appropriated for Inyo County or a third party to establish such a mechanism. It is therefore necessary that as a condition of certification, BSE, its contractors and subcontractors be required to use that route which does not include the portion of Old Spanish Trail west of the project site and further provide for a per truck fine should the condition be violated.

At the May 9 HHSEGS workshop, speakers familiar with conditions on the relevant section

of the road voiced concern about the possible impact of an accident along Tecopa Road, resulting in the roadway being blocked for a substantial period of time. Such a blockage would prevent residents and emergency vehicles from accessing necessary services in Pahrump and/or Las Vegas, as Tecopa Road and the Old Spanish Trail are the only way in or out to the east. One citizen suggested that BSE pay for the paving of the County road currently being used by mining operations in San Bernardino County as an alternative to the routes vehicles presently intend to use to and from the project.

In the absence the condition noted above, the County believes Mr. Wilson's estimates stand. This most certainly applies as well to the estimate of annual operating cost of $78,500, which the staff report also disputes.

Agricultural **Comment 109**

The Fiscal Impact study prepared by the consultants for the California Energy Commission agrees that, "The costs projected by the Agricultural Commissioner appear consistent with weed management costs for other projects." However, the assessment goes on to argue that applicant is required by the conditions of certification "to develop and implement weed management plans." They contend that, "conditions of certification as described in the Biological Resources section of the HHSEGS PSA requiring HHSEGS to develop and implement a weed management plan, it is expected that additional weed management by the County will not be necessary." (page 19)

The County does not contest this, but feels the CEC doesn't answer the question of who will check on the weed management and take corrective action should that management not be up to the standards of the County Agricultural Commissioner. The increase in activity associated with the construction and operation of the HHSEGS correlates directly with the increase in the threat of weed introduction and a likely increase in the introduction of agricultural pests, not only on the project site but off site, which is not under the jurisdiction or monitoring of the CEC. The County Agricultural Commissioner believes the PSA underestimates the increase in vehicles and related interstate activity. He believes that monitoring and dealing with these threats requires a commensurate response from his office, increasing both demands on staff as well as travel expenses.

Waste Management **Comment 110**

The response to the County's estimate of waste management costs seems superficial at best, concluding that, "At this time, the staff believes that no additional costs will be incurred by the County for this project." As far as we can tell, this belief is based on the fact that housing conditions at Ivanpah were such that no additional waste management costs were induced. Furthermore, it was stated that Ivanpah "is similarly remote." It is our understanding that Ivanpah is very close to Primm, which has a large supply of transient housing with

considerable vacancies available in housing, and infrastructure capable of handling waste generated by additional residents.

Comment 111

As we read it, the position ascribed to the staff in the Socioeconomic and Fiscal Impact Report, authored by Dr. McCann, is that it is just too early to tell whether additional waste disposal services will be required during the construction or operation of the project. If and when the need for such facilities and costs arise as a result of the project, how will the County go about getting a determination that these costs are necessary for health and safety? Secondly, assuming that the need for such facilities is self-evident, who will be judged to be responsible for paying these costs, and how will that judgment be enforced?

Motor Pool

Comment 113

The Inyo County estimate of Motor Pool costs having trips to the area as a result of a broad variety of activities potentially related to the project, with the exception of the Sheriff's office, was $33,200 during the construction period. The report indicated that staff forecast no costs would accrue to the County as a result of people having to drive to the area, even though similar cost estimates have been provided to other projects. The rationale given was, "The Commission is fully responsible for all compliance and inspection during both construction and operation, so the County need not incur any costs to visit the worksite or the operating facility." (page 20) However, the construction of the facility will result in service needs from the County off-the project site and, therefore, outside of the jurisdiction of the Commission. Given the geography of the County, those services will, in most cases, be provided from County offices located in the Owens Valley. As a result, demands on the County's motor pool system will also increase.

Water Department

The May CEC socioeconomic report failed to understand and appreciate the grant funding impacts the County may suffer should the County fail to comply with the mandates of SBX7-6 as a result of the project. Dr. Robert Harrington, Director of the Inyo County Water Department, provided the following detailed explanation to support his cost estimates:

> The State of California enacted legislation in 2009 (SBX7-6, Statutes of 2009, Seventh Extraordinary Session, chaptered as Water Code 10920 et seq.) that requires all groundwater basins and subbasins delineated in *California's Groundwater*, the Department of Water Resources' (DWR) Bulletin 118-2003, to be monitored for seasonal and long-term trends in groundwater elevation. The data collected is required to be reported to DWR who will in turn compile the data in an online system that is accessible to the public. The law identifies numerous entities such as counties, cities, water districts, and groundwater monitoring cooperatives that may

assume responsibility for the monitoring. Notably, state, tribal, and federal agencies are not among the eligible monitoring entities.

Comment 114

To fulfill the requirements of the legislation, DWR initiated the California Statewide Groundwater Elevation Monitoring Program (CASGEM). Participation in CASGEM by local entities is voluntary; however, if no eligible local party volunteers to become the designated monitoring entity, DWR may undertake the groundwater elevation monitoring. If DWR assumes responsibility for the groundwater monitoring, nonparticipating eligible monitoring entities may lose eligibility for water grants and loans awarded or administered by the state. Naturally, Inyo County is concerned about the potential for losing eligibility for these grant funds, and wishes to comply with the requirements of CASGEM. No funding was provided in the legislation for local entities to implement this new state program.

SBX7-6 does not allow for exceptions to its requirement that groundwater elevations be monitored in all groundwater basins. In many remote desert basins in Inyo County, designation as federal wilderness or military uses render it impossible to construct monitoring wells, and additionally, many other basins have no significant groundwater pumping. To address these flaws in the SBX7-6 legislation, in August 2011, legislation passed (AB 1152) amending Water Code Sections 10927, 10932, and 10933, and authorizing that a monitoring entity may report groundwater elevations using specified alternate monitoring techniques for certain groundwater basins and subbasins meeting prescribed conditions. AB 1152 allows that, at DWR's discretion, a monitoring entity may use alternative monitoring techniques to assess whether groundwater conditions in a basin are changing. Alternative monitoring techniques may be approved by DWR if groundwater elevations are unaffected by land use activities or planned land use activities.

Comment 115

Approval of HHSEGS will invalidate any argument by Inyo County that the California portion of Pahrump Valley, California Valley, and Middle Amargosa Valley are unaffected by land use activities; therefore, the County will be required to either develop a program for reporting groundwater elevations to DWR, or be ineligible for state water grants and loans. In order to comply with CASGEM requirements, the County could use the groundwater elevation monitoring data proposed in condition of certification Water Supply – 6 and Water Supply – 8 if those data are made available to the County. To that end, we request that the conditions of certification be modified to require that:

1) Groundwater elevations reported as part of this project should be provided to the County with the understanding that the County may report those data to DWR as part of the CASGEM program. These data would be publically available through the CASGEM program.

2) Groundwater elevations should be monitored throughout the duration of the project. Specifically, Water Supply – 6.C.4 and Water Supply – 8.C.5 should be modified to require that groundwater elevation monitoring and reporting continue for the duration of the project. Monitoring should be done at least twice each year.

For the reasons outlined by Dr. Harrington, above, the estimated impacts to the County Water Department under SBX7-6 are appropriately included and justified.

Reaction to Impact Report's Discussions of Changes in Indirect County Expenditures

The comments made by the Socioeconomic and Fiscal Impact Report in Section 5.2, under the heading "Changes in Indirect County Expenditures," seem gratuitous at best. The section starts off by stating, "The solar project could result in changes to local governmental expenses, primarily in two ways. The first is increased spending induced by increased population. The second is decreased spending caused by improved socioeconomic conditions." In the following paragraph, they argue, we believe correctly, that "The applicant's plans to employ up to 1,033 workers during the peak construction period should have a negligible effect on the County's current population of 18,546, and labor force of 9,550." (page 20)

The report goes on to indicate that a majority of the workers will reside in neighboring counties. This is true, but hardly relevant, because the indirect costs of the project are not primarily induced by increases in population, but in all of the many governmental activities required to deal with issues that would not exist without the proposed project. As the Commission well knows, the costs of dealing with the application itself and responding to a variety of relevant documents, such as the Socioeconomic and Fiscal Report that is the subject of these comments, has taken a significant amount of staff and consulting time, and the monitoring of activities in the project and services to it will continue to do so after the construction starts and the project becomes operational.

A quick look at the CEC report's own estimates (see Tables 4.1 and 4.2, page 11) indicates that increase in local jobs and earnings are relatively small during the construction period, and insignificant during the 25 years of operation. Thus, while in many situations we can see where the generalizations about the indirect benefits to the local economy may outweigh the indirect costs of the project, that generalization cannot be shown to apply to the effect of the proposed solar project on Inyo County's governmental activities.

Appendix A

Response from Sheriff's Department

Date: June 14, 2012

To: Dana Crom, Deputy County Counsel

From: Sheriff William Lutze

RE: Response to Hidden Hills Project

Dana,

My staff and I have reviewed the Bechtel Security Plan, Dr. McCann's report, and the PSA.

There are a variety of issues and concerns, as detailed in Lt. Jeff Hollowell's document (attached). The Hidden Hills Project documents make many assumptions, that in some cases are not based on facts, and others simply cannot be done by law. The report, on several occasions, makes reference to other sites that are managed by Bright Source. Quite frankly, as I have stated in several meetings, the other sites are not in Inyo County; and although they are a reference, as Sheriff I have a responsibility to serve the people and protect the property within Inyo County. Law enforcement is a specialized field and there are many factors to consider when reviewing this type of impact to the area that I am responsible for.

After reviewing the Hidden Hills Project documents I have determined that as presented they have not addressed the issues regarding law enforcement and emergency services; and I remain with my original plan as presented to ensure that adequate services will be provided.

Sincerely,

William R. Lutze, Sheriff

Attachment: Staff report by Lt. Jeff Hollowell

Sheriff Lutze,

I have reviewed the Bechtel Security Plan, Dr. McCann's Report and the PSA. There are several glaring issues that I'd like to address:

Site Security Plan:

1. The plan calls for one ingress/egress point to be manned 24/7 by a security guard with various duties related to the gate and parking areas. There is no mention in the security plan of what the security guard's responsibilities are if either a conflict, theft, or other criminal issue arises in regard to contacting law enforcement.
2. The plan calls for an 8-foot chain link security fence; however, it does not mention any cameras, sensors, security lighting or roving patrols. The plan does mention inner fencing around structures, but again, no other security components mentioned.
3. The plan states the security firm has a right to search any vehicles, persons or personal equipment; and if contraband is located they will notify law enforcement if deemed appropriate by the "company". Clarification is needed.
4. They have an extensive section on "bomb threats", most likely due to homeland security concerns. As for their responsibilities regarding bombs, according to the current plan, the Site Manager is to come up with a strategy for responding to a bomb threat with the assistance of the Manager of Security out of the San Francisco office; and as for notifications, the plan states the Site Manager is to report any bomb threats to the Construction manager, Project manager and other appropriate management personnel. It does not say if or when law enforcement will be notified. This plan as written is not acceptable.
5. The security plan provided is for "construction phase" only and does not address the operational phase of the project.
6. The plan does not indicate the size of the "security force"
7. Based on the Security plan, we are at the same figures as originally proposed to the County for fiscal impacts.

Dr. McCann's Report:

1. Dr. McCann's report underestimates the responsibilities of the Sheriff's Department. Perhaps Dr. McCann is not familiar with the duties and responsibilities of the Sheriff?
2. The report assumes there will be sufficient security at the site, thereby diminishing the responsibility of the Sheriff.
3. The report further assumes there will be no project labor agreement (PLA). If there isn't one, their assumptions may be close as to workforce, housing, waste management and taxable income. If there is one, the workforce will come from California first and only after that fill from Nevada. Having said that, if the

workforce comes from California the transient occupancy within the County of Inyo would be far more than their anticipated six (existing) people. As you stated in Sacramento, we believe people will not want to stay in Nevada Hotels when they can camp, rent or just stay somewhere close to the worksite. This creates a larger demand on emergency response needs.

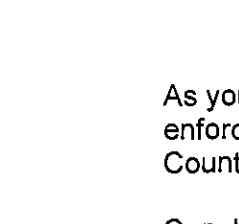
4. On Page 10 of the report, Dr. McCann states "..of the 18,589 construction personnel employed...." I have not seen that figure before.
5. On Page 12 Dr. McCann states that we will have only two to three additional calls a year for fire and police. I believe he is basing this assumption on Bright Sources' belief that they can contract with Nevada for law enforcement (due to 50 mile radius for mutual aid) and EMS. As has been stated before on several occasions, this can't happen.
6. On Page 13 Dr. McCann states that the primary burden the solar project places on police services is the need for additional patrols to prevent and investigate crimes against property. It further states their security devices (fence and gate guard) and appropriate facility design may minimize this need. We don't know what that is as it has not been outlined in the security plan or agreed to.
7. Dr. McCann's report indicates the County would also benefit from sales tax as employees will be spending their disposable income on food, appliances and clothing locally. Not in the area.
8. Dr. McCann's report states SBCSD calls for service have not increased due to the generating plants located there. I have placed a call to SBCSD and anticipate a response soon from them regarding calls for service at their multiple plants.

Preliminary Staff Assessment (PSA):

1. The PSA does not address the issues and fiscal impacts on the Sheriff's Department and eludes to the security plan may mitigating or removing impacts on the Sheriff's Department.
2. It further leaves the impression that Nye County Nevada law enforcement and EMS services are under contract with us, therefore allowing them to handle emergency calls within our county. Law Enforcement of any kind cannot by law be contracted.
3. ICEMA has a mutual aid agreement with Pahrump, but they will not allow them to contractually enter into agreement with Bright Source and provide medical services unless under mutual aid.

As you can see there are many assumptions and miss-information regarding law enforcement's role in this project. As soon as I receive the stats from San Bernardino County I will forward them to you.

Conclusion:



Based on the findings of the PSA, Dr. McCann's report and the security plan provided by Bechtel, I wouldn't change any of our responses to the CEC. Their security plan is a band-aid on what would be necessary for a 2.9 billion dollar project, especially one that will become a target of potential terrorist strikes, thefts and vandalism; as well as our responsibilities to the work force and infrastructure with regard to Emergency Service and the citizens living in the area.

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

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Comments on the Preliminary Staff Assessment of the BrightSource Hidden Hills Solar Energy Generating System

JUL 16 2012

In Reference Reply to:
2801 (LLNV930)

Comment 1

Mr. Mike Monasmith
Project Manager
Siting, Transmission and Environmental Protection (STEP) Division
California Energy Commission
1516 Ninth Street, MS-2000
Sacramento, California 95814

Dear Mr. Monasmith:

This letter transmits the water-related concerns of the California and Nevada offices of the Bureau of Land Management (BLM) resulting from our review of the California Energy Commission's (CEC's) Preliminary Staff Assessment (PSA) of the Hidden Hills Solar Electric Generating System (HHSEGS). Our comments are part of our on-going effort to minimize or mitigate for impacts to BLM water-dependent public trust resources in Nevada and California.

The Nevada BLM is analyzing an associated right-of-way (ROW) application for a transmission line and a gas pipeline in Nevada, together called the Hidden Valley Electric Transmission Line (HVETL) Project, that will provide grid connection and natural gas for the HHSEGS located on private land just over the California state border.

The BLM understands that HHSEGSs would require up to 140 acre-feet per year (afy) of water, pumped from the Pahrump Valley groundwater basin. As stated in an earlier letter, the BLM is concerned that pumping from this water source, combined with cumulative impacts of other pumping, may cause impacts to the Amargosa Wild and Scenic River (W&SR) located in California, and to the Stump Spring Area of Critical Environmental Concern (ACEC) located in Pahrump Valley, Nevada.

The following items are concerns raised by BLM staff during review of the CEC's PSA and the public hearing that occurred on June 14, 2012 in Pahrump, Nevada.

Cumulative Effects:
The cumulative effects analysis should take into account all proposed development within the groundwater basin, including potential agricultural pumping as discussed at the June 14 meeting. Staff at the Pahrump and Barstow Field Offices can provide lists of all pending proposals on BLM land within their respective districts.

Biological Resources:
Condition of certification BIO-23 would require the applicant to conduct vegetation monitoring within groundwater-dependent vegetation communities located east of the project, including those within the BLM Stump Spring ACEC. The dual purpose of such monitoring would be to determine changes to biological resources and to distinguish project effects from background effects or a regional drought. A statistically significant change in biological resources is defined as a "decline in vegetation health of any groundwater-dependent species of 20 percent or more as compared to baseline values and values from offsite reference plots" (page 4.2-234). While the BLM supports this measure, additional clarification is needed to define what is meant by a 20 percent decline in vegetation health.

Soils and Surface Water:
An assumption is made in Table 6 (page 4.10-12) of the PSA that there will be negligible soil disturbance throughout the heliostat fields. Soil disturbance is a direct result of the installation of solar cells or mirrors and, to date, all technologies require some level of disturbance. Ground disturbance can occur even in relatively level areas. See attached Figure 1, where the ground surface in ISEGS disturbed heliostat fields differs markedly in appearance compared to adjacent undisturbed areas.

The applicant proposes to use the western perimeter roadway as a berm that would impound water into a retention basin, flooding a portion of the heliostat field during a 100-year storm event (PSA Figure 7). As the PSA points out, during such a storm event this berm would be insufficient to prevent flow across the roadway. Neither the applicant's plan of development nor the PSA's proposed SOILS-5 condition of certification address the possibility that flow across the roadway may cause this berm to fail, nor do they address any potential impacts of the resulting offsite flooding and scour. In particular, SOILS-5 does not require the berm to be stabilized with riprap, gunnite, or similar material that would prevent piping around the 18-inch culvert that would be the sole drainage point. Armoring of key points in this berm will be necessary to minimize risk to offsite soil resources. Alternatively, the applicant may choose not to install a berm along the western perimeter and simply allow floodwaters to pass through the heliostat field unimpaired, although this may result in heliostats being damaged or washed away.

Water Supply:
The applicant has performed an on-site well pump test, which lasted 4.5 days. We fully support the PSA's pump test review (Appendix A), which questions the assumptions, procedures, and conclusions of the applicant's pump test report. We recommend that another pump test be performed, lasting at least one week. This new pump test, combined with curve fitting for determination of the rate of drawdown stabilization at the monitoring wells, would better determine whether there is a direct link between the alluvial aquifer and the underlying carbonate aquifer. This information would help estimate the degree to which pumping may affect water resources to the east and west of the project, as well as the timing of such impacts. To get the best estimation of key subsurface parameters and impacts, it would be important for at least two of the monitoring wells to penetrate the carbonate aquifer. As shown in Figure 4 of Section 4.15 in the PSA, there are locations close to the project area where the carbonate aquifer is at or near ground surface.

Comment 5

Comment 4

Comment 3

The lack of any physical logs for any onsite or nearby wells impedes the ability to draw clear conclusions as to aquifer parameters and the impact of pumping on the aquifer. If well logs are available, the applicant should utilize them to validate its conclusions regarding the impact of pumping on groundwater. At least some of the monitoring wells should be screened in the same stratigraphic interval as the pumping well. Actual physical data from well logs rather than assumed values for aquifer parameters is critical for analyzing pump test results, and for using these results to construct a conceptual model of local and regional groundwater flow and the impacts of the HHSEGS project on this flow. If any of the above data reveal that the initial pump test conclusions were incorrect, the water supply and mitigation plans may need to be revised.

The BLM supports implementation of condition of certification WATER SUPPLY-1, which would require the applicant to replace all extracted groundwater. This is similar to a mitigation measure being developed by California BLM in discussion with the developer of the Desert Harvest solar project in the Chuckwalla Valley, as well as future developers in that basin. Unlike the Desert Harvest mitigation, however, the PSA recommendation is to require BrightSource to simply replace the extracted water at some point during the 30-year life of the project. At least some of this replacement should be required to occur early in the life of the project. Reinforcing this need is the existence of large ground cracks approximately 4 miles north of the HHSEGS site, which appear to be subsidence cracks caused by groundwater extraction in the area (see attached Figure 2); these features suggest that the basin is already experiencing an irreparable loss of storativity by diminishing local groundwater aquifers.

The groundwater monitoring network suggested by the CEC will be more robust if the number of monitoring wells is increased. The hydrologists for the BLM's Southern Nevada District and California Desert District recommend a groundwater monitoring system that would differentiate project impacts from other impacts such as climate change and other groundwater pumping within the basin. Item A1 of condition of certification WATER-SUPPLY-8 would require a monitoring network of ten wells, but only three of these would be outside the project boundary. We recommend that additional wells be included in the monitoring network. East of the project site on Nevada BLM land, we suggest five additional monitoring wells to supplement the CEC-proposed wells. Specifically, the BLM suggests two additional wells directly up-gradient from Power Block 1 and two additional wells directly up-gradient from Power Block 2 to supplement CEC-identified BLM Mesquite Bosque Wells 1 and 2, respectively. These wells should be placed at regular intervals 0.5 to 1.5 miles from the project boundary. One additional well should be installed east of the Stump Spring ACEC so as to help differentiate any drawdown east of the ACEC, for example drawdown extending from the proposed BrightSource Sandy Valley SEGS project, from drawdown emanating from the HHSEGS site. If any drawdown is measured over time at the Mesquite Bosque Wells, monitoring wells placed in the configuration described above should provide adequate information to determine whether this drawdown is originating from the project site or is due to other factors identified above.

Condition of certification WATER-SUPPLY-8 recommends only one well to the west of the project, between 2 and 3 miles from the project boundary; this well would be on the far side of an inferred fault (Figure 13 of the PSA), which may delay drawdown at that well. The BLM recommends four additional wells; like the wells recommended above, one would be placed at

Comment 8

Comment 7

regular intervals up to two miles west of the project boundary. As stated above, it is imperative that the best estimates of the degree and timing of any potential impacts of the project on the Amargosa River be determined and mitigated for prior to approval of the project.

The BLM supports items C3 and C4 of WATER-SUPPLY-8, which would require the project owner to "substantially reduce, modify, or stop project pumping" if impacts are seen either at the eastern project boundary or at either of the BLM Mesquite Bosque Wells. However, these two items require pumping to cease only if the water table at the BLM Mesquite Bosque Wells drops 0.5 feet (that is, 0.5 feet below the level predicted by current trends) ***and*** plant vigor drops below the threshold set in BIO-23. We recommend a more rigorous and protective set of trigger requirements. First, we recommend that drawdown triggers also be determined for other wells closer to the project, the locations of which are discussed above. These trigger depths would be graduated based on the expected drawdown at these wells that would correlate to an 0.5-foot drawdown at the Mesquite Bosque Wells, based on results of the additional pump test and curve-fitting procedure discussed above. Second, we recommend that pumping be immediately curtailed or ceased if any of these drawdown triggers are crossed, regardless of whether impacts appear in the vegetation. By the time vegetation is noticeably affected, it may be too late for pumping curtailment to save these bosques.

The BLM appreciates having the opportunity to provide comments on the HHSEGS project. If you have any questions please contact Sarah Peterson, Nevada State Lead for Soil, Water, Air & Riparian programs at 775-861-6516; Dr. Boris Poff, District Hydrologist for the Southern Nevada District office at 702-515-5154; Peter Godfrey, Hydrologist, California Desert District, at 951-697-5385; or Dr. Noel Ludwig, Hydrologist, California Desert District, at 951-697-5368.

Sincerely,

James G. Kenna
California State Director

Amy Lueders
Nevada State Director

cc:
Mary Jo Rugwell, District Manager, Southern Nevada District Office
Erika Schumacher, Acting Field Manager, Pahrump Field Office
Bob Ross, Field Manager, Las Vegas Field Office
Teresa A. Raml, District Manager, California Desert District
William Quillman, Acting Field Manager, Barstow Field Office

Comment 11

Comment 10

The view of the entire project as seen from the top of the Unit #1 tower, with Unit #2 (left) and Unit #3 (center) in the distance.

Figure 1. Oblique view of Ivanpah Solar Energy Generating System construction, showing disturbance within heliostat fields.

Figure 2. Large ground cracks located approximately 4 miles north of the HHSEGS site.

United States Department of the Interior

NATIONAL PARK SERVICE
National Trails –Intermountain Region
P.O. Box 728
Santa Fe, New Mexico 87504-0728

IN REPLY REFER TO:
NPS-NTIR Hidden Hills Solar Energy Generating Station Comments

July 23, 2012

Mr. Mike Monasmith
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814-5512

Dear Mr. Monasmith:

Please accept the following comments from the National Park Service National Trails Intermountain Region office regarding the Hidden Hills Solar Energy Generating Station Application for Certification.

Thank you,

Michael L. Elliott
Cultural Resources Specialist

Introduction

The National Park Service National Trails Intermountain Region office in Santa Fe, New Mexico co-administers the Old Spanish National Historic Trail (NHT) with the Bureau of Land Management. Our office has reviewed documents and other material associated with the proposed Hidden Hills Solar Energy Generating Station (HHSEGS) project in the Pahrump Valley in California on the Nevada border. The project as proposed will consist of two 750-foot tall power tower concentrating solar collectors surrounded by thousands of heliostat mirrors over about 3,277 acres of private land in the Pahrump Valley at the California-Nevada border. The California Energy Commission is reviewing the application from the project proponent since the project area is on private land. We have been on the mailing list from the Commission for some time, and have received the updates from the proponent, the staff

assessments, and through agreement with the Commission, the cultural resources inventory and associated documents for review. We are concerned about the effects of the project on the cultural corridor that constitutes the Old Spanish NHT. The Old Spanish NHT is not just a line on the ground. It is a corridor of varying width that may not contain visible archaeological features. Moreover, the cultural resources investigations conducted for the project do not appear adequate in terms of level of effort, methodology, or assumptions to assess adequately the impacts of the project. Even given the limitations of the cultural resources work, it appears to us that there will be significant impacts to the Old Spanish NHT setting and possibly features. We believe that the results of our review, as documented below, justify our conclusions.

The Cultural Resources Investigations

The Cultural Resources Technical Report

Comment 1

The body of the report itself is very brief, containing only about 50 pages of text (most of the pages are not numbered), with attached appendices containing maps, site forms, isolate descriptions, consultation letters, and a few photos. Fifty pages do not seem adequate to discuss the results of a 3,499 acre survey, particularly when much of the material is boilerplate cultural resources background material. We request that the report be greatly expanded to cover all aspects of the project area in greater detail, particularly in regard to Old Spanish NHT resources.

The area surveyed for this report has been inadequately defined to encompass just slightly more than the actual lease area. Impacts from this project will extend far beyond the lease boundaries. The pair of 750-foot tall towers will be highly visible from as far away as 20 miles. Within five miles, the towers will loom over the currently nearly uncluttered landscape. We request that cultural resources inventory be expanded by at least five miles in all directions from the lease boundaries to include potential impacts from associated activities, visual impacts to National and State Register eligible sites, and all impacts to the nationally significant Old Spanish National Historic Trail.

Comment 2

The preparers do not specify the number of hours they spent in the field. It appears that the survey occurred over a period of about 19 field days. The number of people working each of those days is not identified. We ask that the total number of person-hours spent in the various phases of the project (background research, field work, report preparation) be specified so that we can evaluate the level of effort, intensity, adequacy of the work.

Comment 3

Comment 4

The preparers did not really describe their goals for the survey, or interpret their results in terms of archaeological or historical implications. They describe walking transects at a 10-15 meter interval. While these are standard transect intervals for general archaeological surveys, they are not adequate to identify subtle trail features that may be just a meter wide. We request that when additional on the ground survey is conducted, that it be conducted at an intensive survey interval of 3 meters or less.

The references cited do not include many important Old Spanish Trail references, including the National Park Service's feasibility study (2001), Elizabeth Warren's thesis on the Armijo Route (1974), Leroy and

Comment 5

Comment 5, cont'd

Ann Hafen's standard Old Spanish Trail reference (1954), and Hal Steiner's book on the Mojave Road section of the trail (1999). These should be incorporated into the report and discussed.

Historic Trails and Roads Technical Report

Comment 6

The project proponent and their cultural resources contractor prepared a specific study related to historic trails and roads in response to CEC staff information requests. This report shares some of the same shortcomings as the more generic cultural resources inventory report. The contractor primarily conducted a narrowly defined remote sensing study. They did not conduct additional field survey, only reconnaissance and reanalysis of "pre-existing data" (p. 3-1). Our chief argument with the findings of this report are that they clearly state that they did not consider the presence of segments of the Old Spanish NHT that are neither visible on the ground nor in satellite imagery. The further state that "The principal criterion selected for the identification of potentially historic roads and trails within 1 mile of the PAA has an archaeological foundation: In order to be included in this inventory the road or trail *must be identifiable on the ground* (emphasis added by authors, p. 3-2). This statement dooms the utility of this study in our opinion. Cultural resources include more than just tangible archaeological features or artifacts. Cultural landscapes, traditional cultural properties, and historic trails are all examples of such resources.

It is our contention that segments of the Old Spanish NHT may well lie within the project survey area, and certainly lie within the area of potential visual impacts of the project. The Old Spanish Trail Association has been working in the vicinity for years, and has identified possible traces of the trail that they documented as intervenors on this project. These may or not be visible using the methods employed by contractor, however, that does not mean they are not there and are not potentially detectable by finer-grained remote sensing techniques such as lidar, ground-penetrating radar, magnetometry/gradiometry, metal detecting, or electrical resistivity studies. Moreover, the presence of on-the-ground features is not required for eligibility of a property under National Register Criterion A.

Comment 7

The contractor also did not consider recent roads as later manifestations of older trail corridors if they did not appear on old maps. We believe this is an artificial distinction. We administer thousands of miles of National Historic Trails that lie under current roadways or railroads. Old maps often do not show old trails or road accurately.

Comment 8

The study actually identified several historic trails or roads that they did not investigate further and which may be part of the Old Spanish NHT. These resources may be eligible and will almost certainly be subject to adverse setting impacts if the HHSEGS is built. This is why we request survey of a much larger area. We do not agree with the contractor's recommendations eligibility recommendations.

Comment 9

On a positive note, we did see the standard Old Spanish Trail references missing from the original survey report in the bibliography for this report.

The Staff Assessment

We have reviewed the supplemental CEC staff cultural resources assessment. We think the staff did an excellent job in evaluating the impacts of the HHSEGS on cultural resources, including the Old Spanish NHT. The staff assessment was over 100 pages in length. The summary of their assessment of impacts to the Old Spanish NHT was: "At least one historical built-environment resource, the Old Spanish Trail-Mormon Road, has been identified in the HHSEGS PAA thus far. Substantial information, including the National Register of Historic Places nomination of the Nevada segments of the Old Spanish Trail, has led staff to conclude that, within the PAA, this resource is not represented by a single route, but as a corridor of converging and intermingled tracks and trails. The project site is located within this corridor, with traces running throughout the project site. Staff has concluded that that the impacts of the proposed HHSGS project to this Old Spanish Trail-Mormon Road Northern Corridor (Corridor) would be significant and, even with full implementation of [*mitigation measures*] CUL-9 and CUL-12, would not be mitigated to a less than significant level." We agree with these findings.

Conclusions

Many historic sites exhibit no currently visible surface archaeological manifestations. These include trails, battle sites, cultural water routes, traditional cultural properties, cultural landscapes, shipwrecks, treaty trees, and others. All these sites can have great historical significance, often under Criterion A, so the question of their eligibility revolves around integrity. The seven aspects of integrity are location, design, setting, feeling, association, materials, and workmanship. With no tangible surface remains, non-feature sites must exhibit a high degree of integrity in location, setting, feeling, and location. Any undertaking that diminishes the integrity of a property along any of these aspects must be considered an adverse effect.

The National Register Bulletin 15 states: "All properties change over time. It is not necessary for a property to retain all its historic physical features or characteristics. The property must retain, however, the essential physical features that enable it to convey its historic identity. The essential physical features are those features that define both *why* a property is significant (Applicable Criteria and Areas of Significance) and *when* it was significant (Periods of Significance)."

Designation of a National Historic Trail is a rigorous process. The National Park Service conducted exhaustive research—both documentary and in the field—to document the significance, integrity, and location of the Old Spanish NHT as part of the feasibility study for its designation. The language of the National Trails System Act of 1968 (as amended) states: (To be designated as a National Historic Trail…) "It must be a trail or route established by historic use and must be historically significant as a result of that use. The route need not currently exist as a discernible trail to qualify, but its location must be sufficiently known to permit evaluation of public recreation and historical interest potential." The trail was determined to be nationally significant (NPS 2001:23) in terms of National Historic Trail criteria—a much more restrictive standard than National Register evaluation. Congress agreed, designating the Old Spanish NHT in 2002.

Comment 10

The Old Spanish NHT is a nationally significant cultural and historic resource. We do not believe that the nature and extent of the impacts of this project on the Old Spanish NHT have been adequately documented and evaluated because of the limited extent of the cultural resources investigations. But even given these limitations, it is reasonable and foreseeable to assume that the direct, indirect, and cumulative impacts from this project and associated activities upon the trail will be great.

For all of these reasons, it is our professional opinion that the Old Spanish National Historic Trail is present in the area of potential effects for the HHSEGS, that it has been proven to be significant, and that the project will adversely affect trail resources and the setting of the trail, and destroy its association, feeling, and location. We do not believe that these effects can be mitigated. We ask that the application for certification as currently configured be rejected in this location. Thank you for considering our comments. The National Park Service National Trails Intermountain Region office stands ready to consult with the project proponent and agency officials to choose a different and less damaging location, or a revised project with shorter and less visible towers.

Comment 11

The Nature Conservancy
Protecting nature. Preserving life.™

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Tel (213) 327-0104

nature.org

Mr. Mike Monasmith
Senior Project Manager
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814-5512

Subject: Hidden Hills Solar Energy Generating System
California Energy Commission Preliminary Staff Assessment
Comments by The Nature Conservancy on Water Supply Assessment

Dear Mr. Monasmith,

The Nature Conservancy is a worldwide conservation organization devoted to conserving the lands and waters on which all life depends. To help reduce adverse effects of impending climate change and meet the State of California's Renewable Portfolio Standard, The Nature Conservancy supports significantly increasing renewable energy generation and transmission. We believe that we can both meet the state's goals for renewable energy production and protect desert species, communities, and ecosystems.

Our organization has been directly involved in the federal and state solar development siting and environmental review processes. The Nature Conservancy's role has focused on encouraging siting of large solar facilities in locations that are both economically sound and compatible with retaining the desert's vital ecological resources, including groundwater that supplies critical imperiled desert springs and wetlands.

Since the early 1970's, The Nature Conservancy has pursued conservation of the uniquely rich and fragile aquatic and riparian systems in the bi-state Amargosa basin. This region is home to more endemic, rare and listed species than any other area of similar size in the continental U.S. It depends almost entirely on perennial groundwater flow to support both its natural and human communities. Protection of groundwater resources is thus the paramount concern for The Nature Conservancy --as well as for federal and state resource agencies and local residents.

The proposed Hidden Hills Solar Energy Generating System (HHSEGS) plants propose to pump groundwater from aquifers in Pahrump Valley, within the Death Valley regional groundwater flow system. We commend Bright Source for employing dry cooling technology and otherwise agreeing to reduce water use to low levels, an especially significant effort, given the amount of power that will be produced by the planned Hidden Hills plants. However, additional pumping, even of small amounts of groundwater, from already stressed desert groundwater basins

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such as the Pahrump Valley Groundwater Basin (PVGB), where the HHSEGS site is located, can lower critical groundwater levels and adversely affect springs, seeps and wetlands, protected species, as well as other water dependent resources and domestic and municipal water supplies in the area. Reductions of even a foot in groundwater levels, for example, can cause losses and severe declines of aquatic and riparian species such as spring snails, voles, and desert fishes found nowhere else in the world[1].

The Pahrump Valley alluvial and deeper carbonate aquifers are nested within the Death Valley regional groundwater flow system. These aquifers supply water to local springs, mesquite woodlands and other groundwater dependent vegetation, as well as local residential wells. These aquifers are also thought to be linked to, and, after an uncertain transit time, to supply water to the Amargosa River and its vital spring tributaries in the Tecopa and Shoshone California area[2].

The hydrogeology in this portion of the Death Valley regional flow system is not well known. The US Geological Survey (USGS) has done the most extensive work in the region. USGS has constructed a regional groundwater flow model that, based on limited data for this southern portion of the flow system, predicts that precipitation high in the Spring Mountains in Nevada enters the groundwater system there and flows southwest as groundwater into California, beneath and through the Pahrump Basin, under the Nopah Range, and eventually makes its way into the Wild and Scenic Amargosa River and its stream, spring and seep tributaries. The California Energy Commission (CEC) Preliminary Staff Assessment (PSA) Water Supply (WS) analysis references this understanding stating that, based on local gradients, "the basin-fill in Pahrump discharges through most of the Nopah Range." PSA WS at 4.15-11.

However, because the hydrogeology in this portion of the Amargosa is particularly complex and poorly understood, a collaboration between the USGS, the Bureau of Land Management (in both California and Nevada), Inyo County (prospectively), The Nature Conservancy, and the Amargosa Conservancy is funding a series of studies to probe and then model, in fine scale, the subsurface natural "plumbing" of this portion of the Death Valley flow system. These studies are ongoing, and are not yet fully funded. Final results are approximately five years away[3].

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[1] The Devil's Hole pupfish, while a unique example, demonstrates that water level declines of even inches can cause significant negative impacts to protected species.

[2] The CEC PSA water supply analysis agrees that HHSEGS proposed pumping and the Amargosa system are linked, but discounts the effects of the pumping based on hypotheses about time and distance. We believe the effects cannot be so dismissed (see Attachment 1), and we propose below reasons why this linkage is important and steps to ensure that adverse effects on the Amargosa River and its rich ecological communities will not occur.

[3] A proposed program of studies has been prepared by the USGS and is available from that agency's Henderson, NV office. The goal is to develop an adequate understanding of the hydrology and populate a fine-scale groundwater flow model that can be used to predict the effects of pumping and other stresses on the system.

The HHSEGS applicant proposes to drill six new wells within the project's boundaries. These wells would be drilled into the Pahrump Valley alluvial aquifer to depths and in locations not yet finally specified. The wells would be used to extract a total of 288 acre feet of water per year during an approximate three year (29 month) construction period, followed by 140 acre feet per year during an assumed 30 year initial operating life. [4]

The CEC's PSA water supply analysis concludes that three conditions require mitigation to address the likely adverse effects of HHSEGS groundwater use, and proposes monitoring and mitigation requirements to compensate for the 1) exacerbation of overdraft conditions in the Pahrump Valley Groundwater Basin, 2) water level declines potentially affecting the Stump Springs BLM ACEC and other groundwater-dependent vegetation, and 3) lowering of water levels in local domestic wells. While the PSA rejects compensation for effects on the Amargosa River and its tributaries, the PSA WS would require a single offsite monitoring well in the direction of the Nopah Range and California Valley to detect future effects on the Amargosa.

The effects of the proposed HHSEGS pumping on local as well as regional groundwater dependent resources are remarkably indeterminate, and predictions of long term effects exceedingly unreliable. The applicant asserts, based on a truncated 4½ day aquifer performance test (APT, or pump test) and the use of a simplified groundwater model that HHSEGS groundwater pumping will not cause significant effects beyond the boundaries of the project site over 30 years. [5]

The CEC PSA critically reviewed the applicant's conclusions based on the abbreviated pump test (Water Supply Assessment, Appendix A). The Nature Conservancy also contracted for a summary review of that test, the applicant's model and the CEC PSA water supply analysis by an independent hydrological consultant, Johnson Wright, Inc., This review is included as Attachment 1. The Johnson Wright analysis questions the validity of the applicant's conclusions based on the test and modeling results. The admitted deficiencies in the applicant's groundwater model and aquifer test dramatically underscore the nearly total absence of data and consequent lack of science-based understanding of what

[4] The applicant's power tower technology uses much less groundwater than parabolic mirror facilities, but more than photovoltaic facilities generating equivalent amounts of electrical energy.

[5] Two other prior pump tests were conducted that resulted in widely varying transmissivity values. Raw data from those tests were not made available, nor, based on confidentialty issues, were well logs from the limited number of local wells that CEC staff and applicant may have used their analyses. Applicant apparently made limited use of these two previous pump tests, and it is difficult to determine the extent to which publicly unavailable well log or water level data was used by the CEC or Applicant. We believe that any reliance on undisclosed or unavailable information is inappropriate in reaching conclusions about the effects of groundwater use.

direction and how far and fast the HHSEGS pumping cone of depression will propagate and how the withdrawals will affect the regional water balance.[6]

The Johnson Wright review included consideration of the PSA Water Supply analysis and the most recent presentation by CardnoEntrix on behalf of Applicant at the June 14th workshop in Pahrump. That review emphasizes that the CardnoEntrix and CEC PSA conclusions on the effects of proposed groundwater pumping based on such limited information are clearly not warranted.

The PSA correctly notes that the proposed HHSEGS pumping would represent a relatively modest fraction of existing groundwater extraction from the Pahrump Valley Groundwater Basin, and a quite small fraction of outstanding water rights in the basin in Nevada.[7] However, pumping from the basin exceeded sustainable levels for decades, and water levels recorded in wells across the entire Pahrump Valley Basin already show a sustained decline over recent decades.

Beyond the ongoing regional water level declines, other factors make the HHSEGS pumping significant from an ecological and groundwater mitigation perspective:

- The HHSEGS is only the first of a series of likely solar facilities that would be dependent on pumping groundwater from the basin—including another pending application by Bright Source for a power tower plant named Sandy Valley, but actually located in the southern Pahrump Basin.
- Unlike agricultural water use, solar water use is "hard"— in the sense that all of the water will be consumptively and steadily used, very likely for periods of many decades, perhaps centuries, beyond the initial 30 year operations window.
- While there has been considerable pumping from the northern Pahrump Valley basin in Nevada, there have apparently been only a handful of wells drilled and modest quantities of water extracted from aquifers in the

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[6] As Applicant's groundwater expert report observes: "Typically, several hydraulic aquifer coefficients and parameters are required when creating a groundwater model. These parameters include transmissivity, storage, specific yield, boundary conditions such as leakance, aquifer thickness, recharge, and depth of the pumping wells. For this site only an approximate measurement of transmissivity is available. This lack of detailed aquifer property information constrains the modeling approach that can be employed to only a simplified model package that assumes homogeneous aquifer properties." HHSEGS AFC , Appendix 5-15G at 3.0.

[7] The project will average 167 acre feet per year, including the construction period pumping. Estimated pumping from the basin is 13,000+/- acre feet year. Outstanding water rights in the basin in Nevada , including rights that attached to approved but unbuilt residential lots, probably exceeds 70,000 acre feet.

southern portion of the basin in either California or Nevada[8], accordingly, information about the effects of pumping on ecological resources and other water users in this relatively undeveloped portion of basin is notably sparse.

- Finally, pumping to support solar development is a new use of groundwater, and, as such, is subject to limitations based on the priority of the Amargosa Wild and Scenic River designation.

The Nature Conservancy believes there is justification for considering water use by this facility as essentially permanent; as a result, we recommend analyzing the effects of project pumping over a much longer period. The PSA analysis does not adequately take into account potential long-term consequences of the HHSEGS pumping and that of other cumulative groundwater uses in the Pahrump Valley[9]. We believe that the PSA analysis should be extended using assumptions that the HHSEGS pumping will be continued for at least [illegible] that effects will propagate over 200 years or more, and that the effects of additional PVGB groundwater pumpers, including, but not limited to, the facilities listed in the PSA, should be added to the analysis to provide better approximation of the cumulative effects of this facility's pumping combined with that of other reasonably probable water users.

Comment 1

Comment 2

This analysis of longer-term impacts is critical and justified because adverse effects from groundwater withdrawal can take a very long time to propagate through to distant springs and water dependent resources, even following the cessation of pumping. By the time effects are noticed through monitoring, it is often far too late to restore the health of these resources. [10]

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[8] The PSAWS analysis of effects is in fact based upon bifurcating the PVG Basin into north and south sub basins. WS at 4.15-11 et seq. As noted, water levels in the entire basin have been in decline for decades, with decline rates in the southern portion slower than in the north (~.25 ft/yr/ vs ~1 ft/yr), where agricultural pumping and residential wells have been concentrated.

[9] Note that in the EIS analysis of the effects of pumping by the Solar Millennium facility in Amargosa Valley NV, the time period considered was 200 years. See: Amargosa Farm Road Solar Project Final EIS, (NVN-084359), Volume II, Appendix B--Groundwater Modeling Report: http://www.blm.gov/nv/st/en/fo/lvfo/blm_programs/energy/proposed_solar_millenium.html

[10] This is the reason, for example, that the Nevada State Engineer (SE) and BLM, in the context of the approval of the Southern Nevada Water Authority (SNWA) requested permits to pump groundwater from aquifers in rural Nevada counties and pipe it to Las Vegas analyzed the effects of groundwater pumping over more than 200 years, based on well documented groundwater flow models. The SE has approved only a portion of the SNWA's requested pumping, requiring, in essence, a very long term aquifer test prior to allowing additional pumping, and providing that pumping can be halted in the event that adverse effects are noted. See BLM-- Clark, Lincoln, and White Pine Counties Groundwater Development Project Draft EIS, Volume 1A, Chapter 3.3 (water resources) June 10, 2011; http://www.blm.gov/nv/st/en/prog/planning/groundwater_projects/snwa_groundwater_project.html. See, also, a short paper by John Brehehoeft at http://aquadoc.typepad.com/files/groundwater-monitoringfor-mitigation_-will-it-work.pdf , and The Nature Conservancy's critical comments on the BLM's draft EIS, dated September 16, 2011, included in public comments section at http://www.blm.gov/nv/st/en/prog/planning/groundwater_projects/snwa_groundwater_project/draft_eis_public_comments.html.

Placed in a cumulative and long run perspective, the HHSEGS pumping potentially will initiate very significant new burdens on this segment of the regional flow system and its dependent springs and ecological communities – including Stump Spring, nearby mesquite dune vegetation, and the Wild and Scenic Amargosa River and its protected resources[11].

The Nature Conservancy believes that the CEC staff analysis of effects is about as thorough and theoretically correct as possible under the prevailing factual circumstances, but, given the almost total lack of understanding of local hydrology and the long-term effects of pumping in this desert system, the PSA conditions provide insufficient protection for high value and unique protected ecological resources.

The monitoring and mitigation steps outlined in the PSA represent a good start. However, we believe that the program must be augmented to more accurately predict, and more quickly detect and compensate for possible harm in the face of significant long-term hydrologic uncertainties. The high level of uncertainty warrants a very conservative approach, imposing reasonable but clear and effective conditions that would halt HHSEGS pumping if adverse effects are likely. Accordingly, we have the following recommendations.

Comment 3

Monitoring

Given the lack of information about the effects of pumping from the Pahrump Valley aquifer in the Hidden Hills location on local and distant resources, a well-designed monitoring program, including an adequate number of properly placed monitoring wells and enforceable and public reporting requirements, is especially critical. Condition WS-8 in the PSA states that the monitoring network "protects areas that maybe within the influence of project pumping during the project life." We believe that the intended design of the network should be extended to areas or resources that may be influenced by project pumping well beyond the project period and for a minimum of 100 years, given that operations at the HHSEGS facilities are almost certain to continue well beyond the first licensing period. It is simply unrealistic to expect that renewal of the plant's operating franchise would be withdrawn three decades hence, even if severe groundwater problems were encountered.

The PSA WS recommends requiring the applicant to drill and periodically sample water quality and levels in a minimum of 10 monitoring wells. We support requiring an array of monitoring wells located in sites selected as best for detecting offsite

[11] An excellent summary of the Amargosa River system's ecological resources is contained in the Biological Resources section of the PSA at page 4.2-43 et seq. While neither the river nor any of its tributary springs are shown as being located within the unrealistically uniform concentric drawdown isopleths in the PSA WS Figure 23, several important springs are shown to be within 5000 meters of the outer ring and many more within 2-3 miles.

effects from HHSEGS pumping and other groundwater withdrawals on key ecological resources, drilled to at least the same depths as HHSEGS production wells and equipped with continuous recording devices. However, we recommend that additional wells be required, that well locations be more clearly specified in the final staff assessment, that all drilling logs and other data on well construction, testing, and performance be made public.

We also recommend that applicant conduct at least one additional reasonable length pump test to supplement the results of the initial truncated test, using newly drilled production and monitoring wells. This additional pre-construction pump testing is warranted because of the limitations of the recent aquifer performance test and accompanying model, and the lack of geological and aquifer data in the area.

Comment 4 Comment 5 Comment 6 Comment 7

ing at ll-de performance test after ir one or more planned production wells and several associated monitoring wells--prior to the commencement of construction and permanent installation of the rest of the wells--would provide the applicant and the CEC with valuable data about how to site other wells and whether the initial assumptions about the aquifer configuration and the absence of off-site drawdown were correct.

Although the terms of applicant's lease have not been revealed, it seems reasonable that additional wells could be drilled this summer (2012) and tested prior to the Commission's issuance of final Conditions of Certification. Review of the aquifer testing results can then be used to confirm whether the applicant's initial assumptions were correct; if not, the plan and CEC's Conditions for Approval should be appropriately revised. We recommend that, as in the case of other required pre-approval resource investigations (e.g., biological, cultural), gathering critical information about effects on the groundwater resource should be done before approvals are issued.

Further, The Nature Conservancy recommends that the CEC require a total of three offsite monitoring wells (i.e. adding 2 wells) to the southwest of the HHSEGS site to detect possible effects on the Amargosa River and its protected resources. In particular, these wells should be designed to determine levels, direction, and flow in the alluvial aquifer and also to probe whether there is communication between the alluvial aquifer and the regional carbonate aquifer. If significant drawdown is detected or carbonate/alluvial aquifer communication is established, conditions on project pumping should be specified.

Additionally, because of the intense public interest in groundwater issues, WS-9 should provide that all of the monitoring wells should include continuous data logging and recording devices and that the raw data and all reports be promptly placed on a public CEC website .

Mitigation

TNC applauds the PSA approach to mitigation—requiring both permanent reduction in water use in the Pahrump Valley Groundwater Basin and monitoring-based triggers requiring reduction or cessation of pumping occasioned by adverse effects on ecological resources. However, we believe that these mitigation measures need to be clarified and strengthened.

Reductions in Basin Groundwater Use

The Water Use Offset plan (WS -1) requires the applicant to submit a Water Supply Plan that outlines how a total of 4900 acre feet of water, or 163 acre feet per year over the 30 year life of the project, will be replaced through as yet unidentified "activities." The applicant's plan must be approved by the CPM prior to construction or well operations. We support this plan approval condition; moreover, because of its importance in determining the adequacy of groundwater mitigation, we recommend that the complete plan should be submitted prior to and included with the final staff assessment, and be subject to public review prior to its approval by the Commission.

Comment 9

We recommend that WS-1 be interpreted to require actual, steady, contemporaneous reductions in PVGB pumping equivalent to the pumping by HHSEGS, we also strongly recommend replacement of groundwater use at a ratio of greater than 1:1[12], for several reasons:

- Given the severe over-allocation of water rights in the basin (65,000+ acre feet allocated versus 12,000-19,000 acre feet of perennial yield) it is unclear whether the retirement of even senior, active and historically exercised water rights will be effective to reduce water use over a 30-year period. This fact, in itself, warrants acquisition and retirement of water rights well in excess of project pumping rates.

- Little pumping from wells in the southern section of the basin has occurred in the past. Most of the active water rights that could be acquired by the applicant for compensation are apparently located in the northern section of the basin. Long-term water levels have declined in the southern area, but only about a quarter as rapidly as in the north, but presumably as a result of the propagation of pumping effects from north to south in the PVGB. The estimated average rate of water level drop is 0.25 foot per year in the south vs 1.0 foot per year in the north. Roughly, then, if acquisition of northern basin water rights are to be permissible compensation, our recommendation is that acquired rights should be at a 4:1 ratio to project pumping to

[12] Applicant's technical report originally committed to acquire up to 400 acre feet for mitigation, a commitment which was then withdrawn as an error. Applicant is now apparently committed to offset its water usage, and has listed a number of possible options, many of which would not represent permanent retirement of active water rights. See Applicant's Data Responses 1-A, ##s 39 and 40 at pp 33-34.

effectively compensate for long term storage reductions in the southern portion of the basin.

- If, as seems likely, the water rights proposed for acquisition are agricultural rights, the relative certainty of pumping (hardness of the water use) for the solar facility as compared with agricultural use further justifies requiring a compensation ratio that is significantly greater than 1:1.

We also encourage the CEC to provide more clarity around how the PSA compensatory mitigation obligation would work in practice. The PSA appears to allow the applicant to acquire either an annual 167 acre feet/year or a gross quantity of water rights (4,900 acre feet) with no specified time period for the acquisition. While we do not think the PSA contemplates this result, the mitigation obligation theoretically could be satisfied, as an extreme example, by a single-year lease of 4,900 water, promised to be executed at the end of the 30-year operating period. Moreover, the mitigation obligation is framed as "one or more activities," which would apparently not compel the applicant to actually acquire and retire active, senior water rights in the PVG Basin[13].

Comment 10

Comment 11

Comment 12

We recommend that the mitigation obligation be stated categorically to require contemporaneous acquisition and permanent retirement of actively used, senior water rights in the Pahrump Valley groundwater basin of four times the projected annual average project pumping rates of 167 acre feet/year— a total of 668 acre feet/year.

Triggers for reduction in water use by HHSEGs

We strongly support the PSA requirement to reduce or cease groundwater pumping in the event that adverse effects to ecological resources are occasioned by HHSEGS water use. This requirement is of cardinal importance given the lack of information about the hydrology of the area and the importance of the potentially affected ecological resources.

However, we object to the specific trigger conditions proposed in PSA's biological resources (BIO-23 and 24) and water supply (WS-8) sections as Conditions for Certification, because these Conditions will not adequately protect groundwater-dependent ecological resources before they are likely to experience significant harm.

[13] Several of the compensatory mitigation options listed by Applicant in its data responses (see footnote 12, above) would not require acquisition and permanent retirement of water rights. In light of the gross over-allocation of water rights in the Pahrump Valley basin and the fact that Applicant's use of water is very likely to be perpetual, if mitigation is not limited to acquisition and permanent retirement of active, senior water rights in multiples of proposed use, further and more rapid declines in the southern basin water levels—and the Amargosa system-- are likely.

This statement from the Biological Resources section of the PSA (4.2-170) reveals the PSA's sound underlying rationale for imposing adaptive action in the event of predicted adverse effects on protected ecological communities:

> *Given the cumulative concerns..., combined with the limited quantity and reliability of the data, and the ecological significance and sensitivity of the resources at risk, a conservative approach must be applied that combines long-term groundwater elevation monitoring and monitoring the health of the mesquite, with clear and detailed triggers for adaptive action if* ***impending*** *impacts are detected. (emphasis added).*

BIO 24 states:

> *"Thresholds for remedial action... are designed to* ***avoid impacts to the mesquite woodlands and other groundwater-dependent ecosystems (GDE) near the project before they result in a loss of resources,*** *or a significant impact to habitat functions and values." (emphasis added)*

Comment 12a

However, the PSA's trigger conditions will not satisfy these goals. Rather than averting the harmful effects on the ecologically important Stump Springs and Pahrump Valley mesquite Metapatch before resources are lost, the PSA conditions would essentially require proof of a 20% decline in the health of the baseline resource, plus a showing of a statistically significant water level decline, combined with demonstrations that the declines are attributable to the applicant's activities and cannot be attributed to regional drought conditions or other pumping. This is an unwieldy and unworkably difficult test; and, if it were proposed to be invoked to limit pumping, protracted litigation would almost certainly ensue.

Despite a very detailed, sophisticated proposal in the biological resources analysis that would be used determine when the 20% effects level is reached, this trigger would not provide the intended result of avoiding adverse impacts. Once the 20% level is reached, irreversible harm is likely inevitable because of the usual nature of groundwater systems. That is, by the time adverse effects are first detected in resources remote from the pumping location, the time lag to recovery after pumping ceases will cause further and prolonged declines in water levels before they begin to recover, resulting in permanent loss of habitat and dependent ecological resources. Lastly, there are significant difficulties in establishing that decreases in water levels are not due to drought or other extraneous factors, including other groundwater pumping.

We recommend that the CEC establish clearer and more effective trigger conditions. Given that we lack understanding of the local and regional hydrology and an accompanying detailed groundwater flow model that could be used to predict and avoid adverse impacts, the only reasonable alternative is to set very conservative trigger conditions. We recommend that Applicant cease groundwater pumping when specified, measurable water level declines are detected in offsite groundwater

monitoring wells, sited to predict whether the cone of depression caused by HHSEGS pumping is moving toward Stump Spring or other ecologically protected resources, including the Amargosa River. The currently proposed tripartite test, which requires that the agency show offsite water level declines, plus adverse effects on ecological resources, and to exclude other possible reasons for the effects will not protect resources. Most importantly, once a triggering water level decline occurs, applicant should have the burden to establish that any water level declines are wholly caused by drought or other circumstances for which they are not responsible.

We thus advocate permit conditions requiring, once offsite water levels decline or any decline in vegetation health is detected, that the applicant demonstrate that those effects are not the result of their pumping.

We note that this test would be compatible with the applicant's assertions that the effects of its groundwater pumping will not propagate offsite or affect ecological resources.

Comment 2

The Amargosa River

In 2009, a 27-mile perennially flowing reach of the Amargosa River in California was added to the national Wild and Scenic River System, adding inchoate but legally effective federal water rights protections to BLM's previous Area of Critical Environmental Concern. This area of the river and its vital fresh water tributaries support many listed, sensitive and endemic species. The PSA WS analysis states:

> *...the proposed project has the opportunity to reduce groundwater flow that would otherwise be received down-gradient. If this was the case, the project could have the opportunity to capture water that would otherwise flow to the Amargosa River. WS at 4.15-19*

However, the PSA concludes that because "potential impact(s)are ... so far into the future and so distant from the proposed project that it could not be reasonably discerned from other stresses in the regional hydrologic system" (id), "The proposed HHSEGS project would not be expected to have a measurable impact to the Amargosa River or its tributaries. " WS 4.15-1

While minimizing the potential effect of the HHSEGS pumping on the Amargosa, the staff report acknowledges that its analysis is not supported by subsurface data because these data are not available. For this reason it recommends the drilling and monitoring of a single well between the HHSEGS site and the Amargosa River to detect project-induced water level declines in the aquifer between the project site and the river.

We recommend that at least three monitoring wells be required between the project site and the Nopah Range, adequate to determine both water levels in, and effects of

pumping on, the alluvial aquifer, as well as whether the alluvial aquifer and deeper carbonate aquifer are in communication[14]. We also recommend that CEC specify mitigation requirements, including pumping cessation or reduction in the event that specified water level declines (greater than one foot) are noted in any of the monitoring wells or other adverse effects are detected.

The Amargosa River is a critically important regional ecological feature. Wild and Scenic River status protects and lends priority to the river's flows over new uses of water that may adversely affect the river and its tributaries. The CEC should ensure that the river, its spring tributaries, and ecological resources are adequately protected by conservative conditions on project groundwater use to avoid adverse effects before they occur. This will require a well- designed monitoring network, development and use of a predictive groundwater model, and adaptive trigger levels.

Comment 14

Comment 15

Thank you for the opportunity to comment.

Alfredo Gonzalez
Regional Director
South Coast & Deserts

[14] We have attached a proposal for the location and costs for the three wells prepared by Johnson Wight, Inc., the firm whose principal investigators have done significant hydrology work in this region.

Attachment #1

Date: July 17, 2012

To: Project File – JWI1305

From: Jon Philipp, Andy Zdon

Subject: Summary Memorandum - Review of Hydrogeologic Analysis, Proposed Hidden Hills Solar Electric Generating System Project, Inyo County, California

The following memorandum summarizes three previous documents prepared by Johnson Wright, Inc. (JWI), providing comments on hydrogeologic analyses conducted to evaluate the potential impacts to groundwater of the proposed Hidden Hills Solar Electric Generating System (HHSEGS). Based on the following assessment, the project applicant has not provided the requisite supplemental hydrogeologic knowledge regarding the site or surrounding areas to justify the conclusions its consultants have reached. Little is known about the subsurface in this area, and attempting to make general land management decisions based on "assumed understandings" of the groundwater system in the project area is not appropriate. Moreover, recent investigations in the Amargosa Basin indicate that the conceptual hydrogeologic model for the area may vary considerably from that which has has been long-held. For example, a recently installed monitoring well along the Amargosa River north of Shoshone, California suggests a considerably different relationship between the Amargosa River and groundwater flow beneath it at that point than previously believed. Additional hydrogeologic characterization is clearly needed to support a reasonable analysis of the potential impacts of the proposed project, and to provide the basis for sound land management decision-making. For example, a properly-run and documented aquifer test has not yet been completed at the site and should be conducted. As well, the hydrogeologic investigation conducted thus far has not established (and was not designed to evaluate) a disconnect between project pumping and flow in the federally-designated Amargosa Wild and Scenic River flow system.

Groundwater Modeling – Impact Analysis

As part of the Bright Source Energy August 2011 Application for Certification (AFC) for the Hidden Hills Solar Electric Generation System (HHSEGS), Cardno-Entrix (Entrix) authored two documents both titled 'Groundwater Modeling Technical Memorandum.' These two documents were included in the HHSEGS AFC as Appendix 5.15F (July 12, 2011) and Appendix 5.15G (July 20, 2011). The documents describe the results of a modeling exercise

designed to predict the extent of groundwater drawdown in response to a range of potential short and long-term groundwater pumping scenarios at the HHSEGS site. A review of both documents shows that minimal site-specific hydrogeologic information was available, which necessitated the use of a very simplistic groundwater model that does not represent known hydrogeologic conditions (for example the presence of geologic structures such as faults and non-basin fill materials). At the time these documents were written, the applicant's aquifer testing on site-specific wells had not yet been conducted and the results of that testing were not available. The results of previous aquifer testing that were used in the analysis have not been presented and therefore the quality of that work which forms the basis of the analysis cannot be evaluated. There was an absence of site characterization by the applicant prior to the modeling analysis, and modeling was solely based on the sparse existing data for this part of the Pahrump Groundwater Basin. Thus, the results of the modeling have substantial uncertainty and the current model is inadequate as a predictive tool.

In general, the Appendices detail the modeled results of two primary scenarios:

1. The effect on the regional aquifer as a result of the planned pumping of 200 to 280 acre-feet per year (ac-ft/yr) during the two to three year construction period of the HHSEGS facility is detailed in Appendix 5.15F.
2. The effect on the regional aquifer as a result of the planned pumping of 140 ac-ft/yr during the 25 year lifespan of the HHSEGS facility is detailed in Appendix 5.15G.

The primary issue is the technical basis on which the model was built. In Appendix 5.15F, which focuses almost exclusively on modeling results, Entrix states, "The set-up and results of the original model were discussed in a previously submitted technical memorandum (dated July 3, 2011)." This July 3, 2011 memo was not included in the HHSEGS AFC and is not included in the list of documents related to the HHSEGS facility on the California Energy Commission (CEC) website. However, the Appendix 5.15G document does offer more information as to what was apparently relied upon to create the model used in both scenarios.

In Appendix 5.15G, Entrix acknowledges that water for the HHSEGS facility will be pumped from the Basin-Fill aquifer and that, "in the project area, wells of 300-400 feet deep are likely sufficient to provide the required yields for the Project." A 1966 APT conducted in the vicinity of the proposed HHSEGS facility by Geotechnical Consultants estimated aquifer transmissivity to be 7,225 gallons per day per foot (gpd/ft). No additional details of the Geotechnical Consultants APT were included. Another similarly located APT performed in 2003 by Broadbent and Associates estimated the aquifer transmissivity to be 4,675 gpd/ft.

Entrix noted that the short duration of the Broadbent and Associates APT precluded obtaining reliable storage coefficient values or estimating leakance.

Entrix does not mention what model was used to simulate the various pumping scenarios. They understand that "several hydraulic aquifer coefficients and parameter are required when creating a groundwater model." Entrix then acknowledges that "For this site only an approximate measurement of transmissivity is available. This lack of detailed aquifer property information constrains the modeling approach that can be employed to only a simplified model package that assumes homogeneous aquifer properties". For the model, the transmissivity value of 7,225 gpd/ft was used. To represent a "typical semi-confined [aquifer] condition", a storage coefficient of 0.01 was used. The analytical method used for calculating drawdown was Theis (1935), which is a confined aquifer solution. A regional groundwater gradient of 0.01, taken from groundwater surface maps, was applied to the model. In order to account for uncertainty in the one aquifer parameter Entrix had to work with, they ran each model scenario with a transmissivity of 7,225 gpd/ft, followed by runs with half that transmissivity value and with twice that transmissivity value, respectively. The model results can be seen in Appendix 5.15F and Appendix 5.15G in table format and graphically as nearly concentric circles of drawdown around the pumping center-- as would be expected from such a simple modeling approach.

The inherent simplicity of the model employed combined with the absence of site specific data (i.e. the only physical value used in the model was aquifer transmissivity derived from the Geotechnical Consultants APT) disconnects the model results from a reasonable simulation of existing conditions. The lack of site specific information then imposes no reliable constraints on the model; therefore, the model is not useful as a tool for predicting drawdown impacts related to any pumping scenarios.

The most important piece of missing information is the detailed geology under the HHSEGS site to the depth of proposed project production wells (the maximum depth Entrix believes a well would have to be drilled for adequate water to meet project needs is 400 feet, although applicant has recently suggested that deeper wells may be employed). This information could easily be obtained by supplemental drilling and collecting soil core data. Currently, neither the depth of the actual water bearing zone is known , nor if there are multiple water bearing zones. The water bearing zone materials are also unknown. Without APT-derived pumping test data, a primitive site conceptual model could still be prepared based on the soil core information, leading to some better informed assumptions as to what appropriate aquifer coefficients and parameters should be used in an analytical model. **Comments Regarding Aquifer Testing**

The March 2012 document titled 'Long-Term Aquifer Performance Test Report' (APT Report) by Entrix summarizes the design, implementation, analysis and conclusions of an aquifer performance test (APT) conducted at the future site of the HHSEGS. A thorough review of the document has revealed deficiencies in the design, implementation and analysis of the APT that question the conclusions reached by Entrix regarding the proposed HHSEGS long term project pumping impacts. The following paragraphs highlight the deficiencies,and their relevance to the Entrix conclusions.

In general, the biggest deficiency is the lack of a data-based conceptual site model of subsurface conditions. It is important to the proper design of an APT to identify the water bearing zones (aquifers) and the low permeability zones (aquitards) separating them. Entrix has compiled a narrative of regional geologic conditions based on previous investigations around other portions of Pahrump Valley and has made some assumptions as to what they believe geologic conditions are like under the HHSEGS site. In general, Entrix summarizes HHSEGS site conditions as follows:

> The HHSEGS site is underlain by Quaternary sediments, which form the primary water bearing units within the basin. Channel gravels become finer grained upward, becoming mudstone near the top of the sequence. The mudstones are overlain by silt and thin gravel beds. These deposits record a change from a fluvial and lacustrine condition during the most recent glacial cycle to the arid conditions found today (Flynn, et al 2006). The maximum thickness of the alluvium is at least 800 feet (DWR, 1964).

The summary suggests variable subsurface conditions ranging from mudstones, which would likely act as an aquitard, to gravel beds, which would likely act as an aquifer. However, no HHSEGS site specific information has been collected below a depth of 200-feet below ground surface (bgs), which was done during the installation of the observation wells Entrix used for the APT. In short, knowledge was lacking regarding site specific conditions below that depth when the APT was designed, run and analyzed.

The pumping wells used during the APT were wells already in existence on the HHSEGS site, including the Orchard Well and Well #3. Well #3 was evaluated using a down-hole camera. This well was found to be cased to a depth of 790-feet bgs and open hole from 790 to 970-feet bgs, which indicates that; 1) water is being drawn from a depth of 790-feet or greater and 2) the surrounding formation from 790-feet bgs and below is lithified enough to not collapse on itself in the absence of a well screen. The Orchard well was only evaluated

for total depth, which remains unknown as the device used to measure total depth was not long enough. Thus, one of the pumping wells has an inlet below 790-feet bgs while the inlet of the other pumped well is unknown. In both cases, the boring logs for the pumped wells were not included in the APT Report, so the assumption is they were not made available to Entrix. Accordingly, geologic conditions in and surrounding the pumping wells are unknown. In contrast to the pumping wells, the observation wells were installed to a shallower depth of 200-feet bgs. With the partial exception of well MW-6, all of the observation wells were screened within clay and silt formations which are generally considered aquitard material rather than aquifer material. In short, the Entrix APT pumping wells are in unknown geologic formations (potentially lithified) and, in the case of the Orchard Well, the pumping inlet is at an unknown depth, while the observation wells are set many hundreds of feet shallower in geologic formations generally more akin to aquitard material.

Entrix encountered several difficulties during the data collection phase of the APT. The most significant was the premature end to the APT when the pumping equipment in Well #3 fell to the bottom of the well. In general, the longer the duration of the APT, the better and more informative the results, as the cone of depression will continue to expand as pumping continues. The foreshortening of the test introduces additional uncertainty to the test results, especially when using the results to make long term predictions related to water availability.

Other issues surrounding the Entrix data collection efforts related to the APT which have to potential to add uncertainty to the APT results include:

1. Something happened to the transducer in pumping Well #3 50 minutes into the test. There is a nearly two hour gap in data collection from 50 minutes into the test to 2 hours and 40 minutes into the test.
2. Manual depth to water measurements in the pumping Orchard Well do not match the data collected by the transducer. At some points, the difference is as much as five feet.
3. It seems as if there were only four data points collected from observation well MW-1 during the first 5 hours and 42 minutes of the test. It also seems that drawdown was 'zeroed' at 5 hours and 42 minutes into the test.
4. It seems as if there was only four data points collected from observation well MW-2 during the first 5 hours and 39 minutes of the test. It also seems that drawdown was 'zeroed' at 5 hours and 39 minutes into the test.
5. There are only two manually collected data points from observation well MW-6 during pumping portion of the APT.

6. A seemingly arbitrary 'zero' point was chosen for the transducer data collected from Stump Springs. Although this method would still show a response in the monitoring well, this is another example of how the field work conducted during the APT varies from standard water resource investigation techniques and adds concern to the data collection efforts. Future aquifer testing should be conducted with independent oversight.

Entrix used the commercially available software package Aqtesolv to analyze their APT data. According to Section 5.2 of the APT Report, Entrix used Aqtesolv to fit each observation well's time vs. drawdown curve "to the appropriate type curve" to determine aquifer properties. Although not explicitly stated, this suggests that multiple solutions were tried until a best fit was encountered. In all cases, the best curve fits were from the family of curves used to describe leaky aquifers: Entrix specifically called out both a Hantush-Jacob solution curve and a Neuman-Witherspoon solution curve for specific data sets. Both of these solutions specifically describe a situation where the aquifer being tested resides beneath another aquifer separated by an aquitard. The solutions take into account water sourced from both the pumped aquifer and from water leaking though the aquitard to the pumped aquifer from the aquifer above.

Despite the fact that the solution curves fit the data generated by the recorders in the observation wells, due to the lack of subsurface information, the geologic situation the solution curves solve for has not been established at the HHSEGS site. It should also be noted that Entrix assumed a 1000-foot aquifer thickness in their solutions, which may be contradictory with the leaky aquifer concept, and suggests the pumping well and the observation wells are all in one continuous water bearing formation. If this situation is true, an unconfined aquifer solution may be more appropriate for the data. Finally, one primary caveat related to the curve fit aquifer solutions is that the pumping well fully penetrates the aquifer and that flow to the pumping well is horizontal. This cannot be true, assuming that Entrix's 1000-foot aquifer thickness is valid, which would introduce additional error to the analysis. In short, there is a lack of information about the local geology or depths to aquifers and aquitards, a significant difference between the depth of the pumping wells and the depth of the observation wells, and a seemingly arbitrary application of aquifer test solution curves and aquifer thickness values.

In summary, there are significant deficiencies related to the design, implementation, and analysis of the APT conducted at the HHSEGS site. The most critical is that there is an absence of knowledge of local geologic and hydrologic conditions from which to design a successful test. Entrix designed their APT with no local knowledge of the subsurface below

200-feet bgs, used pumping wells installed into unknown formations and at unknown depths, and used observation wells that were between 300 and nearly 800 feet vertically offset from the pumping wells, and which does not follow standard practice. Any conclusions drawn from such a test are suspect. Additional concerns regarding the collection of data, the duration of the APT, and the way the data were analyzed only add to the uncertainty of the APT results.

California Energy Commission (CEC) Preliminary Staff Assessment (PSA)

The PSA for the HHSEGS was released by the CEC during May 2012. The Water Supply section of the PSA (Section 4.15) addresses potential impacts on groundwater resources by the proposed HHSEGS, including impacts to the Amargosa River. In the summary of conclusions for the Water Supply section, the PSA states "The proposed HHSEGS project would not be expected to have a measureable impact on the Amargosa River or its tributaries." JWI believes there is an insufficient technical basis to support this statement.

Comment 16

In general, there is a scarcity of data related to the hydrology of the southern Pahrump Valley, California Valley, Chicago Valley and the Amargosa River. Also poorly understood are the groundwater interconnections between these aforementioned areas. Data supplied by the applicant has not increased the base of knowledge.

The applicant has attempted to quantify the effects of direct groundwater impacts related to the proposed pumping at the HHSEGS site via two methods. The first method was the use of a simple analytical groundwater model to show the cone of depression likely resulting from 25 years of project pumping. The available data for use in the model was limited to a value for aquifer transmissivity derived from a 1966 aquifer performance test (APT) conducted near the HHSEGS site. All other aquifer parameters were assumed values. The resulting cone of depression extended into the Nopah Range suggesting impacts might extend into California Valley (which is hydrologically linked to the Amargosa River), but not as far as the Amargosa River itself. The second method used by the applicant was to conduct an APT at the HHSEGS site using two pumping wells and an array of monitoring wells. The results of the applicant's APT suggested that the cone of groundwater depression resulting from 25 years of project pumping might not extend past the HHSEGS site boundaries. As described earlier, these results are suspect based on significant concerns related to the applicant's design, implementation and analysis of their APT. Further, it is not appropriate to use an APT to make long-term conclusions regarding impacts. An APT solely allows for the evaluation of hydraulic characteristics which are then used as input in a subsequent analysis to evaluate long-term impacts. In summary, the applicant's APT and modeling efforts have

not added to the understanding of the groundwater flow system at the HHSEGS site or in the surrounding areas.

In order to determine if groundwater pumping at the proposed HHSEGS site might have an impact on the Amargosa River, the PSA used a model similar to the applicant's model to show the possible cone of depression resulting from 30 years of project pumping. Using a range of values for aquifer parameters based on the CEC Staff's best estimates, groundwater surfaces were generated for 30 years of proposed project pumping at the HHSEGS site. The resulting cone of depression extended into both Chicago Valley and California Valley. While these assumed drawdowns did not directly intersect the Amargosa River, the project pumping could potentially affect groundwater levels in these valleys that have a defined connection with the Amargosa River.

Comment 17

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The PSA also utilized the existing dataset to make general statements about regional groundwater flow. Regarding regional flow from the HHSEGS site, they state,

> "Although a map of the potentiometric surface constructed from available water level data suggests that groundwater in Pahrump [Valley] has a southwesterly flow direction, limited data is available to suggest that groundwater flow in the southern portion of the Pahrump Valley would discharge at the Amargosa River. Potentiometric contours suggest the possibility that groundwater that could be captured by the proposed HHSEGS site has a flow path that may not intersect the river, but would instead flow to the south."

There is no significant data to support or refute the scenario suggested by the above paragraph. The PSA acknowledges this lack of information in the next paragraph by stating,

> "…that flow from the Pahrump Valley, to Chicago Valley, to the Amargosa River could be limited, based on preliminary geochemistry data (ARM 2011a). Unfortunately very few wells exist in between the proposed project and the Amargosa River, which would help to identify flow paths and potential discharge to the Amargosa River."

The PSA is entirely correct in acknowledging the lack of adequate subsurface data supporting or refuting groundwater flow connections between the HHSEGS site and the Amargosa River through the intervening valleys. Impact(s) to the Amargosa River related to project pumping cannot and should not be discounted.

Finally, the PSA performed a travel time calculation for groundwater flowing between the HHSEGS site and the Amargosa River assuming a direct connection. Assuming a travel distance of 20 miles, a hydraulic conductivity (K) value of 1 foot per day (ft/d), a porosity of 0.2 and a gradient based on the difference in groundwater elevation between the site and the river, the calculated groundwater travel time was over 3,000 years. Increasing K to 15 ft/d reduced the travel time to 214 years. These calculations do not reflect the potential for the actual groundwater flow path between the HHSEGS site and the Amargosa River (assuming it exists) to significantly reduce those travel times. For instance, Willow Creek Wash, located at the southern end of California Valley, is a very narrow canyon filled with very recent and unconsolidated alluvium though which g[illegible]d potentially travel at much higher velocities than those calculated in the PSA. Additionally, the water flowing in this wash often becomes surface flow in the China Ranch area and often remains so all the way to the confluence with the Wild and Scenic Amargosa River. Both of these flow properties would have the effect of shortening the groundwater travel time from the HHSEGS site to the Amargosa River. Groundwater flow system specifics are not accounted for in the PSA travel time calculations due to lack of data, and thus should not be discounted by assuming "no effect."

Comment 19

Comment 20

More critically, the travel time for a particle of water to reach the Amargosa River from Pahrump Valley has little relationship to hydraulic effects, which can be transmitted nearly instantaneously over long distances within a confined aquifer. The result is that an estimate of travel time from Pahrump Valley is not a conservative assessment of potential effects to the Amargosa River.

In conclusion, the applicant has not substantially added to the needed body of hydrogeologic knowledge regarding the site or the surrounding areas. Additionally, the CEC PSA forms conclusions about the potential for the HHSEGS project to impact flows in the Amargosa River based on an inadequate base of knowledge about the local and regional flow systems. Falling back on 'assumed understandings' about the system is not appropriate based on recent drilling along the Amargosa River which altered 50+ years of one 'assumed understanding' regarding the relationship between the Amargosa River and the underlying groundwater. Ultimately, additional data points, most significantly monitoring wells both at the HHSEGS site and along suspected flow paths to the Amargosa River, will be needed to answer the question of connectivity.

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July 21, 2012

Commissioner Karen Douglas, Presiding Member
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814-5512

Subject: Hidden Hills Solar Electric Generation System: Comments by the Amargosa Conservancy on the California Energy Commission Preliminary Staff Assessment

Dear Commissioner Douglas:

The Amargosa Conservancy, with headquarters in Shoshone, California, is a non-profit conservation organization devoted to preserving the land, water and beauty of the Amargosa region. We appreciate the very open process that the Commission staff has conducted in addressing the Hidden Hills Solar Energy Generation System (HHSEGS), Application for Certification (AFC) and for providing ample opportunities to comment and sponsoring several local workshops where a wide range of views and opinions from the applicant, residents and organizations can be exchanged and fully aired.

As it is described in the PSA, the Amargosa Conservancy opposes the HHSEGS project. If the Commission were to approve the project, substantial mitigation, above and beyond what the PSA has recommended, would be necessary. We outline below our objections and concerns--as well as mitigation and other recommendations--for this massive $3 billion industrial facility that will be the bellwether of additional development.

We encourage the Commission and its staff to continue providing additional public workshops prior to and after the publication of the Final Staff Report. We believe that this project, if approved, will have very significant negative long-term effects on the natural communities in this region, and widely varying effects on the human population in two states.

I. Groundwater

Previous comment issues unresolved

The Conservancy has previously submitted extensive comments to the California Energy Commission (CEC) on detecting and averting effects from proposed groundwater pumping by the Hidden Hills Solar Energy Generation System (HHSEGS) from aquifers that are hydrologically connected to the Wild and Scenic Amargosa River and its groundwater-fed tributaries. Unfortunately, none of the issues our organization raised in those prior comments on groundwater use have been resolved. If anything, we have become even more concerned about proposed water use by this plant and by that of other utility-scale solar generation plants and the related regional development projects that are quite likely to follow in its wake.

Data absent

In particular, the data relevant to assessing groundwater impacts in this region are extremely limited, and the Applicant's repeated assurances that its long term pumping will have no off-site effects, based largely on guesswork rather than on collection and analysis of additional subsurface information, are distressingly dismissive of concerns raised by this organization, the BLM, and Inyo County, among others.

The Applicant's and the PSA's predictions unsupported

Applicant asserts that project pumping over the life of the project will not affect biological resources or wells beyond (or much beyond) its property boundaries, relying on scant geologic mapping, scattered, publicly undisclosed well logs, inadequate pump test data, and simplistic groundwater modeling. The latest assertions by Applicant's groundwater consultant are contained in a PowerPoint slideshow that was aired at the June Pahrump workshop. The slides speculatively propose one possible version of subsurface conditions to predict effects of HHSEGS pumping over a 25-year period, but add little or nothing to the real understanding of this complex system. Predictions are only as reliable as the data used to prepare the presentation; and it does not appear that any new information was obtained or used to buttress the very slim portfolio of available information. The PSA analysis uses the same sparse data and simplistic modeling techniques as the Applicant's consultants to predict the effects of the project's groundwater pumping.

Uncertainty

The key issue facing the CEC is what to do in the face of great uncertainty in the hydrogeologic properties of the area—and thus whether and how pumping impacts will propagate and affect off site resources.

Effects on the Wild and Scenic Amargosa River—Monitoring and Mitigation Required

One principal concern of the Conservancy is that groundwater pumping in the southern portion of the Pahrump Valley will affect the Wild and Scenic Amargosa River and its spring tributaries. Despite the fact that little pumping has occurred to date in the southern portion of the valley, water levels have been steadily dropping in most of the wells in this area from which data is available, apparently the result of pumping further north in the Pahrump Valley. The USGS regional groundwater flow model posits flow from the Spring Mountains through Pahrump Valley under the Nopah Range and through California Valley and thence into the Amargosa River. To us, this raises a serious unresolved issue of whether long term HHSEGS pumping will adversely affect the river and its tributaries. The solution, in the face of significant uncertainty, is to require clear and enforceable monitoring and mitigation conditions that will require reductions or cessation in pumping if monitoring predicts effects are likely to occur.

Amargosa effects could be rapid and significant

Although the PSA water supply analysis acknowledges that HHSEGS pumping might affect the Amargosa, it discounts that effect based on calculations of the length of time that the pumping effects might take to affect the river— using the same inadequate body of data discussed above. The attached analysis commissioned by the Nature Conservancy by Johnson Wright, Inc., hydrogeological consultants, posits other likely routes by which the HHSEGS pumping might well affect the river much more quickly and directly than the PSA analysis estimates. We believe that it is incumbent on the Applicant and the CEC to rule out these effects and to require mitigation (e.g., pumping cessation) if effects are predicted by water level declines in appropriately sited monitoring wells.

Comment 1

Longer term analysis required

The analyses by the Applicant and included in the PSA are limited to predicting effects of pumping for the first 30 years the plant will be operating. We believe this analysis period is far too short for two reasons: first, the plant will undoubtedly operate and pump groundwater far beyond the 30 year first period. Second, the effects of groundwater pumping usually propagate for long periods after pumping has stopped, and by the time that effects are detected in critical resources, it is too late. By the time recovery starts to occur after pumping ceases, water dependent life is often eliminated. Other analyses (e.g., the BLM environmental assessments of the Amargosa Valley solar plant and the Southern Nevada Water Authority's proposal to pump water from remote valleys to Las Vegas) have appropriately predicted effects over much longer terms—200 years or more. If that same standard were to be applied here, the likely effects on the Amargosa system would undoubtedly be apparent.

Monitoring and mitigation recommendations

The PSA proposes that Applicant install a single monitoring well between the project and California Valley, but would propose no mitigation conditions in the event that water level declines are detected. This is clearly inadequate. We suggest that at least three monitoring wells be located west of the project site, completed in the alluvial aquifer in the producing horizon from which the project will be pumping water. Moreover, to establish whether the HHSEGS pumping will affect the carbonate aquifer, at least one well should have a dual completion in the alluvial and carbonate aquifers. (We note that the BLM's recent comments on the PSA support installing monitoring wells penetrating the carbonate aquifer.) If future water level declines in these wells predict effects on the Wild and Scenic Amargosa River, pumping should cease or be curtailed; however, the Applicant should first be given a reasonable opportunity to demonstrate that the water level changes are not due to its operations.

Comment 2

With regard to the groundwater dependent resources, in an attempt to protect groundwater dependent resources, the PSA water supply and biological resources conditions would require mitigation in the form of a temporary pumping cessation; however, before groundwater pumping is modified or discontinued over the long-term, the PSA requires the CEC to meet the burden of satisfying three difficult conditions: a water level decline of .5 foot, that the health of water dependent vegetation had declined by 20%, and that these effects were not due to actions or conditions beyond the control of the Applicant. This is nearly an impossible burden, and enforcement would be extraordinarily expensive, difficult, and protracted even in the face of clear adverse changes. Moreover, by first requiring a demonstrable decline in the health of vegetation, remediation would very likely be too late to avert permanent harm to the target resources.

The Conservancy believes that declines in the water level in off-site monitoring wells sited to detect impending effects on key resources alone is a sufficient trigger for mitigation requirements, both for the groundwater dependent resources and the Amargosa River. In addition, vegetation effects should be included as a triggering condition as an independent basis for pumping reduction.

Comment 2a

Mitigation burden of proof is key

In our view if a clear and easily enforceable groundwater level trigger is reached, the Applicant should have the burden of proof to establish that their operations are not the cause of the decline and, if the Applicant cannot meet this burden within a reasonable period time, groundwater pumping should cease.

Comment 3

Compensatory mitigation: purchase of water rights

Both the PSA and the Applicant propose compensatory mitigation for groundwater pumping by employing some (largely undefined) method to offset project water use on a 1:1 ratio. The Amargosa Conservancy supports such compensatory mitigation, but

Comment 4

Comment 4, cont'd

believes that the nature of the obligation as proposed in the PSA and by the Applicant poses significant issues and requires clarification and improvement.

The offset obligation, if framed to require reduction of Pahrump Valley basin water use, should be limited to permanent retirement of active senior water rights with a long and documented history of steady use, located closest to the project site, approved by Nye County and the Nevada State Engineer—and in multiples of the proposed project use. Multiple retirements are necessary for compensation because of the fact that the Pahrump basin is grossly over allocated, so retirement of even senior active rights may well have no positive effect on reducing basin water use, even in the short run. Also, because offsetting rights may likely be available only in the distant northern section of the Pahrump Basin in Nevada, effective mitigation for impacts of project water use on nearby resources also justifies a higher ratio. Accordingly, we suggest at least a 4:1 permanent retirement ratio.

II. Alternatives

The PSA acknowledges that the project will have significant adverse impacts on the environment. Under such circumstances, California law requires that there be an analysis of alternatives to the project that would avoid or substantially reduce the impacts of the project. The alternatives analysis in the PSA is inadequate and should be significantly expanded.

Comment 5

The Final Staff Assessment should analyze alternative sources of water to supply the project in the event that trigger conditions require the cessation or reduction in groundwater pumping. In addition, the Commission should more seriously examine alternative locations such as Sandy Valley and other technologies such as solar PV and distributed generation. Alternative locations would avoid or substantially reduce the necessity to pump groundwater from an over allocated desert basin in which water resources are in secular decline because of pumping beyond sustainable amounts. Solar PV would eliminate the need for two 750 foot-high towers.

III. Cumulative Impacts

CEQA Guidelines define cumulative impacts as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." (Cal. Code Regs., tit. 14, § 15355.) The Guideline continues: (a) "[t]he individual effects may be changes resulting from a single project or a number of separate projects" and (b) "[t]he cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time." (*Ibid*.)

Comment 6

The proposed natural gas pipeline and transmission line associated with the project are likely to draw and accommodate both additional electrical generation capacity as well as collateral development. The Hidden Hills plant is not only the first development, but it is also the proximate cause of additional economic activity in the Pahrump area that will require significant new water usage. Because the electrical and natural gas transmission lines associated with the project are subject to approval by the BLM and are being addressed in an EIS being prepared by the BLM, the PSA largely defers analysis of the cumulative impacts of the projects to the BLM. In its comment letter on the PSA, the BLM requests that the CEC conduct a more rigorous cumulative impact analysis. The Conservancy agrees with the BLM. The EIS is not currently available; thus, a complete cumulative impact analysis is not available to the CEC or to the public and the cumulative impacts of the project have not been fully assessed as required by law. In the absence of such an analysis, California law requires that the CEC conduct such an analysis and include it in the Final Staff Assessment.

Comment 7

We believe that the CEC is required to take a much more serious look at the potential, long term effects of all of the existing and allocated water rights in the Pahrump Valley basin and of the potential cumulative impacts of groundwater pumping by the project in combination with groundwater pumping by other reasonably foreseeable projects on the Amargosa River and on other groundwater dependent resources. While the PSA has included a short list of current and future projects, the list is not complete, and does not include other forms of water pumping and use (e.g., agricultural pumping).

IV. Cultural and Visual Resources

The HHSEGS plants, if built, will cause unacceptable changes in the character of our rural desert area. The massive 750 foot high towers, mirror fields and generation equipment will industrialize our area but provide little economic benefit for our small local California communities or Inyo County. The viewshed from the Old Spanish Trail Highway will be very substantially altered. The segment of Old Spanish Trial from the Spring Mountains through the Amargosa Canyon, a portion of which is documented to pass through or vary near the HHSEGS site, is one of the least disturbed and intact sections of any historic trail in the US southwest. Mule and wagon traces can still be easily seen, with the vistas yet unchanged and the rigors, solitude and grandeur of the trail imagined. Native American religious, burial and ceremonial sites and practices will be adversely affected. The obtrusiveness of 750 foot night-lighted towers will be ever apparent and will destroy dark sky views.

Comment 8

Comment 9

The Final Staff Assessment should more seriously examine alternative locations such as Sandy Valley and other technologies such as solar PV and distributed generation. Alternative locations and distributed generation would avoid the visual and cultural impacts of the project to the Amargosa region and solar PV would eliminate the need for the two 750 foot-high towers.

Comment 10

Respectfully submitted,

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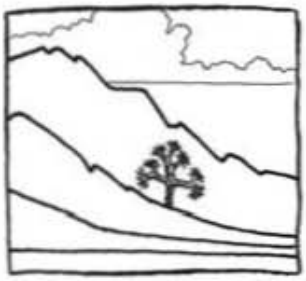
Donna Lamm
Executive Director, Amargosa Conservancy



Basin and Range Watch

July 21, 2012,

To: Mike Monosmith
Project Manager
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California Energy Commission
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Dear Mike,

We would like to submit the following comments for the Preliminary Staff Assessment (PSA) for the California Energy Commission staff's independent analysis of the proposed Hidden Hills Solar Electric Generating System (HHSEGS). CEC-700-2012-003-PSA DOCKET NUMBER 11-AFC-02.

Basin and Range Watch is a group of volunteers who live in the deserts of Nevada and California, working to stop the destruction of our desert homeland. Industrial renewable energy companies are seeking to develop millions of acres of unspoiled habitat in our region. Our goal is to identify the problems of energy sprawl and find solutions that will preserve our natural ecosystems and open spaces.

Alternatives:

The PSA fails to analyze a full range of reasonable alternatives. Missing from the PSA are alternatives that would consider private lands outside of the area.

Comment 1

An off – site alternative should be considered in areas like the Central Valley of California or other disturbed or degraded lands.

Comment 2

The US Environmental Protection Agency has identified over 15 million acres of degraded lands or "brown-fields" in the United States that would be appropriate for large scale renewable energy development. http://www.sustainablebusiness.com/index.cfm/go/news.display/id/23646

While siting the project outside of the area may not be financially feasible for BrightSource, many exceptions have been made in both the NEPA and CEQA review process for their Ivanpah project to expedite construction. This favors the goals of the developer, but over-rides the concerns of those of us who oppose these projects.

Comment 3

The CEC fails to analyze the distributed generation alternative which is a win/win energy situation for all of us. The justification is for the convenience of BrightSource. The CEC reviewed the DG alternative for other projects including Ivanpah, Genesis and the now bankrupt but approved Imperial Project.

Comment 4

Distributed generation in the built environment should be given much more full analysis, as it is a completely viable alternative. This project will need just as much dispatchable baseload behind it, and also does not have storage. But environmental costs are negligible with distributed generation, compared with this project. Distributed generation cannot be "done overnight," but neither can large transmission lines across hundreds of miles from remote central station plants to load centers. Most importantly, distributed generation will not reduce the natural carbon-storing ability of healthy desert ecosystems, will not disturb biological soil crusts, and will not degrade and fragment habitats of protected, sensitive, and rare species.

Alternatives should be looked at that are in load centers, not closest to the project site. There is a need to consider the "macro" picture, the entire state, to look at maximum efficiency.

Comment 5

A master comprehensive plan should exist before large expensive inefficient solar plants are sited and built out in the wildlands. This plan should carefully analyze the recreational and biodiversity resources on public lands. A list of assumptions should be included detailing the plan for integrating various fuels mixes and technologies into each utility's plan, an overall state plan, and a national plan. Loads should be carefully analyzed to determine whether additional capacity is needed for peaking, intermediate, or baseload purposes. Unit size, which impacts capital and operating costs and unit capacity factors, has a direct bearing on the relative economics of one technology over another. A plan might recommend that smaller units built in cities and spaced in time offer a less risky solution than one large unit built immediately.

Comment 6

Right now there is no utility plan, no state plan, and no national plan. Large-scale central station energy projects have been sited very far from load centers out in remote deserts, with the only criterion being nearness to existing transmission lines and natural gas lines. Very little thought has been given to the richness of biological resources, the cumulative impacts on visual scenery to tourists, the proximity to ratepayers, or the level of disturbance of the site.

There will be a need to build many new efficient natural gas peaker or baseload plants to back up the renewable projects planned. Instead, the renewables should be distributed generation in load centers, which will provide much more efficiency, rather than inefficient remote central station plants that reduce biodiversity and require expensive transmission lines. This reduces the risk, as distributed generation is a known technology and has been proven in countries like Germany where incentive programs have been tested. Incentive programs can be designed in an intelligent manner to vastly increase distributed generation. Incentives for large remote projects are unproven to lower risk and may actually raise debt levels with runaway costs associated with poor sighting and higher-than-anticipated

Comment 7

operating and maintenance costs. Many renewable project developers have failed to consider reasonable or viable alternatives that could serve as solutions that everybody could live with. In the case of this particular project, conflicts with endangered species, cultural resources, storm water drainage erosion, viewscapes from National Parks and wilderness areas could all be avoided with a distributed generation alternative.

Comment 7

The CEC rejects a smaller project footprint alternative because "The applicant concludes that a smaller plant "would not feasibly accomplish most of the basic objectives of the project and would not avoid or substantially lessen one or more of the significant effects. Furthermore, a smaller plant may result in an inefficient use of the land by failing to fully realize the solar potential of the area."

Comment 8

It appears that the CEC rejected this alterative for the benefit of BrightSource. The people who oppose this project are not concerned with the problems of feasibility and solar potential for BrightSource. Alternatives that are not feasible for the applicant should still be considered. If the applicant cannot meet the objectives of these alternatives, it could be a justification for No Action or considering another application. Such alternatives could still be considered for potential future applicants.

Comment 9

Visual Resources: Even though the project would be built on private lands, the massive horizontal and vertical scale of the project will have three-dimensional cumulative visual resource impacts that could have damage view-sheds over 50 miles away. We agree with the statement on page 4-13-2: "Project impacts, in combination with existing and foreseeable future solar and other development projects within the greater Pahrump Valley, including both California and Nevada, would contribute to a perceived sense of industrialization of the open, undeveloped desert landscape and impact views of scenic resources in the Pahrump Valley viewshed, having the potential to be significant and unavoidable."

Comment 10

All of the viewsheds that could be potentially be impacted by HHSEGS should be viewed under BLM Class One VRM standards due to the immense size of the project foot print. Just about every acre of the project has the potential to impact the view from surrounding wilderness and residential areas. BLM VRM analysis are often insufficient to review projects spanning 3 to ten square miles.

The KOP Visual simulations are incomplete. There are not enough simulations representing upper bajada or mid-elevations from wilderness areas. There are not enough simulations from high elevations from BLM and Forest Service Wilderness Areas. There is no simulation of night lighting. There are no KOP simulations of flash-glare events. There are no KOP simulations of dust plumes that would occur from construction.

Comment 11

The below photo was taken looking towards the project site from Bonanza Peak, about 9,500 feet up in the Mt. Charleston Wilderness Area, in the Toiyabe National Forest, Nevada. Glare from the towers and the heliostats will be visible from this view. A KOP representing high elevations is needed.

Comment 12

Flash Glare from heliostats can occur from many different locations at different times of day at different times of year. It will be more likely to occur and be seen from mid -bajada to mountain top locations. We would like to see at least 4 KOP simulations of flash glare from different elevations around the project area.

Comment 13

The below photo is actual flash glare from the Nevada Solar One plant near Boulder City, Nevada. While this is a different technology, it still incorporated the reflective use of sun. Similar events can be expected from the HHSEGS Project.

Comment 14

Comment 15

More KOP simulations should be made of the Stump Spring Area of Critical Environmental Concern (ACEC). Because part of the conservation management objective for this ACEC is to maintain the historic quality of the area for the Old Spanish Trail, we believe the visual impacts will be particularly impossible to mitigate. Not only would the power towers and heliostat flash glare impact the ACEC, but the Valley

Comment 16

Electric Transmission Project will be sited right next to Stump Spring. Efforts to mitigate the visual impacts with planted trees will not be effective because the towers and the powerlines will be very tall. Planted trees will look unnatural and require too much water to maintain. It is not likely that they will all survive. Efforts to mitigate visual impacts by building interpretive signs and a visitor center will also be ineffective. Again, there is no way that these efforts can hide such large industrial visual intrusions. It is a value call by the agencies to determine that a visitor center would somehow offset a visual intrusion. It is not a value that makes sense to us.

Comment 17

Below is a view from Stump Spring looking towards the location of the proposed 550 KV Valley Electric Transmission Line. A KOP simulation of the transmission line should be provided from this view:

Comments 18a-18g

We believe the following Key Observation Points should be analyzed and added:

1. More from the 5,000 foot elevations from adjacent wilderness areas such as the Nopah Range Wilderness.
2. KOP simulations from higher elevations from the Spring Mountains National Recreation Area
3. Dark Sky and night lighting KOP simulations
4. More simulations from the Stump Spring Area of Critical Environmental Concern.
5. Multiple simulations depicting flash glare events from different locations.
6. Simulations of worst case scenario dust plumes during construction.
7. There should be one KOP depicting browning or dying vegetation at Stump Spring to simulate the worst case scenario of water draw down and how it may impact the spring. Water draw-down at Stump Spring can be considered a visual impact as well as an ecological impact.

Cultural Resources: We agree with the conclusions in the PSA that the Hidden Hills Project and the proposed Valley Electric Transmission Project will have adverse impacts to the Old Spanish Trail.

Dust from construction, noise from construction, flash glare events from the project, very bright receiver towers, and flashing night time aviation lights will all degrade the remote and historical feel of Stump Spring.

We agree with the following statement in the PSA: "While not all of the traces on the project site have been ground truthed, it is clear that the project site lies squarely among all of these tracks/traces and, therefore, within the OST-MR Northern Corridor, a regionally and nationally significant travel/trade

corridor that aided the exploration and shaped the development of the southwestern United States. Although not formally included in the Act, staff has concluded that these tracks/traces should also be considered part of the Old Spanish National Historic Trail. As such the Corridor is a historical resource for the purposes of the CA Environmental Quality Act and potential impacts resulting from the proposed project must be evaluated. The proposed project has the potential to significantly impact the OST-MR Northern Corridor by erasing traces/trails on site and visually impacting traces/tracks off site, which could jeopardize the integrity of the OST-MR segment in the Pahrump Valley." (quoted from pp. 70-71)

The CEC is recommending the following mitigation measures for damage to cultural landscapes:

"CUL-9 calls for the project owner to fund and contract for a study by OSTA of the OST-MR Northern Corridor. CUL-9 details steps that must be included in the study."

" CUL-10 calls for the project owner to construct and maintain an Interpretive Center, with parking, and interpretive panels highlighting the visual and cultural resources that will be adversely impacted by the HHSEGS project. Again, CUL-10 details steps and features that must be included in the interpretive center."

Comment 19

These are value judgments by the CEC. We do not think that funding a study will do much of anything to offset the intrusions to the experience that large power towers and transmission lines would have on the visitor to Stump Spring or the Old Spanish Trail in general. It's almost as if you are telling us that we would feel better looking at these intrusions knowing that BrightSource is funding a study. That is a far stretch for mitigation.

Even more ridiculous is the idea that a visitor center with a lot of parking spaces would somehow off set the impacts to the Old Spanish Trail. If anything, a new visitor center will add a modern looking component to the Old Spanish Trail and the presence of more big bulldozers and dust plumes is exactly what we are trying to avoid out there.

Comment 20

The impacts to the Old Spanish Trail and Stump Spring should be reason enough for the CEC to choose either the No Action Alternative or look at an alternative for a different location or a different technology.

Socio-Economics: Large energy projects like this tend create a boom and bust effect on small economies. In the case of the Hidden Hills Project, BrightSource is proposing to place intrusive industry right next to a small residential community and close to the communities of Sandy Valley and Pahrump. Initially, the economy would boom to a point during construction, but after construction, a limited amount of full time jobs would be created and any future potential for a housing community or increased tourism has been sacrificed for one company. Placing an unsightly industrial complex on the Old Spanish Trail Highway will tend to drive people away from places like Tecopa and the businesses there. The community of Pahrump originally was quite supportive of the Hidden Hills Project until they realized that BrightSource is more committed to employing Union workers from the State of California. Like their Ivanpah Project right next to the Nevada border, they are closer to a workforce in Nevada, but are having people travel a long way from California to satisfy the commitment to California unions. The state of Nevada gets a small economic benefit from all of this. Only about ten percent of the workers come from Nevada.

Comment 21

Inyo County, California has been concerned about having to flip the bill for emergency response to fires, medical, etc. and they do not have the resources to pay for all emergency services. These BrightSource projects have never been tested at the large scale they are being built. The Ivanpah Project has been reconfigured a few times. The site has been flash flooded and the company wants to change the design to burn more natural gas.

Comment 22

As residents and tax payers of Nye County just over the state line, we are concerned that our county will be financially burdened with dealing with any potential emergencies that come up for this project. We do not want to have to flip the bill for the consequences of a poorly planned and expedited review for this project. The CEC did not give the public nearly enough time to adequately review the 1,159 page PSA. We would like to once again ask the CEC to slow things down, give us another two to five years to review this project before you make a decision that we will all be sorry for. Please resist the temptation to "Over-Ride" all of the issues that cannot be mitigated. We are very concerned about the way the CEC gives very thorough review to these projects and as in the case of the Imperial Project (and several others), implemented "Over-Rides" to all of the issues they could not come up with mitigation solutions for. In the case of the Imperial Project, that was about 90 percent of the issues.

Comment 22a

Biological Resources:

The PSA does a thorough job of analyzing the impacts that the HHSEGS Project would have on biological resources. We would like to emphasize our concerns in the comments below:

The CEC has determined that the Stump Spring Area of Critical Environmental Concern could be in danger of water draw down from efforts by BrightSource to control dust, wash heliostats, and cooling turbines. Stump Spring has already been impacted by water over-draft in the basin. Water draw down has impacted the spring to the point where surface water is now only confined to 3 seasonal pools, but there is still an abundance of riparian habitat that supports much of the wildlife in the region. The potential removal of this spring could have unrivaled consequences to the biological diversity in the region.

The close proximity of the HHSEGS Project to Stump Spring makes the region's wildlife particularly susceptible to the solar flux treat. Stump Spring provides a very important habitat for the region's avian fauna.

Mesquite is abundant and provides ample wildlife habitat. The PSA states that the mesquite in the area predate the sand dunes. Because it is difficult for mesquite seeds to germinate in sand, Stump Springs may be a unique, relic population of mesquite which would make it even more vulnerable to water draw down.

Comment 23

Stump Spring will likely see impacts from invasive weeds that will spread as a result of the industrial removal of 3,300 acres of habitat.

Avian Fauna: The PSA provides a list of bird species that were observed during the surveys. The PSA also provides a list of rare and sensitive birds that may occur at the spring.

Comment 24

We would like to add these photos of a juvenile Swainson's hawk (*Buteo swainsoni*) that we observed at the spring in June of 2012. The Swainson's hawk is a California Department of Fish and Game Threatened Species and a Species of Special Concern with the Fish and Wildlife Service.

Comment 25

Comment 26

Solar Flux: The solar flux issue is documented from the old Daggett Power Tower (now taken down). The issue of avian fauna getting injured or burned to death from power tower solar flux is not close to being resolved. This is primarily because the largest power tower in operation is in Spain and is not much taller than 150 feet. The only official study that we are aware of is the paper AVIAN MORTALITY AT A SOLAR ENERGY POWER PLANT, by Michael D. McCrary, Robert L. McKernan, Raplh W. Schreiber, William D. Wagner, and Terry C. Sciarrotta, Journal of Field Ornithology, 57(2): 135-141, found that Solar 1 during 40 weeks of study, caused 70 bird fatalities involving 26 species, most from collisions with both heliostats and tower, but thirteen (19%) birds (of 7 species) **died from burning in the standby point**. Heavily singed flight and contour feathers indicated that the birds burned to death. Six (46%) of these

fatalities involved aerial foragers (swifts and swallows) which are apparently more susceptible to this form of mortality because of their feeding behavior.

Comment 27

Other than a study being conducted for the 100 foot BrightSource power tower in Israel, there is very little data out there other than the fact that we expect this to be a big problem with avian mortality. The solar flux issue came up in extended debate during the Ivanpah Solar Electric Generating System proceedings. At the time (and this still stands because Ivanpah has not been activated yet), there was no resolution for the solar flux issue in Ivanpah Valley. Even though Clark Mountain is a sky island and is known to have a series of rare birds that migrate and utilize the white fir forest close to the summit, the project was approved with no adequate mitigation to prevent solar flux from killing the birds. The HHSEGS project may have an identical issue with birds using the relic white fir forest located on Kingston Peak within view of the HHSEGS project. Many may be the same birds that use the Clark Mountain Sky Island.

Comment 28

The PSA also fails to analyze the full impacts that flux could have on many individual species. The burrowing owl does not glide, but can fly to very high elevations. While it is more likely for a turkey vulture or a golden eagle to be injured or killed by flux, species like the burrowing owl are still at risk.

The Altamont Pass Wind Farm is estimated to kill 100 burrowing owls *(Athene cunicularia hypugaea*) per year. Of course, a wind turbine and a solar receiver tower with heliostats are two different things, but many feel that solar flux may be more dangerous to birds than wind turbines.

Comment 29

We would like to request a study on which birds would and could be impacted by flux. The PSA should list flux as a risk to the burrowing owl.

Here is the link for the Altamont Pass wind farm burrowing owl kill numbers:
https://www.biologicaldiversity.org/campaigns/protecting_birds_of_prey_at_altamont_pass/pdfs/Burrowing_Owl_Fatalities_APWRA.pdf

The three towers at Ivanpah are 450 feet tall and nobody has any clue as to how many birds will be killed by flux. The HHSEGS Project towers will be over 700 feet tall and it appears that the agencies are ready to approve this before they even know the scope of risk that would be caused by flux.

Comment 30

We would like to request that the solar flux issue be studied in Ivanpah Valley after the BrightSource plant is activated. This study should go on for 3 years before approval of the HHSEGS Project is even considered. You simply do not have enough data and information to convince us that the HHSGS Project will not cause a permanent reduction of the avian fauna in the region.

Golden Eagle *(Aquila chrysaetos)*:

Comment 31

The HHSEGS Project will remove 3,200 acres of foraging habitat for golden eagles and eagles stand a good chance of getting killed by the solar flux problem. The project area has been known as a golden eagle hot spot for some time now. Surveys uncovered 19 golden eagle nests within ten miles of the project site. As it stands now, Take permits are very difficult to issue under the Bald and Golden Eagle Protection Act. Attempts to issue the first Take permit for eagles for the West Butte Wind Farm in Oregon are currently under litigation.

At this point, we see no ideas for mitigating or preventing golden eagle kills with the solar flux issue.

Comment 32

Desert Bighorn Sheep *(Ovis canadensis nelsoni):*

Part of a carcass of a bighorn sheep was found on the project site years ago; Bighorn sheep do not "accidentally" use habitat, sheep have reasons for occupying an area and the Hidden Hills project site may be connectivity habitat between the Spring Range, the Kingston Range, and the Nopah Range. This occurrence should not be looked at as an anomaly, but as part of the normal range of the bighorn sheep here. These metapopulations need to maintain connectivity for genetic health, and landscape-level obstacles and barriers will hinder movement across valleys and alluvial valley sides. No mitigation can replace this function of habitat and regional geographic movement corridors. Some lower areas, fans, and valley floors are only used on rainy years when vegetation provides forage, making these habitats even more important to protect. Wherever an animal is found is its habitat.

The goal of conservation biology is not to protect individual animals, but to protect populations in a landscape, as well as the ecological processes that occur at the landscape level. This must include all habitat areas including those with irregular use such as valley floors.

Comment 33

In order to understand and possibly be able to mitigate bighorn movement corridors in the area that may be impacted by the project, a study and monitoring plan should be undertaken. This plan should seek to understand population connectivity in this landscape, and could use such methods as least-cost modeling of dispersal costs for each habitat type in Pahrump Valley and surrounding mountain ranges, and dispersal paths between metapopulations based on genetic studies and expert opinions. The plan should include a GIS map of migration rates for bighorn sheep and connectivity models. After this modeling has been completed and a reasonable hypothesis of gene flow predicted for the area, a conservation strategy can then be developed for the bighorn in the local area (see Optimizing dispersal and corridor models using landscape genetics. 2007. Epps, C. W., Wehausen, J. D., Bleich, V. C., Torres, S. G. and Brashares, J. S. Journal of Applied Ecology 44: 714–724).

Kit fox (*Vulpes macrotis)* and American badger (Taxidea taxus):

Comment 34

Because of the growing outbreak of canine distemper in Desert kit foxes along the I-10 corridor in Riverside County, possibly associated with passive relocation and hazing of the kit foxes from their home territories on large-scale solar project construction areas and associated transmission lines, we request the applicant be responsible for a Regional Kit Fox Monitoring Plan in the Pahrump Valley. There is a possibility the disease could spread to Inyo County, or a new outbreak occur, and monitoring must be undertaken to ensure the Desert kit fox does not decline in population.

Because of the potential declines observed over much of the range of the kit fox (see Meaney et al. 2006) the kit fox should be treated as a potential sensitive species or species of special concern. It is a fully protected fur-bearing mammal in California Department of Fish and Game code.

Comment 35

The applicant should be required to test for canine distemper in kit foxes impacted directly and indirectly by the project. Fenced areas should be monitored for any kit foxes climbing back into active construction areas. Surveys should be undertaken to count how many kit foxes are in the area and ten-mile buffer zone around the project, to set a baseline for an ongoing monitoring program. Fencing to exclude kit foxes should be described. Hazing techniques should be explained in full detail for public review. A plan to address any distemper outbreak should be formulated. A plan for contacting California Department of Fish and Game and a veterinarian should be in place. A monitoring plan should be ongoing for five years after construction.

The American badger should also be included in a monitoring plan, in addition to kit fox.

Reference:

Meaney, C.A., M. Reed-Eckert, and G.P. Beauvais. (2006, August 21). Kit Fox (*Vulpes macrotis*): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/kitfox.pdf [date of access].

Desert Tortoise: *(Gopherus agassizii)*

Comment 36

We request that mitigation ratios for shadscale scrub habitat on the project site be mitigated at a 3:1 ratio when purchasing compensatory habitat, similar to the ratio proposed for Mojave Desert creosote scrub. Although sometimes thought of as "lower quality" habitat, the shadscale scrub we examined near the project site appeared to be very good Desert tortoise habitat, with many active tortoise burrows among the shadscale. Basing habitat occupancy estimates by merely looking at maps or models should not replace on-the-ground surveys for sign and animals. We believe the shadscale scrub habitat in this area is high quality tortoise habitat and should be mitigated at a higher ratio than 1:1.

Below is a photo of an active desert tortoise burrow that we found in shadscale scrub habitat adjacent to the site:

Comment 37

Tortoise Relocation: At the workshop in Bishop, California, BrightSource stated that they wanted to move the tortoises to a small strip of land near the Nevada border. They would put them on the California side in order to avoid regulations that prohibit moving tortoises from state to state. BrightSource is going to request that state agencies change the rules for this project. We understand that BrightSource feels that this is the best habitat to move the tortoise to, but we also feel that state regulations can be useful tools in conservation. We are concerned that any changes to state law would set a precedent and overall weaken conservation laws. We are worried that these rule changes could be used for other big utility scale solar and wind projects.

The HHSEGS Project will cut off and remove 3,200 acres of desert tortoise habitat. The massive footprint will not only destroy habitat, but also block connectivity corridors. According to the PSA, as many as 33 adults, 34 juveniles and 158 eggs could be on the site. This indicates a healthy, functioning population.

Complications from relocation could lead to respiratory disease outbreaks and predation. BrightSource has already removed and compromised a good functioning desert tortoise population in Ivanpah Valley. The CEC should think twice before permitting removal of yet another 3,200 acres of habitat.

Rare Plants:

Below is the list of rare plants we have that could occur on the site and in the area. Some are in the PSA, some are not:

Aliciella humillima (medium – soon to be listed by CNPS)

Aliciella triodon (medium)

Arctomecon merriamii (medium)

Asclepias nytaginifolia (low)

Astragalus geyeri var. *geyeri* (low)

Astragalus mohavensis var. *hemigyrus* (low)

Astragalus nyensis (low)

Astragalus preussii var. *preussii* (likely)

Astragalus sabulonum (known)

Astragalus tidestromii (high)

Atriplex longitrichoma (high)

Bouteloua trifida (low)

Camissonia boothii ssp *alyssoides* (low)

Camissonia boothii ssp *boothii* (low)

Chaetadelpha wheeleri (low)

Chamaesyce parryi (medium)

Cryptantha costata (medium)

Cryptantha insolita (low)

Coryphantha chlorantha (low)

Cordylanthus parviflorus (medium)

Cymopterus gilmanii (medium)

Cymopterus multinervatus (low)

Enceliopsis covillei (low)

Enceliopsis nudicaulis var. *corrugata* (low)

Eriogonum bifurcatum (high)

Eriogonum contiguum (medium)

Eriogonum hoffmannii var. *robustius* (low but habitat present)

Gilmania luteola (low)

Iva acerosa (low)

Loeseliastrum depressum (low)

Mentzelia leucophylla (low but habitat present)

Mentzelia polita (medium)

Mortonia utahensis (low)

Oenothera cavernae (low)

Pediomelum castoreum (medium)

Penstemon bicolor ssp. *bicolor* (low)

Penstemon bicolor ssp. *roseus* (low)

Penstemon fruticiformis ssp. *amargosae* (low)

Penstemon stephensii (low)

Penstemon utahensis (low)

Perityle intricata (low)

Petalonyx thurberi ssp. *gilmanii* (low)

Phacelia coerulea (low but habitat present)

Phacelia filiae (low)

Phacelia parishii (medium)

Phacelia pulchella var. *gooddingii* (known)

Physalis lobata (medium)

Polygala heterorhyncha (low)

Sclerocactus johnstonii (medium)

Sibara deserti (low)

Sphaeralcea rusbyi var. *eremicola* (high)

Stipa arida (low)

Tripterocalyx micranthus (low)

Water:

Stump Springs to the east of the project is a valuable resource, and the wells of local residents in Charleston Heights are also an issue that need protection. Groundwater declines from project pumping should be limited to close to zero at the springs. The applicant did a well pump test at the request of the California Energy Commission to learn more about the aquifer in the area, but the interpretations of the data were widely divergent between the applicant and the Energy Commission hydrologists.

There was disagreement about the characterization of the groundwater basin at a June 14, 2012 workshop in Pahrump. The CEC hydrologist said the data fit a fully confined aquifer characterization better. They believed drawdown could reach Stump Springs at 30 years, and could even be several feet of lowering. There is still enough uncertainty. As for leakance, the hydrologist said not enough data was collected for a long period, there could be temporary leakance. The recharge must be looked at not locally but for the whole aquifer, and all evidence indicated the Pahrump Valley aquifer was not recharging.

Storage is extremely low other tests showed. There may be confining units such as clay beds at Stump Springs, that a drawdown could impact. The Energy Commission hydrologist said the applicant needed to reach out much farther in their analysis, and we agree. A gradient in a confined system is not a source of recharge.

Comment 38

CEC wanted the applicant to have 3 monitoring wells outside the project in a line with the proposed project wells, all at 1,000 feet deep, and we recommend this as well. Two upstream from the project and one downstream. Triggers should be required as new mitigation, such as sending out biologists to monitor how the deep-rooted mesquite at Stump Spring react, and if they appear to be adversely affected. CEC said if they see a half-foot drop in water at the project boundary, then the assumption could be made that pumping might be affecting Stump Spring.

We agree with the CEC that groundwater pumping by the project would need mitigation. Mitigation Measures Water Supply 1, 6, 7, and 8 to offset impacts to overdraft in the basin and potential impacts to

Comment 39

local well owners and nearby springs are needed. We also recommend, in contrast with CEC, that there might be potential impacts to the Amargosa River drainage from unstudied connections with the Pahrump Valley aquifer; mitigation measures should be enacted.

Comment 40

A Water Supply Plan showing how the applicant will replace 163 AFY per year as a condition of certification in Water Supply-1 should be completed before approval and certification of the project so that the public can review this important plan. How do we know there are even enough private wells and water rights to purchase and retire?

Comment 41

Similarly, a Groundwater Level Monitoring, Mitigation, and Reporting Plan (Water Supply-6) should be prepared now, before certification, so that the public -- and especially local residents -- can review the plan. There is a lot of deferred mitigation in this review. If project pumping lowers residents' well levels by 1.5 feet then the applicant should reimburse the well owners. We believe ten feet lowering is too much and damage may already be done to resident's ability to have a reliable water supply.

Comment 42

Saying that the applicant will simply reimburse local well owners if their well goes dry to dig a deeper well, is not acceptable. There may come a point when no depth can be reached to water, so extreme is overdraft. The project should be not be approved if this is a possibility.

The Amargosa Conservancy pointed out that their pump tests in cooperation with US Geological Survey in the Amargosa Valley showed surprising results. Some areas that were supposed to have water did not. Past Yucca Mountain Nuclear Repository testing, which was very extensive in Amargosa Valley, showed a complex picture of drilling hitting carbonate rocks at 200 feet and in other areas 2,000 feet -- there are buried mountain ranges under the valley sediments, it is not just a big fill basin. The Conservancy said the applicant's pump test was inadequate. They want more monitoring wells farther out, towards California where unknown and potential connections with Amargosa Valley could be present. We support this recommendation, as more needs to be studied about the complex hydrology of the region before more drawdown is allowed. A regional groundwater map should be made, and more well testing should be undertaken before approval of this project.

Comment 43

Impacts to Local Communities:

We see this all of the time. A big energy developer (usually subsidized) comes to a small community, promises everyone a job and offers to buy the town something like a community center. The projects are usually built right next to people's homes (as in the case of Charleston View). Most of the people have trouble selling their property and do not have the resources or finances to move. Their quality of life goes downhill while the developer makes money and usually does not share that with anybody. It is a dead end for these people.

Comment 44

The Cumulative Scenario:

On the one hand, BrightSource promises the most minimum impacts from the HHSEGS Project. On the other hand, BrightSource has publically stated that they would like to build up to three more of these massive projects in the same region! That would multiply their water use for HHSGS by 4. It would multiply their removal of habitat for biological resources by 4. All of the people living in the area would be forced to look at these developments from many different perspectives. Any attempts to turn the whole area into a solar energy farm will likely be met with bitter opposition. It is quite unfortunate that

politicians and energy developers like BrightSource have chosen the most environmentally unfriendly way to use solar energy. Please visit the following link for the right way: www.solardoneright.org.

Conclusion: The CEC should not permit the HHSGS Project to go forward. There are simply too many impacts that cannot be mitigated. At the very least, the CEC should delay approval of this project for at least another 5 years so more studies can be conducted concerning hydrologic, biological, cultural, visual and socioeconomic resources can be better evaluated. It does not work to "approve now, mitigate later'. The agencies tried that and it has failed miserably.

Comment 45

Thank you,

Kevin Emmerich
Laura Cunningham
Basin and Range Watch
P.O. Box 70
Beatty, NV 89003

Hidden Hills Solar Electric Generating System, 11-AFC-2

Preliminary Staff Assessment

General Comments

by: the Pahrump Paiute Tribe

California Energy Commission
DOCKETED
11-AFC-2
TN # 66323
JUL 25 2012

In the history told by the dominant culture in the United States, Europeans "discovered" a vast, unexplored continent unknown to any before them and "claimed" it in the name of their countries. They went on to "civilize" the land and the ignorant peoples they encountered, eventually creating a venerable democratic government that provided for "freedom" in religion, speech, and other personal rights. They created a military to protect the civilized people from invaders, and now, as in most governmental systems, people are taught to honor and revere both the government and the military.

In Native history, in the reality that is *our* past and *our* present, Europeans were the invaders. They took over lands that were already occupied by established functioning governments. They blatantly stole land that was already tended by peoples who co-existed with the land. The Europeans eventually killed between 80 to 95 percent of the Native peoples on the continent, primarily from intentionally introduced diseases to which the Native Americans had no resistance. With the goal of either eliminating or suppressing resistance achieved, the Europeans then began possessing, bargaining with, and using the land for monetary gain rather than sustenance and survival. The European advance into what is now the United States stripped away virtually all rights of the Native Americans, and continued to do so throughout history through broken treaties and empty promises. And now, as American citizens, we are expected to proudly honor and revere both the dominant government and military installations.

The problem with this expectation is that the dominant culture and the government associated with the dominant culture have never stopped in their attempts to "civilize" the Native Americans. They have never stopped stripping away the rights of peoples who have a government and a culture and a lifestyle that is different from theirs. They have never stopped believing that their claims to the land override the responsibility that the Creator gave Native Americans to watch over the land and all that is in it, and that their plans and uses for the land override our historical and current use of the land. This has been proven to our tribe time and again as the town of Pahrump and the surrounding areas have been settled and have grown far past the point of balance with nature. Large areas of our ancestral lands have been taken over, physical evidence of our history has been stolen and placed in facilities for the dominant culture to enjoy, our tribal encampments have been stolen, our tribal members have been forcibly removed from their homes, and our burial grounds have been taken over by those who moved here and have since been turned into an all-purpose graveyard.

The dominant government has put into place a number of legal "safeguards" that are supposed to provide for the protection of Native artifacts and other objects or areas of spiritual or religious

significance. In most cases, however, these safeguards are interpreted based solely on physical manifestations of Native American presence, such as artifacts or burials. The fact that the religious and spiritual existence of the Native Americans is both intertwined and inseparable from the land and its resources is largely ignored by the dominant culture in favor of personal wishes and monetary pursuits. The language used in the Cultural Resources Policy of Inyo County's General Plan is evidence of this: "Preserve and protect key resources that have contributed to the social…history and prehistory of the area, *unless overriding circumstances are warranted*."

Our tribe is once again in a position in which perceived "overriding circumstances" may be a factor. The California Energy Commission will have before them a decision whereby they determine whether the greater good achieved by a solar facility is more important than the spiritual and natural relevance of Pahrump Paiute ancestral territory. We disagree with the concept that this "greater good" is more important. First, it is not the responsibility of the Pahrump Paiute to shoulder the burden of those that moved into our territory and did not pay attention to the teachings about resource management that are automatically embedded in Native life. Instead, they have chosen to overpopulate, requiring more food, more oil, more land, more energy – more, more, more. The solution to this need for more resources is simple: control the growth of the population enough so that the available resources become sufficient. Second, if the need for energy were the sole factor driving the potential construction of this facility, other alternatives could be devised whereby current urban development could be utilized. It is not solely the need for energy driving the project, however; it is primarily the desire for profit. Thus, other alternatives are counterproductive. So, as illustrated before, the approval of this project would simply become one more way in which tribal ancestral lands have been acquired and developed in the name of the dollar.

Obviously, we support the denial of the project. We concur with the finding on page 61 of the PSA that there is no action that would "directly avoid or substantially minimize the significant effects that the proposed project would have on the three ethnographic landscapes and associated Native American practices." Since we are ultimately not the deciding vote, however, our tribe has reviewed the proposed compensatory mitigation in the event that the project is approved. Specific comments regarding PSA mitigations will follow in a separate document.

Hidden Hills Solar Electric Generating System, 11-AFC-2

Preliminary Staff Assessment

Specific Comments

by: the Pahrump Paiute Tribe

1) CUL-10 to CUL-12: The applicant would like to place a solar plant on over 3,000 acres of Pahrump Paiute ancestral land, which would cause significant impacts to the visual landscape, the wildlife in the area, nearby Native American cultural sites that would likely be disturbed or destroyed through cumulative-impact population growth, and the area's water and water-related biology. This land falls within the path of the Salt Song, a religious trail the deceased of the Southern Paiute (including the Pahrump Paiute) follow to the afterlife. If this path is broken, the spirits of our deceased may not make it to the appropriate place in the afterlife. In exchange for negatively impacting all of the above, the PSA proposes that appropriate compensatory mitigation would be a few panels at an Interpretive Center addressing Native American history and land use, research of an area of historical tribal land use, and restoration of the project site in the event of closure. While our tribe feels these mitigations are proposed in good faith, we do not feel their level of compensation is commensurate with the level of impact this project will have. We ask that Staff consider some of the further comments below.

Comment 1

Comment 2

Comment 3

2) Our tribe has made, and is making, our best effort to engage in effective communication with CEC, the lead agency for the project. CEC Staff have made themselves readily available to us in order to assist us in navigating the path to the FSA. However, the reality of our tribe is that we do not have a staff. The majority of us have day jobs that do not allow us to contribute the amount of time necessary to thoroughly and successfully address all the aspects this project encompasses. If this project is approved, the mitigations will take on lives of its own. CEC Staff will move on to new projects and cannot be expected to have the resources to continue helping us on the many points with which we will need assistance. We do not have the knowledge to navigate this process alone, and we do not have the financial resources necessary to hire someone who does know how to navigate the process. The applicant, on the other hand, has ample legal representation. Since we would not otherwise have had need for legal services, we find it appropriate that the applicant pay for a lawyer of our choosing to represent and advise the Pahrump Paiute in all dealings that relate to this project and the mitigations associated with this project for the life of the project so that we are able to meet the applicant on equal ground.

Comment 4

3) Salt Song Landscape pgs. 57-59: We agree with the information on page 59 written under this section regarding the inability to substitute or replace the Salt Song Landscape and the inability to modify the process by which we deliver our deceased to the afterlife. We are also, along with CEC Staff, unaware of means by which one could reduce the impact of building in this area to a

less than significant level or even a means by which our tribe, and all the other Southern Paiute whose deceased would be affected by the project, could be compensated. On this basis, we continue to advocate for denial of the project.

Comment 5

4) In the event the project is approved, based on cumulative impacts to the three landscapes identified in the PSA (pg 53), we would like to propose that lands, identified in conjunction with the Pahrump Paiute tribe, including, but not limited to, lands having religious, cultural, or spiritual value, and of equal size to the project, be acquired for the Tribe, in perpetuity, as we anticipate this project will be profitable and will extend past the original lease. We propose this on the basis that over 3,000 acres of tribal ancestral land and all associated uses are being eliminated, and on the basis that our rights to watch over and protect the land as the Creator tasked us to do are being violated by the construction of this project. We wish to fulfill our promise to the Creator, and if we fail in this endeavor by being forced to accept the approval of this project, we feel it is appropriate compensation to exchange land that we were not able to watch over for land that we are able to protect by putting it into our hands.

Comment 6

5) CUL-10: We have not had the opportunity to review mitigations in other portions of the PSA outside of the Cultural Resources section (see #2 above). As such, we are unaware if this request conflicts with VIS Conditions of Certification. However, if it does not, we would like to request that "Interpretive Center" be adjusted to read "Interpretive Building," or otherwise incorporate the word "building" into the Condition of Certification. As the Condition reads now, it seems as though the Condition could be fulfilled by panels on a stake. In the event of the project's approval, our tribe feels that wayside information panels would not be an appropriate exchange for the loss of land, habitat, gathering grounds, and educational opportunities caused by the project's existence. We also wish to request that the Condition include "interpretive panels and exhibits" in its language. An appropriate educational facility, for Natives and non-Natives alike, will include interactive exhibits. In addition, if the presence of a federal curator would qualify the interpretive facility to curate artifacts according to federal requirements, our tribe would like to request that a federal curator be employed at the interpretive facility for the life of the facility.

6) Verifications of some conditions of certification require the applicant to notify particular parties of interest when the verification has been completed (for example, CUL-10). When the PSA references the location of the proposed Interpretive Center, the verifications require notification of Inyo County. We believe it is preliminary to assume the Interpretive Center will be located in Inyo County and still be able to fulfill all conditions of certification. We request this language be replaced with "the county of locale" or equivalent.

7) CUL-10, Verification 2: We request that Native American tribal representatives be added (as in Verification 1) to the list of those who shall be notified that the site is ready for inspection.

Comment 7

8) Though we have not had the time and resources to read through the conditions of certification for biology or water (see #2 above), we wish to reiterate that the appropriation and development of tribal ancestral lands has occurred repeatedly throughout history. A direct effect of development is the relocation of wildlife from their native territory. When the next development occurs, the wildlife is moved again – then again – then again. This has occurred repeatedly over the course of development in the Pahrump Valley. Animals do not always adjust to new territory and sometimes die. Animals die in the process of development. Another effect to development is water usage, as illustrated by the lack of springs that once existed in the Pahrump Valley. When you eventually consider the cumulative impacts of past, present, and proposed development, the impact is significant. The plants, wildlife, and water are highly important to our culture and our tribe would like to be involved in management plans or mitigations regarding plants, wildlife, and water.

Comment 8

Comment 9

9) CUL-6, Paragraph 3: We would like to be part of the decision regarding who serves as Native American monitors. While we currently receive preference as a monitor as the only Native Americans with traditional ties to the area, if no or too few Pahrump Paiute are qualified or available to serve as monitors, we would like input as to what tribe then has preference.

Comment 10

California Energy Commission
DOCKETED
11-AFC-2
TN # 66326
JUL 25 2012

PAHRUMP PAIUTE TRIBE

Mr. Mike Monasmith, Project Manager
State of California
California Energy Commission
1516 Ninth Street,
Sacramento, CA

RE: Preliminary Staff Assessment for the
Proposed Hidden Hills Solar Electric Generating System Project

Dear Mr. Monasmith:

In addition to the multiple comments expressed you have received about Preliminary Staff Assessment (PSA) for the Hidden Hills Solar Electric Generating System (HHSEGS) at the June 27, 2012 in Bishop, CA, I am writing to amplify our concerns relating to specific items contained within and/or omitted from the PSA. While my focus in on the PSA, you will note that I refer to certain elements indentified in the ethnographic study, as a foundation.

As you have heard and we have shared during multiple public workshops and other forums, the Pahrump Paiute Tribe is concerned with the PSAs failure to discuss and/or consider certain items, which we believe are critical in the CEC's deliberations.

Based upon our review of the PSA, the document does not appear to thoroughly evaluate many of the cultural concerns we consider essential for the perpetuation of our culture. One contributing factor at the forefront of these concerns is the manner in which the ethnographic information was collected through an approved informed consent process. This agreed upon process provides for the reassurance that culturally sensitive information would be protected and kept confidential. We fully support the opportunity to redact culturally sensitive prior to posting on the CEC web site for the public to gain a glimpse into our culture and concerns.

Comment 1

Secondly, the PSA fails to address American Indian Environmental Justice issues relating to the citing of the proposed project within our traditional homelands and within culturally sensitive areas. The traditional stories of the Southern Paiutes passed down for generations, describes our place of creation or origin, which emanates from the Spring Mountains. The Pahrump Valley is considered our traditional holy lands and is known to possess the greatest of spiritual and physical resources within our cultural landscape. Traditional ceremonies that are conducted occur in the southern portion of the Pahrump Valley and incorporate the Hidden Hills area. According to tradition, these ceremonies must be done with the intention of spiritually assisting Southern Paiutes throughout Southern Nevada, Utah, Northern Arizona and Southern California. These culturally and linguistically

connected groups share these same perspectives and rely on our important resources for our mutual cultural survival. Violations to this holy land will be perpetuated by the impact from the proposed HHSEGS to the Southern Paiute cultural landscape and most directly in holy lands specifically the proposed Project Area of Analysis (PAA).

The Hidden Hills area is central to the lives of our people and is near our Creation place in the Spring Mountains. The Pahrump Paiute considers the disregard for our holy lands as constituting both Environmental Justice and equity violations. No other people have had their holy lands impacted by these types of projects causing perceived environmental and/or cultural pollution or damage. There is no question that Southern Paiutes from Nevada, Utah, Arizona and California will continue to lose cultural traditions attributed to the siting of this inappropriate project. Accordingly, the HHSEGS will forever alter and obstruct the visual, auditory and spiritual connection to the resources integral to important cultural ceremonies essential to our existence.

Comment 2

Comment 3

It is our contention the denial of access where certain ceremonies occurred resulting to from this project, notwithstanding the collection of traditional use plants and animals needed for our cultural survival is not thoroughly understood nor conveyed in the PSA. These particular issues are deep-rooted and steeped in our rich cultural traditions that are an integral part of proprietary songs and ceremonies. It is our position that if consideration is given to releasing vetted ethnographic information, a broader understanding about the complex issues relating to our cultural traditions will be better understood.

Comment 4

The lives and health of the Pahrump Paiutes who have occupied this area since our creation have been seriously threatened by the continuous expansion of projects that adversely impact our culture. This threat is not limited to Indian people who live in the immediate vicinity to the HHSEGS and use its resources on a regular basis, but extends to other Southern Paiutes who share resources that have been collecting and using area in or near the proposed PAA. As such, Southern Paiutes fear the continuous invisible peril of auditory, visual, cultural and spiritual contamination of our resources and its cumulative effects on future generations of Indian people. We continue to experience health effects from other energy projects and encounter the perceived risks from impacts to cultural resources needed for survival.

Comment 5

One of the most detrimental consequences of the HHSEGS for the survival of American Indian culture, religion, and society has been the denial of access to their traditional lands and resources. Losses of access to traditional foodstuffs medicine and other important resources have greatly contributed to the undermining the cultural well being of Indian people. Our people will continue to experience breakdowns in the process of cultural transmission due to the lack of access to the Hidden Hills area and the resources within. Although mitigative measures may be suggested by the project proponent and considered by the CEC, allowing our access to the area with impacts derived from the proposed land disturbance, as being with irreparable contamination compounded by the disturbance of the soil and

Comment 6

Comment 6, cont'd

underground water that ultimately renders these locations unusable. Any impacts to the hydrology and other important resources associated with the HHSEGS will elevate the risks of us maintaining cultural and ecological balance within and adjacent to the proposed Project Area and most importantly, to our cultural landscape.

It is well known among our people that within the PAA are an inordinate amount of cultural and archaeological resources that are more than merely remnants of the past. These resources are still used by our people and needed for our cultural survival. Any impact to these resources must be thoroughly and systematically evaluated and protected for future generations. As such, the area within or surrounding the proposed project should be designated as an Archaeological Landscape.

Comment 7

Further, the CEC must identify efforts to insure cultural conservation easements to include threatened and endangered plant and animal species are designated for the proper management by Southern Paiutes. Our people are tied to the land and resources. When speaking at the June 27th meeting, I provided a short overview of our epistemology relating to the Desert Tortoise. This important "relative" is highly revered and is known to bring good luck, protection to the people environment and the area, it brings one good luck and most importantly, allows one to live a long life. These attributes must not be forgotten and can disrupt the natural balance of the area. The Bighorn Sheep that are known to exist in the area is considered our teacher who brings our songs, stories and knowledge that is vitally needed. Clearly, the approach of keeping these animals and preserving the areas where they were traditionally placed will insure proper protection of the area and the continuity of our culture.

Comment 8

Lastly, as you are aware, the HHSEGS is being proposed near the St. Therese Mission now currently under construction. It is important to note, the Pahrump Paiute Tribe does not have any affiliation with this undertaking or plans to become aligned with this particular income generating private venture. Any consideration by the project proponent to suggest or the CEC to consider an agreement to incorporate the Pahrump Paiute Tribe in a shared mitigation strategy is highly inappropriate and considered culturally unacceptable.

Comment 9

Sincerely,

Richard W. Arnold

Richard W. Arnold, Traditional Practitioner, and
Tribal Chairman
Pahrump Paiute Tribe

cc: Thomas Gates

BIG PINE PAIUTE TRIBE OF THE OWENS VALLEY

Big Pine Paiute Indian Reservation

July 23, 2012

Mike Monasmith,
Senior Project Manager
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814-5512
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RE: Comments on the Preliminary Staff Assessment and Supplemental Staff Assessment of the BrightSource Hidden Hills Solar Energy Generating System

Dear Mr. Monasmith:

The following comments address the Preliminary Staff Assessment and Supplemental Staff Assessment of the BrightSource Hidden Hills Solar Energy Generating System.

The Big Pine Paiute Tribe of the Owens Valley (Tribe) recommends the "No Project" Alternative for the project. This area of southeastern Inyo County is not appropriate for industrial-scale solar development which would produce significant impacts on cultural, historical, biological, and visual resources which can't be mitigated to a less than significant level. The 500 megawatt power plant would have approximately 85,000 elevated mirrors which would be used to focus the sun's rays on a solar receiver steam generator that would produce steam to generate electricity. There would be two solar receiver steam generators on 740 ft. towers.

Cultural Resources—Cultural Landscapes Adversely Effected

The Supplemental Staff Assessment provides an excellent description of three cultural landscapes which would be adversely effected by the project: Salt Song Landscape, Pahrump Paiute Home Landscape, and the Mo hav Landscape. The Tribe supports the Pahrump Paiute Tribe's opposition to the project and the staff report's assessment of the project's significant impacts to cultural resources which can't be mitigated:

"The construction of the proposed project would cause a substantial adverse change in the significance of the three ethnographic landscapes. The presence of the heliostat fields and the 750 foot tall solar power towers would be a stark visual intrusion that would profoundly and irreparably degrade the ability of the landscapes to convey historical significance under CRHR

Criterion 1. In particular, the mass of the looming towers, in combination with the operational glare from the solar receiver steam generators atop each one, would compromise the setting, feeling, and association aspects of the resource integrity, aspects critical to the resource's ability to convey its associative values under Criterion 1. Subsequent to the construction of the facility, one would no longer be able to experience the sense of the landscape as it was during its period of significance" (p. 56).

Historic Resources—Old Spanish Trail/Mormon Road Adversely Effected

The Supplemental Staff Assessment states: "At least one historical built-environment resource, the Old Spanish Trail-Mormon Road, has been identified in the HHSEGS PAA thus far. Substantial information, including the National Register of Historic Places nomination of the Nevada segments of the Old Spanish Trail, has led staff to conclude that, within the PAA, this resource is not represented by a single route, but as a corridor of converging and intermingled tracks and trails. The project site is located within this corridor, with traces running throughout the project site. Staff has concluded that that the impacts of the proposed HHSGS project to this Old Spanish Trail-Mormon Road Northern Corridor (Corridor) would be significant and, even with full implementation of CUL-9 and CUL-12, would not be mitigated to a less than significant level" (p. 2).

In addition, the two 750 foot tall towers will have significant adverse visual impacts on the Old Spanish Trail, a National Historic Trail. Bill Helmer, the Tribal Historic Preservation Officer for the Big Pine Paiute Tribe, studied this area in 1998 as part of the National Park Service team which conducted the preliminary research for the Old Spanish Trail Feasibility Study. He also hiked a 350 mile segment of the Old Spanish Trail in 1983, with a 22 mile walk from Resting Springs on the west, past the project site to Stump Spring. Industrial-scale developments definitely would encroach upon the historic qualities of this landscape and would compromise the integrity of the Old Spanish Trail in this area.

Comment 1

Preliminary Staff Assessment (PSA), Biological Resources

Comment 2

The project will use approximately 140 acre feet of water a year. The Pahrump Valley groundwater basin has been in a state of overdraft for decades. The additional amount of water depletion for this project could have severe impacts on fragile desert vegetation such as the nearby mesquite bosques and other sensitive plant associations. Some last surviving cottonwoods and willows at Stump Spring not mentioned in the report may also be severely threatened with even minimal impacts to groundwater depletion.

The PSA recommends a monitoring plan in case the project produces adverse impacts to vegetation. This monitoring plan is inadequate because it seems that impacts to vegetation due to the project would be discovered after the damage had already been done. The project's impact on water resources and water-sensitive species and habitat would be significant, and could not be mitigated to a non-significant level.

Comment 3

Comment 4

Distributed Generation Alternative Needed

It is well known that Distributed Generation is a viable alternative to the industrial-scale projects which require huge adverse impacts to cultural, historical, biological, and visual resources (Bill Powers and Sheila Bowers, *Distributed Solar PV – Why It Should Be The Centerpiece Of U.S. Solar Energy Policy* (http://solardoneright.org/index.php/briefings/post/distributed_solar_pv_why_it_should_be_the_centerpiece_of_u.s._solar_energy_/). However, this alternative is not included in the PSA. It is recommended that a Distributed Generation Alternative be included in the Alternatives section.

Sincerely,

Virgil Moose
Tribal Chairperson

STATE OF CALIFORNIA

Energy Resources Conservation and Development Commission

In the Matter of:	
APPLICATION FOR CERTIFICATION FOR THE HIDDEN HILLS SOLAR ELECTRIC GENERATING SYSTEM (SEGS)	DOCKET NO. 11-AFC-2

INTERVENOR CENTER FOR BIOLOGICAL DIVERSITY'S COMMENTS ON THE PRELIMINARY STAFF ASSESSMENT MAY 2012 CEC-700-2012-003-PSA HIDDEN HILLS SOLAR ELECTRIC GENERATING SYSTEM (HHSEGS)

July 21, 2012

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STATE OF CALIFORNIA
Energy Resources Conservation and Development Commission

In the Matter of:

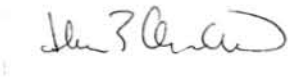
APPLICATION FOR CERTIFICATION FOR THE HIDDEN HILLS SOLAR ELECTRIC GENERATING SYSTEM (SEGS)

DOCKET NO. 11-AFC-2

The Center for Biological Diversity ("Center") submits the following comments on the Preliminary Staff Assessment May 2012 CEC-700-2012-003-PSA– Hidden Hills Solar Electric Generating System (HHSEGS).

Dated: July 21, 2012

Respectfully submitted,



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July 21, 2012

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RE: Application For Certification For The Hidden Hills Solar Electric Generating System Docket No. 11-AFC-02: Comments on the Preliminary Staff Assessment May 2012 CEC-700-2012-003-PSA– Hidden Hills Solar Electric Generating System (HHSEGS)

Dear Mr. Monasmith,

The Center for Biological Diversity ("Center") is a non-profit environmental organization dedicated to the protection of native species and their habitats through science, policy, and environmental law. The Center has over 378,000 members and supporters throughout California, Nevada and the western United States, including members that live nearby the vicinity of the proposed Hidden Hills Solar Electric Generating System (HHSEGS) and recreate in the nearby public lands. On December 22, 2011, the Center was granted leave to intervene in this proceeding. The Center submits these comments regarding the May 2012 Preliminary Staff Assessment ("PSA") on behalf of our board, staff and members.

I. INTRODUCTION

The development of renewable energy is a critical component of efforts to reduce greenhouse gas emissions, avoid the worst consequences of global warming, and to assist California in meeting its mandated emission reductions. The Center strongly supports the development of renewable energy production, and the generation of electricity from solar power, in particular. However, like any project, proposed solar power projects should be thoughtfully planned to minimize impacts to the environment. In particular, renewable energy projects should avoid impacts to sensitive species and habitat, and should be sited in proximity to the areas of electricity end-use in order to reduce the need for extensive new transmission lines and the efficiency loss associated with extended energy transmission. Only by maintaining the highest environmental standards with regard to local impacts, and effects on species and habitat, can renewable energy production be truly sustainable.

The current site proposed for this project in the Pahrump Valley in Inyo County, California is relatively devoid of human disturbance except for some dirt roads and the abandoned agricultural orchard. We concur with the Preliminary Staff Assessment which states, "The Hidden Hills Solar Electric Generating System project (HHSEGS or project)

would have significant direct and indirect impacts on biological resources." PSA at pg.4.2-1.

For biological resources and other topics, the PSA is incomplete, making it impossible to assess much less comment on the all of the proposed project impacts. However, based on the information provided in the incomplete PSA, significant impacts have been identified for a suite of species (PSA pg 4.2-63-67) including groundwater dependent vegetation, special status plant species, migratory/special status resident avian species and potentially golden eagle and negative impacts to numerous other rare plants and animals, including the beleaguered desert kit fox and the declining state threatened desert tortoise. Additionally, six "blue line" stream and an unidentified number of ephemeral drainages covering 28.33 acres of waters of the state would be impacted by the HHSEGS on the proposed site. The proposed project intends to pump groundwater from the already overdrafted aquifer further impacting precious desert water resources. The following comments address these issues:

II. COMMENTS ON THE MAY 2012 PSA

A. The Alternatives Analysis Outlined in the PSA Fails to Comply with CEQA

Comment 1

Pursuant to CEQA, the "policy of the state" is that projects with significant environmental impacts may not be approved "if there are feasible alternatives or feasible mitigation measures available which would substantially lessen the significant environmental effects…" Pub. Res. Code § 21002; Guidelines § 15021(a)(2). A Project should not be approved if environmentally superior alternatives exist "even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly." Pub. Res. Code §§ 21002; Guidelines §§ 15021(a)(2), 15126.6. The Project must be rejected if an alternative available for consideration would accomplish "most [not all] of the basic objectives of the project and could avoid or substantially lessen one or more of the significant effects." Guidelines § 15126.6(c).

Comment 2

Accordingly, the environmental review documents must consider a range of alternatives that would achieve the basic objectives of the project while avoiding or substantially lessening significant environmental effects, and it is essential that the "EIR shall include sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the proposed project." CEQA Guidelines § 15126.6. Alternative sites must also be considered where relocating the project would substantially lessen the significant impacts of the project. Guidelines Section 15126.6(f)(2). *See Citizens of Goleta Valley v County of Santa Barbara* (1988) 197 Cal.App.3d 1167; *Save Round Valley Alliance v. County of Inyo* (2007) 157 Cal.App.4th 1437 (whether an alternative site may be feasible even where it requires a change in land use designation; to determine feasibility requires detailed analysis of the alternatives; and even if an alternative is less profitable than the project as proposed it may still be a feasible alternative).

Comment 2, cont'd

Because the agency is charged with considering alternatives to avoid and minimize impacts, it cannot lawfully fulfill this duty based on the limited alternatives analysis presented in the PSA. Most importantly in this instance, the PSA must look at alternative sites that could avoid impacts to desert including resources where significant unmitigable impacts would occur. Alternatives could minimize or eliminate even supposedly "mitigable" impacts to species and communities such as water dependent vegetation by significantly reducing the need to pump more groundwater out of an already overdrafted groundwater system, or move the tortoises out or their native home ranges – a so-called mitigation measure that in practice has proved to be a disaster for the species. Therefore, the PSA should fully explore other alternatives that would achieve the same level of renewable energy production—the basic objective of the project—but without the significant impacts of the proposed project.

Comment 3

While the PSA provides review of five alternatives, we do not believe that the agency has as yet adequately explored alternative sites. This is evidenced by the fact that only one alternative site was discussed in any detail—Sandy Valley—although it would have substantially fewer impacts to biological resources than the proposed project. PSA at 6.1-24-25. Clearly this alternative is a feasible alternative that achieves the proposed project's goals while significantly reducing impacts to biological resources.

However, simply looking at one alternative site with fewer impacts as the proposed project does nothing to fulfill the agency's duty under CEQA. It strains credulity to believe that there are no other sites in California where the valid project objectives could be accomplished while further reducing the impacts (for example from required transmission infrastructure and gas pipeline which are essential infrastructure for this project but are not being analyzed in the PSA – see below discussion). Furthermore, it is unclear if this alternative is actually a currently proposed project, called Sandy Valley SEGS.

Comment 4

Comment 5

The remaining alternatives in the PSA explore different types of technologies on the same site. Several of the alternative technologies appear to be superior to the proposed project both in reaching and surpassing the goals of the proposed project and minimizing environmental impacts. For example, the photovoltaic alternative, based on the MW/acre presented in Alternatives Table 5 (PSA at 6.1-60-61), shows that the proposed project acreage could easily accommodate a 500 MW solar photovoltaic project, which would significantly reduce the need for ground water pumping in the already over-drafted Pahrump aquifer (PSA at 6.1-68), which may very well have hydrologic connection to the Amargosa River. It would also significantly reduce some of the unmitigable visual resources impacts by eliminating the two 750-foot towers, lower fire risks through the elimination of superheated fluids on-site, reduce air quality issues (PSA at 6.1-62), eliminate the need for construction of a gas pipeline, reduce noise and vibration impacts (PSA at 6.1-64), reduce public health impacts (PSA at 6.1-64), reduce glint and glare to adjacent traffic and transportation (PSA at 6.1-65), significantly reduce biological impacts to water dependent vegetation and avian species (PSA at 6.1-63), cultural resources (PSA at 6.1-63), and geology and paleontology (PSA at 6.1-63). With

Comment 5, cont'd

all of these identified reductions in impacts, clearly a solar photovoltaic project would be a better project choice in avoiding and minimizing impacts.

Comment 6

These alternative-technology alternatives appear to be eliminated not because they are infeasible but because of their "effectiveness" (PSA at 6.1-78), although the PSA does point out that the difference between the "effectiveness" of the proposed technology and single-axis tracking PV panels is "insignificant" (PSA at 6.1-79). The overall analysis of "effectiveness" is unacceptable because if fails to take into consideration flexibility of different technologies in avoiding impacts. The PSA is deficient because it failed to meet the requirements of CEQA as outlined in *Preservation Action Council v City of San Jose* (2006) 141 Cal App 4th 1336. In *Preservation Action Council*, the Respondent lead agency relied heavily on the Real Parties' project objectives and the EIR rejected a smaller alternative that would have met all project objectives except for size, and would have been environmentally superior. *Id.* at 1355. The Court rejected the EIR finding that it did not meet the information requirements of CEQA because the inadequacies in the EIR's analysis "meant that the public and the City Council were not properly informed of the requisite facts that would permit them to evaluate the feasibility of this alternative." *Id*. at 1355. The PSA draft provided to date is similarly deficient.

Comment 7

Comment 8

The PSA provides a basic description of the objectives of the project (PSA at 6.1-3), but it then unreasonably narrows the objectives used to consider the viability of alternatives and unreasonably includes timing of the environmental review as a basic objective of the project and fails to evaluate at all if the proposed project actually will result in competitively priced renewable energy. PSA at 6.1-3. Given that the staff has stated that the applicant has to date failed to complete necessary studies and provide other information needed for the environmental review (*see, e.g.*, PSA at 4.2-62 (applicant has not provided results of all rare plant surveys) and a CEC workshop is currently being scheduled on the impacts of solar flux on avian species), the timing of the environmental review cannot fairly be used as a "basic objective" of the project such that it limits the consideration and evaluation of alternatives that would avoid significant impacts to environmental resources of California. Indeed, to the contrary, it appears from the available documents filed to date that the applicant has thus far been unable to provide the complete surveys and information regarding the impacts to the rare plants, desert kit fox and other resources, which indicates that this site may be inappropriate for such a large-scale industrial development project. This further underscores the need for the agency to comprehensively explore a range of alternative sites that will avoid these and other significant impacts of the project.

Comment 8a

Comment 9

The basic objectives of the project are to provide 500-MW of renewable power in California. This goal can be met in a number of ways by feasible alternatives that would avoid impacts to the desert tortoise and intact habitat, rare plants, water resources, and waters of the state. While "high solarity" may be necessary for the type of large-scale solar thermal plant that the applicant prefers to build, the added costs and energy losses from transmission, which is not being analyzed as part of this project, although new transmission and a gas pipeline are essential infrastructure for this project, may make it more cost effective to locate a solar power generating facility closer to load centers such

Comment 9, cont'd

as the cities such as Los Angeles and San Diego which have significant "solarity" even if it is not the very highest amount. In evaluating this factor the agency should assess whether re-use of disturbed sites near existing population centers could both meet the project objectives and avoid many of the significant environmental impacts of the project including impacts to rare species, natural communities and water. Given the economic set-backs in the past year, there are more and more large-scale industrial areas that are under-utilized in many parts of southern and central California. These industrial parks, malls and auto rows long ago replaced native habitat, they are connected to the power grid, and are readily accessible to workers for jobs in California. Converting these areas to solar centers is a feasible alternative that would have many societal benefits (including maintaining robust economic zones and avoiding urban blight) and would avoid nearly all of the environmental impacts of siting this project in ecologically functioning habitat in the Mojave Desert that supports many rare and less common species and communities. Accordingly, the PSA should also explore the use of distributed smaller-scale solar as an alternative.

Comment 10

B. Additional Analysis is Needed to Assess All Impacts that Require Avoidance and Minimization

Even if the Project is eventually approved to go forward at the Hidden Hills site which it should not be based on feasible alternatives, significant impacts must be avoided to the extent feasible and minimized. Some impacts that were not fully analyzed in the PSA that will need to be avoided or minimized and mitigated include growth-inducing impacts and habitat fragmentation.

Comment 11

Growth-Inducing Impacts: CEQA requires environmental analysis to consider the ways in which the proposed project could foster economic, housing, or population growth, whether directly or indirectly in the surrounding environment. Guidelines § 15126.2(d); *see also* 14 Cal. Code Regs § 15358(a)(1) ("Indirect or secondary effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems, including ecosystems."). The Guidelines specifically require that the EIR should "discuss the characteristics of [] projects which may encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively." Guidelines § 15126.2(d). Growth-inducing impacts from the proposed project in the Pahrump Valley include encouraging additional large-scale solar projects to be sited in this same area across the state line in Nevada and making it more likely that additional solar development projects could be approved in this same area. For example, the placement of one industrial project with a new powerline connection, substations, gas pipeline and/or new access roads may make it more likely that a second or third project will be sited in this area. Siting multiple projects in this area could lead to complete collapse of the habitat values in this valley due to habitat loss and fragmentation. This would be a significant change to an area which now contains a significant amount of contiguous, high value, intact habitat for the desert tortoise and other species and exacerbate the groundwater overdraft. The need for additional analysis of the impacts

from multiple solar projects that have pending applications in this area and in the Mojave ecosystem is discussed further below in the section on cumulative impacts.

C. Desert Kit Fox

Comment 12 While the PSA recognizes that the desert kit fox is a protected animal as a furbearing mammal under California Code of Regulations Title 14 Section 460 (PSA at 4.2-11) and recognizes that desert kit fox occurs on site (PSA at 4.2-4), no surveys were done to quantify the density of desert kit fox that will be displaced and "taken" by the proposed project. As the CEC is well aware, the first documentation of a deadly outbreak of canine distemper was confirmed in late 2011 in desert kit fox, when dead kit foxes found on and adjacent to the Genesis industrial solar project during construction were necropsied by state veterinarians.

Comment 13 Kit foxes have great fidelity to their natal burrows and as documented on the Genesis project site are not easily evicted from their burrows and home ranges through "passive relocation" or hazing. The PSA need to require that "take" permits be acquired for desert kit fox, as the California Department of Fish and Game did on Genesis, to allow for accurate tracking and monitoring of desert kit foxes to determine the efficacy of "passive relocation". Tracking the "passively relocated" kit foxes will enable monitoring of the ultimate outcome of the hazing activities, and should allow for identification of distemper outbreaks earlier on, where the disease may be more easily controlled.

Comment 14 As the CEC is also well aware, despite the efforts of state and federal biologists, who tried to prevent the distemper outbreak from spreading, their efforts have not been successful, and so far the kit fox distemper epidemic has spread at least over eleven miles south of the Genesis project site. Hope has dimmed that the epidemic can now be contained. Additional disruption of native populations of desert kit foxes from hazing them off this proposed project site will result in additional displaced animals wandering the desert and potentially being vectors for spreading the disease farther through the population.

The state wildlife veterinarian for the California Department of Fish and Game isn't certain the distemper outbreak is connected to the construction activities, but has concluded that habitat disturbance causes stress, and when animals succumb to stress they become more susceptible to disease.

Comment 15 The PSA fails to quantify how many kit fox territories overlap the proposed project site, analyze the impacts from the proposed project or provide any avoidance, minimization or mitigation measures regarding this increasingly rare and declining species. Clearly a supplemental SA needs to include a substantial section on the status of the on-site desert kit fox population and strategies to minimize and mitigate impacts to this species.

D. Desert Tortoise: Analysis of Impacts is Inadequate and the Translocation Plan is Missing

Comment 16 The desert tortoise is continuing to decline throughout its range (USFWS 2008) despite being under federal and state Endangered Species Acts protection as threatened for two decades. We submitted the USGS data set that indicates that most of the proposed project site is located within modeled desert tortoise habitat.

Murphy et al. (2007) undertook extensive genetic analysis across the range of the desert tortoise and identified genetically unique populations within the larger listed population. The desert tortoise located on the HHSEGS site represents a unique genetic group – the Eastern Mojave group. Because these animals represent a unique occurrence in California, adequate avoidance, minimization and mitigation must be applied to this project. The uniqueness of this population is also recognized both in the 2011 Desert Tortoise Revised Recovery Plan (USFWS 2011) as the Eastern Mojave Recovery Unit.

Comment 17 Additionally, the Scientific Advisory Committee of the U.S. Fish and Wildlife Service's Desert Tortoise Recovery Office has concluded that "translocation is fraught with long-term uncertainties, notwithstanding recent research showing short-term successes, and should not be considered lightly as a management option. When considered, translocation should be part of a strategic *population augmentation program*, targeted toward depleted populations in areas containing "good" habitat. [emphasis added]. The SAC recognizes that quantitative measures of habitat quality relative to desert tortoise demographics or population status currently do not exist, and a specific measure of "depleted" (e.g., ratio of dead to live tortoises in surveys of the potential translocation area) was not identified. Augmentations may also be useful to increase less depleted populations if the goal is to obtain a better demographic structure for long-term population persistence. Therefore, any translocations should be accompanied by specific monitoring or research to study the effectiveness or success of the translocation relative to changes in land use, management, or environmental condition."[1] Translocation should be used as a tool to *augment populations within depleted recovery units*, not as a mitigation strategy to allow for development in desert tortoise habitat.

Comment 18 As the CEC is well aware, the project proponent *significantly* underestimated the number of desert tortoise on the Ivanpah Solar Electric Generating System (ISEGS) site, despite expert testimony and filings from intervenors including the Center that provided compelling evidence that the there would be many more desert tortoise on the project site, based on habitat and survey methodology. Unfortunately the intervenors were correct. So many more desert were found on the project site that the "take' limit for desert tortoise was quickly exceeded and the project was forced to cease construction via a stop-work order while subsequent reconsultation with trustee state and federal wildlife agencies was implemented. Based on this disaster, the proposed project should be held to much higher standards of survey data and analysis or an alternative developed and selected that is out of desert tortoise habitat to preclude impacts to this state and federally

[1] http://www.fws.gov/nevada/desert_tortoise/documents/sac/20090313_SAC_meeting_summary.pdf

threatened species. Selecting a better site for project implementation that avoids, and minimizes the impacts to the environment is required under CEQA.

Lack of Desert Tortoise Translocation/Relocation Plan: As noted in the PSA, "the legal and practical ramifications of translocation remain unresolved at this time" (PSA at 4.2-74). While the number of desert tortoise that are proposed to be moved are estimated to be between 6 to 33 adult and sub-adult desert tortoises, 3 to 34 juvenile tortoises and approximately 46 to 158 eggs. Due to the lack of a relocation or translocation strategy, it is impossible to evaluate the impact to on-site desert tortoise from the information presented in the PSA.

Comment 19

If translocation is implemented for use on the proposed project, the agency should carefully review the Desert Tortoise Recovery Plan (USFWS 2011) and require incorporation of the U.S. Fish and Wildlife Service's most recent (2010) guidance on desert tortoise translocation[2]. Additionally the translocation plan should incorporate new information on current translocation implementation successes (if there are any). Information on desert tortoise home ranges, landscape carrying capacity, and other ecological factors need to be included in a revised or supplemental SA, so that the public and decision makers can more accurately evaluate the impacts from the proposed project

We also request that the following recommendations that originate with the Desert Tortoise Recovery Plan are incorporated into the translocation plan:

Comment 20

- Provide monitoring to confirm that desert tortoise "establish home ranges and integrate into any existing social structure". Note is taken that no translocation studies have been implemented long enough to confirm integration, so moving forward with yet another translocation without the data required to confirm actual integration of the translocated tortoises into the existing population renders the translocation effort experimental. The experimental nature of the action then requires at a minimum a long-term commitment to monitoring and potential adaptive management to ensure that these animals and the unique genotypes that they represent continue to survive.
- Temporary fencing should be included in the relocation areas as well, due to the well documented fact that desert tortoises will try to return to their home range. Additionally, provisions to deal with the fact that desert tortoises will end up along the new tortoise proof fences of the project site, trying to get back to their home territory, should be included because this behavior leaves them vulnerable to predation.
- Determine the translocation site's carrying capacity. In light of global climate change and the predicted warming of the desert, translocation zones should only be located at *higher* elevations, not lower areas of the Pahrump Valley.
- At least a two-year study should be undertaken on the host population prior to translocation.

[2] http://www.fws.gov/ventura/species_information/protocols_guidelines/docs/dt/USFWS%20DT%20Translocation%20Guidance.docx

Comment 21 In addition to the avoidance and minimization measures and any translocation effort, adequate mitigation at a rate of at least 5:1 to off-set the impacts to the desert tortoise is required, including acquisition of private lands in nearby desert tortoise habitat to be set aside as tortoise conservation areas in perpetuity so that the mitigation has durability. In order to adequately mitigate for the desert tortoise population that will be affected by the proposed project, the mitigation needs to occur within this same recovery unit, and as close to the proposed project site as possible. Additionally, the proposed mitigation has differing ratios for Mojave Desert scrub (3:1) and Shadscale Scrub (1:1) (PSA at 4.2-86). As we have brought up repeatedly at workshops, Shadscale scrub is a much rare community type than Mojave Desert scrub, therefore the PSA should not treat these different community types differently. A 5:1 ratio of mitigation is required because 1) the desert tortoise population continues to decline[3], 2) more of its habitat is being developed, which is a net loss to the species[4], and 3) fragmentation of the habitat, including this proposed project continues.

E. Bighorn Sheep: Analysis of Impacts is Incomplete

Comment 22 Important native (i.e. not re-introduced) populations of desert bighorn sheep occur in mountain ranges[5] adjacent to the HHSEGS. Bighorn are a large and wide-ranging species that require connectivity across large landscapes in order to assure persistence. Existing anthropogenic barriers have already eliminated gene flow between certain populations[6]. Elimination of sheep connectivity by HHSEGS could lead to further isolation and inbreeding issues. Additional information on bighorn sheep movement corridors and the impact of development on them needs to be included. Avoidance of these areas needs to be included, or minimization and effective mitigation if the project actually could impact these important linkages. Indeed, public comment at CEC's June 27, 2012 workshop identified that desert bighorn sheep have been documented on the proposed project site.

Comment 23 To date, no studies have been done on the effects that miles of mirrors may have on bighorn sheep movement or effects of their use of historical lambing areas. Data indicate that human caused disturbance negatively affects species fitness and population dynamics via the energetic and lost opportunity costs of risk avoidance[7]. More information about the potential impact from the installation and operation of mirrors on desert bighorn needs to be included.

Comment 24 Desert bighorn rely on springs and seeps, especially during the hot dry summer months for their survival in the ranges adjacent to the proposed project site and while moving across the valley floor. While the goal of the groundwater mitigation and monitoring requirements is to minimize impacts to the groundwater, there is no guarantee that impacts from this activity will not impact, to some extent the springs and seeps, that

[3] http://www.fws.gov/nevada/desert_tortoise/dt_reports.html
[4] Moilenen et al 2009; Norton 2009
[5] Epps et al. 2004
[6] Epps et al. 2005
[7] Frid and Dill 2002

Comment 24, cont'd

the desert bighorn rely upon. The monitoring plan will only identify water drawdown after it has occurred, and this could be deadly for bighorn and other desert species that depend on the springs and seeps for survival. For that reason, the CEC should consider the requirement of artificial guzzlers at strategic locations to help offset the impacts of the proposed project to bighorn (and other wildlife). Please refer to our water resources section pertaining to impacts to seeps and springs from the groundwater pumping proposed by the project, and please provide an analysis of the potential impacts to bighorn sheep including the potential mitigation of guzzlers in a supplemental SA.

F. Rare Plants: Data and Analysis Incomplete

Comment 25

As noted in the PSA, data is lacking on the spring 2012 surveys for rare plants. As it is, the site appears rich with rare botanical resources (PSA at 4.2-132) based on the reported survey results, and the analysis of impacts to a five of the ten rare plants that occur on the project site are significant and "immitigatable". What does this term – immitigable - actually mean? While the lack of survey data and analysis makes it impossible to determine the impacts to the species, clearly the proposed project site is poorly sited because of the number of rare plant species that occur on the site. Avoidance is the most preferred method to eliminate impacts to rare plants, many of which appear to be located in the eastern portion of the project area (where other rare biological resources also occur).

If avoidance is not possible, then securing additional sites for conservation in perpetuity will be necessary. Mechanisms must be put in place to secure all areas acquired for mitigation from future impacts such as conservation easements in perpetuity (see discussion below about durability of mitigation).

Comment 26

While transplantation of rare plants has been documented to be mostly unsuccessful[8], if relocation is to be part of the mitigation effort, then a clear and concise relocation plan should be developed and included as supporting documentation in the Final Staff Assessment for public review. So many times these plans are proposed to be developed in the future, with no public input or review. We believe these plans should be included as part of the CEQA process and that their absence is a violation of CEQA. If plants are to be moved, requirements for interim monitoring during establishment (including triggers for adaptive management to meet the needs of plant survival) need to be put in place. Long-term monitoring for survivorship and successful reproduction and establishment also needs to be included as part of the mitigation requirements if relocation is a chosen strategy.

Comment 27

To assure conservation of the rare plants in addition to avoidance and minimization and mitigation presented above, seed collection and curation into a seed bank should be required, to preclude potential genetic loss of the species if avoidance, minimization and mitigation measures should fail.

[8] Feidler 1991

G. Western Burrowing Owl

Comment 28 The information in the FSA regarding the status of the burrowing owl on the project site is confusing. It remains unclear how many burrowing owl territories are located in the project area. As with the kit fox, desert tortoise and other species, a plan is to be produced for mitigation and monitoring of burrowing owls, but that plan is not provided in the PSA. It is therefore unclear how the compensation acreage for burrowing owl impacts was calculated (PSA at 4.2-69)

H. Golden Eagles

Comment 29 The PSA recognizes that the proposed project "would remove approximately 3,277 acres of foraging habitat for golden eagle and migratory birds" (PSA at 4.2-4) and that "the USFWS may consider this loss to constitute substantial interference with normal breeding, feeding, or sheltering behavior, which would be considered a "take."" (Ibid). The PSA fails to present exactly how to mitigate the loss of a substantial amount of foraging habitat for the golden eagle from this project. The fact still remains that significant amounts of foraging habitat will decrease carrying capacity of the landscape and could result in a potential loss of habitat needed to support a nesting pair, which would impact reproductive capacity.

Comment 30 Scientific literature on this subject is clear - the presence of humans detected by a raptor in its nesting or hunting habitat can be a significant habitat-altering disturbance even if the human is far from an active nest[9]. Regardless of distance, a straight-line view of disturbance affects raptors, and an effective approach to mitigate impacts of disturbance for golden eagles involves calculation of viewsheds using a three-dimensional GIS tool and development of buffers based on the modeling[10]. Golden eagles have also been documented to avoid industrialized areas that are developed in their territory.[11]

Comment 31 Furthermore, information on the impacts to avian species from the power tower technology is well documented[12]. The PSA fails to analyze impacts to golden eagles from the solar flux and towers. Because the CEC is proposing a workshop on these issues in early August, the PSA once again seems premature, having been issued before data on this key environmental issue is available.

Comment 32 In addition, the construction of the mandatory transmission line, an essential connected project to the HHSEGS, will cause additional direct and indirect impacts to golden eagles, yet these impacts remain unanalyzed in the PSA. Because the transmission line is a connected project that is necessary for the HHSEGS to get the electricity onto the grid, a supplemental SA must include an environmental analysis of this transmission line project.

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[9] Richardson and Miller 1997
[10] Camp et al. 1997; Richardson and Miller 1997
[11] Walker et al. 2005
[12] McCrary et al. 1986

Comment 33 Based on the severity of the incomplete impacts identified in the PSA alone, the CEC must consider other alternatives that minimize the impacts to the fully protected golden eagle.

I. Groundwater Dependent Vegetation

Comment 34 As with the rare plants, the impact analysis and mitigation is incomplete, making it impossible to comment on the proposed action. Based on current proposed monitoring scheme, impacts to this rare plant community and vital wildlife resource will still be impacted by the proposed project. Additional off-site impacts to more distant groundwater dependent vegetation communities in the Amargosa Valley do not appear to be included in the analysis either. The supplemental SA needs to clarify the issues associated with the groundwater dependent vegetation.

J. Mitigation, Nesting and Acquisition Ownership

Comment 35 Mitigation acquisitions must mitigate for the impacts of the project. While the project proponent is currently taking advantage of the mitigation opportunities established under SBX8 34 for the impacts to desert tortoise from the ISEGS project, we note that the proposed mitigation does not actually mitigate for the impacts because the land acquired by CDFG are outside of the northeastern recovery unit for the desert tortoise, which is where the impacts from the ISEGS project occurred. The HHSEGS project occurs in the Eastern Mojave Recovery unit, and therefore mitigation for desert tortoise must occur within this desert tortoise recovery unit.

Comment 36 Any "nesting" of mitigation acquisitions must assure that impacted species are actually mitigated by the acquisition property. Therefore species presence at densities found on the proposed project site or greater must be documented through monitoring of the potential mitigation site prior to acquisition in order to adequately fulfill the mitigation requirement.

Comment 37 Mitigation acquisitions must be managed by a land management entity that can assure conservation of those lands in perpetuity. For example, the Bureau of Land Management can not assure conservation of lands donated to it based on its multiple use mandate. Therefore, the PSA should clearly lay out a mitigation strategy to assure land ownership/management that will result in conservation of all mitigation acquisitions in perpetuity.

K. Missing Plans

Comment 38 Numerous plans are relied upon in the PSA to provide adequate avoidance, minimization and mitigation of biological resources. However, these plans are not available for public review, which makes it impossible for the public and decision makers to actually evaluate if these plans do what the PSA intends them to do. Examples of missing plans include:

- Weed Management Plan
- Bird Monitoring Study
- Burrowing Owl Mitigation Plan
- Avian, Bat, and Golden Eagle Protection Plan
- Management plan for desert kit fox and American badger
- Biological Resources Mitigation Implementation and Monitoring Plan
- Desert tortoise translocation plan

Comment 39

These plans should be made available to the public before the FSA in a supplemental SA.

L. Water Resources: Requires Additional Information and Analysis

Comment 40

The PSA indicates that up to 140 AFY of water will be used yearly on the HHSEGS site during normal operations (PSA at 4.15-2), although construction water use could be as high as 288 AFY for up to three years (PSA at 4.15-8). Although no water will leave the site, additional information on the effects of groundwater pumping on nearby seeps and springs in the adjacent mountains is lacking. In fact the seven-day ground water pump test that the CEC required was never completed. We have repeatedly requested that the seven-day ground water pump test be completed and once again ask the CEC to enforce their own requirement. No data is presented that addresses the hydrological connection between these essential wildlife sustaining locations, the Amargosa drainage and the proposed project impacts.

Additionally, because of the substantial evaporation rate at the project site, please provide data on how much pumped ground water will actually be returned to the groundwater basin.

Comment 41

Waters of the State: The PSA indicates that 28.33 acres of Waters of the State (PSA at 4.2-6), which will need to be mitigated. In this arid part of the state, this impact is significant. Again we urge the CEC to look at avoidance and minimization of the impact through alternative siting.

Comment 42

As with the other sensitive resources, securing additional sites for conservation in perpetuity will be necessary, and may be accomplished in conjunction with sensitive species mitigations. Because the proposed project is relying on groundwater pumping as its water source, it is crucial to replicate the existing surface hydrology to enable groundwater replenishment, particularly with regards to the slow pace of groundwater recharge in the desert.

M. Essential Part of the HHSEGS Project Not Analyzed.

Comment 43

As discussed above, the HHSEGS project relies upon an unbuilt transmission and gas pipeline that are currently undergoing National Environmental Policy Act (NEPA) review in Nevada. That NEPA review does not relieve the CEC from including environmental review of those projects which are clearly connected and required by the

HHSEGS project. The transmission lines and gas line do not rely upon the HHSEGS in order to be viable projects, but the HHSEGS relies upon the transmission and gas pipeline in order to be a viable project. Therefore the CEC needs to include the transmission line and gas pipeline as part of the HHSEGS project and must analyze the project and its impacts in a supplemental SA.

Comment 44

N. Cumulative Impacts are Not Fully Disclosed and Analyzed

Comment 45

Even before undertaking a fully adequate analysis of the cumulative impacts as outlined in the Cumulative Scenario, the PSA admits that impacts from this project will be "cumulatively considerable" (PSA at 4.2-172). CEQA requires not only full disclosure of cumulative impacts but a full and fair effort on the part of the agency to first avoid such impacts, and then to ensure any remaining impacts are minimized and mitigated. Until the agency completes an adequate alternatives analysis, the staff conclusions that not all cumulative impacts can be mitigated are premature.

Comment 46

Additionally, the cumulative impacts need to identify the impacts to desert tortoise by translocation and relocation efforts. As the other potential projects get implemented, it will push higher and higher numbers of desert tortoises into smaller and smaller areas. Additional development of other renewable energy projects in the Pahrump valley in Nevada will also further isolate the existing population of resident, relocated and translocated desert tortoise in the Eastern Mojave recovery unit. These same potential isolation issues due to the cumulative impacts of projects proposed in the Pahrump Valley also need to be discussed for desert bighorn sheep and groundwater pumping. All of these cumulative impacts need to be included and analyzed in a supplemental SA.

O. Conformance with the Desert Renewable Energy Conservation Plan

Comment 47

The CEC is signatory to the planning agreement for the Desert Renewable Energy Conservation Plan (DRECP), a proposed conservation plan under the Natural Communities Conservation Plan Act (NCCPA). The NCCP Act 2810 (b)(8)requires that "interim process during plan development for project review wherein discretionary projects within the plan area subject to Division 13 (commencing with Section 21000) of the Public Resources Code that potentially conflict with the preliminary conservation objectives in the planning agreement are reviewed by the department prior to, or as soon as possible after the project application is deemed complete pursuant to Section 65943 of the Government Code and the department recommends mitigation measures or project alternatives that would help achieve the preliminary conservation objectives. As part of this process, information developed pursuant to paragraph (5) of subdivision (b) of Section 2810 shall be taken into consideration by the department and plan participants". The current preliminary conservation strategy of the DRECP[13] identifies the proposed project site as moderate biological sensitivity, surrounded by high biological sensitivity area and considers it for conservation purposes, not development purposes.

[13] http://www.drecp.org/documents/#conservation

Comment 48

To that point, the PSA fails to provide an evaluation of the conformance of the HHSEGS with the preliminary conservation objectives of the DRECP as required under the NCCPA. Therefore, we request that the supplemental SA include an analysis of the conformance of this proposed project with the DRECP.

III. CONCLUSION

From a scientific perspective, developing utility scale renewable energy project in the California deserts without comprehensive planning is a huge gamble for wildlife[14]. .For this and future proposed projects, mechanisms should be put in place that encourage solar facilities to be proposed and sited on disturbed lands instead of in fully ecologically functioning habitat such as is found in the Pahrump Valley at the Hidden Hills proposed project site, which support a variety of rare and threatened species.

We hope and expect that the agency will carefully consider the proposed impact reducing alternatives and others and go beyond the admittedly incomplete and preliminary information provided in the PSA. The CEC should revisit these issues in detail, filling in the missing data gaps and analyses and provide a full range of alternatives, including distributed solar generation, as part of a supplemental SA for public review.

Thank you for the opportunity to submit these comments. Please feel free to contact me for additional information at 535-654-5943 or at ianderson@biologicaldiversity.org

Respectfully submitted,

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[14] Lovich and Ennen 2011

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California Energy Commission
DOCKETED
11-AFC-2
TN # 66302
JUL 23 2012

OSTA's Public Comment on CEC Preliminary Staff Assessment of Cultural Resources, in conjunction with the license application for Hidden Hills Solar Energy Generation System (HHSEGS)

Submitted July 23, 2012

The OSTA Comment and Its Confidential Appendix

The Old Spanish Trail Association submits the following comments regarding the California Energy Commission's Preliminary Staff Assessment (PSA), particularly the section dealing with cultural resources, which was issued on June 15, 2012.

This public comment addresses non-site specific statutory measures providing for the protection of National Historic Trails. These are all matters of public law and administration. Separately, OSTA is submitting a Confidential appendix to this comment--which will be subject to the same confidentiality strictures as the CH2MHill's cultural resources reports. The Confidential appendix addresses specific issues concerning the trail route in and near the HHSEGS site.

OSTA'S Previous Submission to the CEC and the PSA

OSTA's cultural resources report, submitted to the CEC in May, focused on the Old Spanish National Historic Trail/Mormon Road (OSNHT/MR) in and around the Hidden Hills project site. We demonstrated through the use of archival documents, historical maps, and our on-the-ground survey, that portions of the OSNHT mule trace and the later Mormon Road must have passed across the project site.

The Commission's PSA, issued in June, essentially agreed with OSTA's findings. Among the PSA's conclusions on historical cultural resources, we cite the following:

- (quoted from pp. 70-71) "While not all of the traces on the project site have been ground-truthed, it is clear that the project site lies squarely among all of these tracks/traces and, therefore, within the OST-MR Northern Corridor, a regionally and nationally significant travel/trade corridor that aided the exploration and shaped the development of the southwestern United States. Although not formally included in the Act, staff has concluded that these tracks/traces should also be considered part of the Old Spanish National Historic Trail. As such the Corridor is a historical resource for the purposes of the CA Environmental Quality Act and potential impacts resulting from the proposed project must be evaluated. The proposed project has the potential to significantly impact the OST-MR Northern Corridor by erasing traces/trails on site and visually

impacting traces/tracks off site, which could jeopardize the integrity of the OST-MR segment in the Pahrump Valley."

- (p. 71) "The visual quality of this section of the OST-MR would be permanently damaged, resulting in a substantial adverse change in the significance of a historical resource and a significant and unmitigatable impact..."
- (p. 72, emphasis added)" *[CEC] staff is unaware of any action, short of project relocation or denial that would directly avoid or substantially minimize the significant effects* that the proposed project would have on the OST-MR Northern Corridor identified in this document."

OSTA's Response to the PSA Findings

In light of previously published research on the Old Spanish National Historic Trail and the Mormon Road, and considering the archeological survey and archival data submitted by OSTA in our Cultural Resources report to the CEC, OSTA is pleased that the PSA essentially upholds our contention that the HHSEGS project will severely impact the OSNHT/MR. In this comment we wish to emphasize several major points and express additional concerns regarding the project and the PSA findings.

1. The integrity of the OSNHT route is high in the project area, regardless of whether the applicant finds no physical traces.

The significance of the OSNHT is evidenced by its inclusion in the National Trails system, an inclusion based upon extensive research in 200 and 2001 (NPS Feasibility Study 2001). The act designating the OSNHT included maps showing the trail route, with a variability factor to account for areas of disturbance, mapping errors, alternative branches, traversal of private property, etc. In some places, the physical remains of the track may have disappeared, particularly in soft soils. This does not negate the trail route, however. Many important historical sites—battlefields, historical river crossings—may have no remaining physical traces. Their location is established through documentation and oral tradition.

In addition, there is the "goes-in-one-side, comes-out-the-other" argument. The OSTA cultural resources report provided abundant archival evidence that springs and forage areas just to the east of the HHSEGS site were used by travelers on the OSNHT/MR. Likewise OSTA has located and recorded "stubs" of the OST mule trace leading directly away from the project site to the west (Prichett 2012:17).

2. Applicant wrongly concludes that trail and road resources that occur within the HHSEGS project site are not eligible for inclusion on the National Register of Historic Places (NRHP) or the California Register of Historic Places. This conclusion is based on a false and prohibitively narrow view of NRHP and CEQA criteria.

Whether or not segments of the OSNHT/MR are still present on the HHSEGS site, it is clear from the historical evidence that the trail must have passed across the Hidden Hills site, as OSTS the CEC's PSA concluded. That being the case, the integrity of the trail route in the project area allows for the application of NHRP and CEQA criteria.

- Applicant's own citing of Applicable Standards (CH2MHill 2012:5-1)) states one criteria for NRHP listing: It [resource] is associated with events that have made a significant contribution to the broad patterns of history (Criterion A). The fact that Congress in 2002 designated the OST as a National Historical Trail is prima facie evidence of the route's historical importance.

  Consider these measures of the OSNHT's historical significance: The trail served as a path for American explorers of the far west in the first half of the 19th century. Even before the first mule caravan in 1829, its route—south from Utah, across the Mojave, and down the Cajon Pass into southern California—was followed by mountain men, such as Jedediah Smith and perhaps Pegleg Smith (Hafen and Hafen (1993:109-129 and 136). Later, Col. John C. Fremont left California via the Old Spanish Trail in 1844. Fremont's 1845 report on his expedition of 1843-44—including his establishing the fact that the Great Basin is indeed a basin, with no outlet to the sea—brought broad, new understanding of the geography of the western U.S. ***"This report and the Fremont (Preuss) map which accompanied it, changed the entire picture of the West and made a lasting contribution to cartography,"*** wrote Carl Wheat (1955 2:194; emphasis added).

- Applicant further cites NHRP criterion that: It [resource] is associated with the lives of persons significant to our past (Criterion B). This criterion is clearly met in the case of the OSNHT/MR in and near the project area. We have just mentioned Col. John C. Fremont, who camped within a few miles of the project boundary (Steiner 1999:156-159). Kit Carson traveled the OSNHT more than once, his name being indelibly associated with the Hernandez massacre at Resting Springs, the destination of parties leaving the complex of springs immediately to the east of the project. Immigrants arriving in California over the OSNHT include pioneer George Yount, businessman William Workman, and other key builders of American California.

3. In addition to meeting Criterion A and B, the OSNHT in the project area is likely eligible under the NRHP's category of Rural Historic Landscapes (NRHP 1999).

According to the NRHP a historic landscape is: a geographic area that historically has been used by people, or shaped or modified by human activity, occupancy,

or intervention, and that possesses a significant concentration, linkage, or continuity of areas of land use, vegetation, buildings and structures, roads and waterways, and natural features." (U.S. Department of the Interior 1999:3).

The Bulletin lists a number of types of rural historic landscapes based upon historic occupation or land use. Two of the categories are transportation systems and migration trails. The OSNHT/MR clearly fits into both these categories. The Bulletin notes: "Because of the overriding presence of land, natural features, and vegetation, the seven qualities of integrity called for in the National Register criteria are applied to rural landscapes in special ways."

These qualities include Location, Design, Setting, Feeling, Association, Materials, and Workmanship. In the case of a trail, Design, Materials, and Workmanship do not apply. However, the following do:

> *Setting*—the physical environment within and surrounding a property, such as mountains, rock formations and vegetation—has a very strong impact on the integrity of Setting. The majestic, largely unspoiled natural setting of the HHSEGS project site, would meet the NRHP standard. The project's construction of towers and mirror arrays would violate this standard.
>
> *Feeling*—although intangible (the Bulletin says) is evoked by the presence of physical characteristics that reflect the historic scene. This relates to the standard of modern-day visitors being able to vicariously enjoy the experience of travelers on the OSNHY/MR. The project's construction of towers and mirror arrays would violate this standard.
>
> *Association*—the direct link between a property and the important events or persons that shaped it—is more complicated to assess. However, the definition states that "New technology, practices, and construction, however, often alter a property's ability to reflect historic associations." The project's construction of towers and mirror arrays would violate this standard.

4. Segments of the OSNHT/MR near the Nevada state line and the associated complex of freshwater springs must be considered as having high potential for registration to the National Register of Historical Places.

Stump Spring and the others in the spring complex at the foot of the Spring Mountains (the complex includes Hidden Spring, Le rocher qui pleu, Brown Spring, and Mound Spring), mark a key transition point on the trail route. Las Vegas, with its huge spring and good forage, and the Spring Mountains both supplied good water and animal feed on the way to Stump Spring.

The spring complex at the foot of the mountains, however, marked the beginning of a long desert stretch that only ended with the descent down Cajon Pass into

the Los Angeles basin. From Stump Spring onward the way to Los Angeles became more difficult for men and animals. Steiner notes that the section from Salt Spring to Bitter Spring in California was one of the most difficult passages of the entire OST. "It took at least a day and a half to travel from Salt Spring to Bitter Spring and there was no reliable water source ;in between. Many oxen died on this part of the Trail." At Stump Spring (or others in the complex), travelers knew that this hostile stretch of trail lay ahead.

The significance of Stump is manifest. It appears on nearly every 19th century map showing the OST/MR in this area and it is mentioned in numerous travellers' accounts (Fremont 1845, Pratt cited in Hafen and Hafen 1993, Lorton 1849). Stump and the other nearby springs were key stopping points on the OSNHT/MR. Under the criteria outlined in Sections 1, 2, and 3 above, OSNHT/MR segments and the associated springs must be considered as high-potential candidates for nomination to the NRHP.

5. California's State Historic Preservation Office should have been consulted under provisions of the National Historic Preservation Act.

Applicant's report states that the NHPA and Executive Order 12372 require that potential effects of an undertaking on historic properties are presented to the State Historic Preservation Office (CH2MHILL 2012:5-1).

OSTA wishes to know whether the California SHPO was notified and to see their written response to the notification.

6. The CEC must consider not only the impacts of the HHSEGS plant, but the cumulative effects of HHSEGS with other projects upon the area.

OSTA is concerned about the cumulative effects that the HHSEGS project will have, both on the OSNHT/MR, the adjacent springs, and the surrounding desert environment.

Two other possible solar projects are planned for the area near HHSEGS. As Figure 1 (following page) shows, the Sandy Valley Project and the Element Solar Project both fall partly within a six-mile radius of HHSGES.

The combined effect of these projects, proposed on vast tracts of relatively undisturbed open land, will result in fundamental changes in how the desert and the OSNHT/MR are experienced by the public. The cumulative effects of these projects will also result in substantial impacts to a wide range of environmental resources in the local desert. These include impacts to biological resources and ground water.

To ensure that desert solar projects are sited in appropriate locations, using appropriate technologies to avoid impacts to our nation's natural and cultural heritage, it is imperative that landscape level analyses be conducted to fully

evaluate the implications of the widespread deployment of renewable energy projects and their associated support facilities, on public lands. This is crucial in the case of HHSEGS because:

- the cumulative effects of the three proposed projects would effect BLM-owned lands in Nevada and nearby BLM-owned lands in California.
- the plants' associated support facilities will be substantial. These include dozens of miles of new transmission lines and service roads and a large gas pipeline to supply HHSEGS. The transmission lines and gas pipeline will impact BLM lands in Nevada.

7. The CEC must consider the cumulative effects of HHSEGS and the other projects on visual resources, i.e., the desert landscape and the ability top vicariously experience the OSNHT/MR.

The two towers proposed for HHSEGS are each 750 feet tall. This is nearly three-quarters the height of the Empire State Building. The towers will be visible for miles and will place a strong visible imprint on the Pahrump Valley. Should there be a second phase of the project, or should either of the two nearby proposed projects (Section 6, above) erect towers of similar height, the area from Nevada Highway 160 to Charleston View, California, would become a virtual forest of skyscraper like towers.

Such a collection of huge, industrial structures will destroy the broad desert vistas the area now affords. It will also destroy the historic sense of place in what could be classed a Rural Historic Landscape (Section 3, above).

*** *** ***

Conclusion: HHSEGS Will Do Irreparable Damage to the Old Spanish National Historic Trail and the Later Period Mormon Road; to associated historic sites, particularly springs used for watering and forage; and to largely unspoiled desert landscape.

The Hidden Hills project, if approved, would forever change the landscape of the local area and irreparably degrade the integrity of the OSNHT, both on the project site and closely adjacent areas. These adjacent areas include freshwater springs intimately related to use of historically significant transportation corridor represented by the OSNHT and the Mormon Road, which followed much the same route after 1848.

The damage to the OSNHT/MR and the surrounding landscape will diminish the public's experience and understanding of the historic expeditions (including the Col. John C. Fremont' 1843-44 expedition) that used the trail and impact cultural understanding of the Mexican period (1821-1848) and succeeding American period (1849-ca.1900) in this largely unexploited desert portion of California.

In short, the project area and its surroundings comprise a jewel in California's desert lands. The high peaks of the Spring Mountains form a dramatic backdrop to a vast sweep of visually pure desert extending westward.

This land at the foot of the mountains has been the site of a well-documented, ancient travel corridor, over which American Indians traded goods in a network that extended from the Pacific Coast well into the Great Basin (Hafen and Hafen 1993, Crampton and Madsen 2007, Myhrer et al 1990, Lyman 2004). The OSNHT/MR adapted that water source-to-water source pathway to their travel needs—creating the mule caravans of the OST and the wagon trains of the American period.

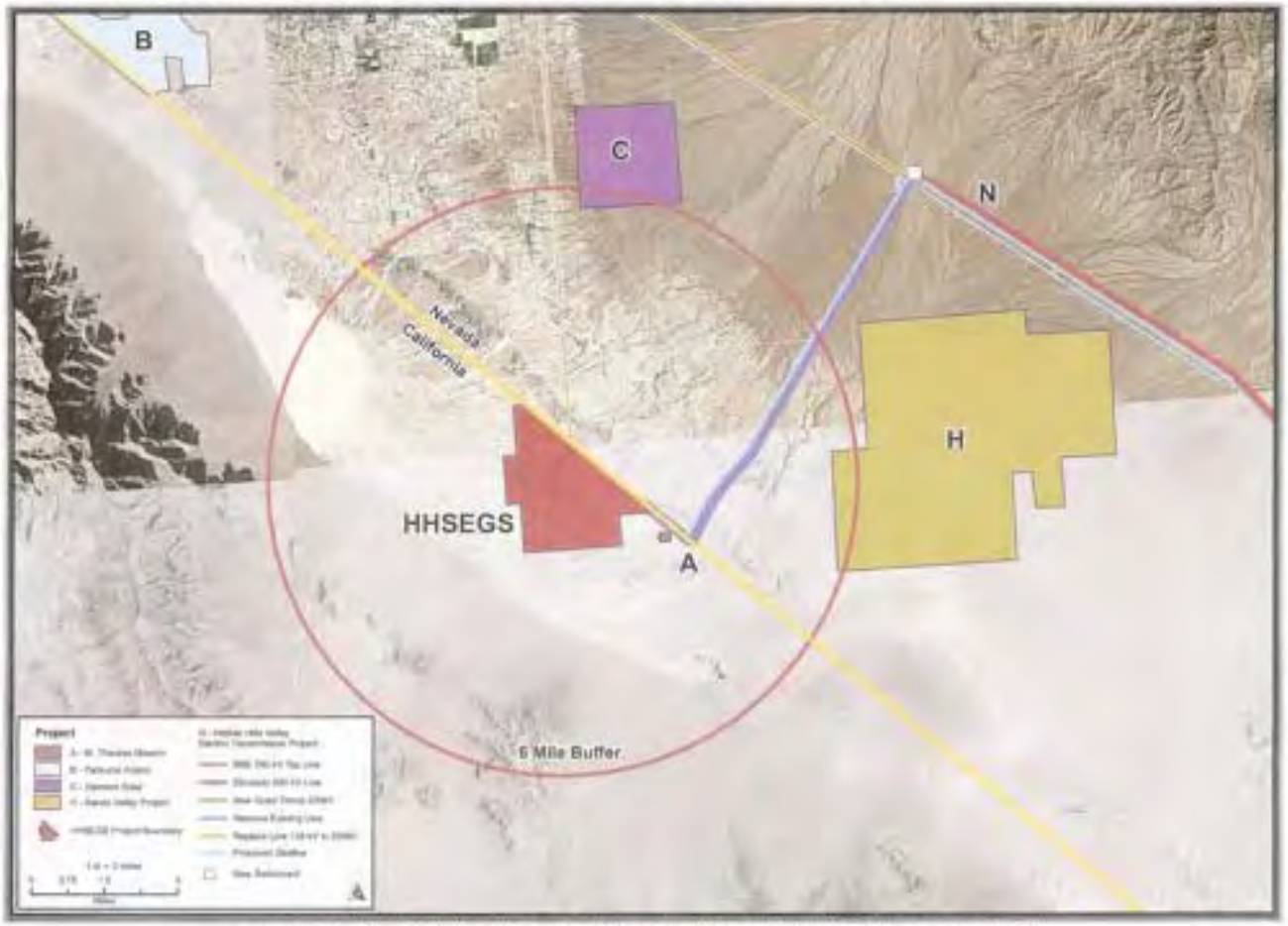
In light of this irreplaceable heritage, a high-potential site for nomination to the National Register of Historic Place, OSTA reiterates its position: HHSEGS is the wrong project in the wrong place. The mitigation measures proposed in the PSA, CUL-9 and CUL-10 are palliative afterthoughts that will do little to compensate for the massive damage done to a historically important transportation corridor and to the desert landscape. Short of sacrificing part of our national heritage, there is no alternative but to relocate the proposed solar project.

###

Figure 1. Map showing proximity of HHSEGS to other potential solar plants

CUMULATIVE PROJECTS - FIGURE 2

Hidden Hills Solar Electric Generating System (HHSEGS) - Cumulative Projects within a Six Mile Buffer of HHSEGS Boundary



CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: BLM Southern Nevada District - Renewable Energy in Southern Nevada, BLM California - Renewable Energy Priority Projects, and Los Angeles Department of Water and Power.

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APPLICATION FOR CERTIFICATION FOR THE HIDDEN HILLS SOLAR ELECTRIC GENERATING SYSTEM

Docket No. 11-AFC-02

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(Revised 9/20/12)

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DECLARATION OF SERVICE

I, Cenne Jackson , declare that on December 21, 2012, I served and filed copies of the attached, dated December 21, 2012 . This document is accompanied by the most recent Proof of Service list, located on the web page for this project at: [http://www.energy.ca.gov/sitingcases/riomesa/index.html].

The document has been sent to the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit or Chief Counsel, as appropriate, in the following manner:

(*Check all that Apply*)

For service to all other parties:

x Served electronically to all e-mail addresses on the Proof of Service list;

x Served by delivering on this date, either personally, or for mailing with the U.S. Postal Service with first-class postage thereon fully prepaid, to the name and address of the person served, for mailing that same day in the ordinary course of business; that the envelope was sealed and placed for collection and mailing on that date to those addresses NOT marked "e-mail preferred."

AND

For filing with the Docket Unit at the Energy Commission:

x by sending electronic copies to the e-mail address below (preferred method); *OR*

____ by depositing an original and 12 paper copies in the mail with the U.S. Postal Service with first class postage thereon fully prepaid, as follows:

CALIFORNIA ENERGY COMMISSION – DOCKET UNIT
Attn: Docket No. 11-AFC-4
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512
docket@energy.state.ca.us

OR, if filing a Petition for Reconsideration of Decision or Order pursuant to Title 20, § 1720:

____ Served by delivering on this date one electronic copy by e-mail, and an original paper copy to the Chief Counsel at the following address, either personally, or for mailing with the U.S. Postal Service with first class postage thereon fully prepaid:

California Energy Commission
Michael J. Levy, Chief Counsel
1516 Ninth Street MS-14
Sacramento, CA 95814
mlevy@energy.state.ca.us

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct, that I am employed in the county where this mailing occurred, and that I am over the age of 18 years and not a party to the proceeding.

Originally signed by Cenne Jackson