# HIDDEN HILLS SOLAR ELECTRIC GENERATING SYSTEM (HHSEGS)

## Preliminary Staff Assessment

DOCKET
11-AFC-2
DATE MAY 24 2012
RECD. MAY 24 2012



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

MAY 2012
CEC-700-2012-003-PSA

DOCKET NUMBER 11-AFC-02

PROOF OF SERVICE ( REVISED 5/15/12 ) FILED WITH
ORIGINAL MAILED FROM SACRAMENTO ON 5/24/12
RR

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# HIDDEN HILLS SOLAR GENERATION SYSTEM (11-AFC-2)
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# EXECUTIVE SUMMARY

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## INTRODUCTION

This Preliminary Staff Assessment (PSA) is being published by the California Energy Commission for the Hidden Hills Solar Electric Generating System. This PSA contains staff's independent, objective evaluation of the BrightSource Energy, Inc. (Applicant) Hidden Hills Solar Electric Generating System (HHSEGS) Application for Certification (11-AFC-2). The PSA examines engineering, environmental, public health, and safety aspects of proposed HHSEGS project, based on the information provided by the applicant, government agencies, interested parties and other sources available at the time the PSA was prepared. The PSA includes analyses normally contained in a Draft Environmental Impact Report (DEIR) required by the California Environmental Quality Act (CEQA).

When considering a project for licensing, the Energy Commission is the lead state agency under CEQA, and its process provides environmental analysis that satisfies CEQA requirements. The Energy Commission staff provides an independent assessment of the project's engineering design and its potential effects on the environment, the public's health and safety, and whether the project conforms with all applicable local, state, and federal laws, ordinances, regulations and standards (LORS). Energy Commission staff also recommend measures to mitigate potential significant adverse 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 PSA 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. This PSA does, however, contain "Proposed Findings of Fact" as indicated in each section of this document; comprised of 21 separate technical sections: 15 Environmental-discipline sections, five Engineering-discipline sections and an **ALTERNATIVES** section. Staff's **CULTURAL RESOURCES** analysis is not included in this PSA, but will instead be published in a June 15, 2012 Supplemental Staff Assessment (SSA).

The PSA (and forthcoming SSA) will serve as pre-cursors to the Final Staff Assessment (FSA), which will act as staff's testimony in evidentiary hearings to be held by the HHSEGS Committee (comprised 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 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. The full five-member Energy Commission will make a final decision on HHSEGS, including findings, after the Committee's publication of the Presiding Member's Proposed Decision.

# PROPOSED PROJECT LOCATION, DESCRIPTION AND COMPONENTS

HHSEGS is being developed by a wholly owned subsidiary of BrightSource Energy, Inc. (applicant). As proposed, HHSEGS would be located on approximately 3,277 acres (5.12 square miles) 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 (see **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, 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.

## 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 required to keep turbines online and producing electricity. Please see the **PROJECT DESCRIPTION** section of this **PSA** for specifics discussion 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.

### *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 use for HHSEGS would be 140 acre feet[1] per year. The **WATER SUPPLY** section of this **PSA** details the various aspects of this critical resource.

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

HHSEGS will 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 **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.

### *Electrical Transmission System*

Two distinct transmission options are being considered because of a unique situation concerning Valley Electric Association (VEA). Under the first option, the project would interconnect via a 230-kilovolt (kV) transmission line to a new VEA-owned Tap Substation (Gamebird) at the intersection of Tecopa Road[2] and Nevada State Route (SR) 160 (the Tecopa/SR 160 Option). The Tecopa Road/SR 160 option would require an approximately 10-mile long generation tie-line from the HHSEGS switchyard to the proposed Valley Electric Association's Tap (Gamebird) substation. The Eldorado generator-tie line option would follow the same 10 mile long single 230kV circuit to the Tap substation and would continue as a 230kV circuit for approximately 53.7 miles to the Eldorado substation in Boulder City, Nevada. (**Project Description Figure 6**). Please refer to the **TRANSMISSION SYSTEM ENGINEERING** section of the **PSA** for further information related to the electrical transmission system.

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.

### *Natural Gas Supply System*

A 12- to 16-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-

[2] The road is also called "Tecopa Highway" and "Old Spanish Trail Highway" -- the names are generally used interchangeably.

Nevada border and travel on the Nevada side southeast along the state line, then northeast along Tecopa Road until it crosses under SR 160. From this location a 36-inch line would turn southeast and continue approximately 26 miles, following the proposed Eldorado Option transmission line corridor (**Project Description Figure 3**), to intersect with the Kern River Gas Transmission (KRGT) pipeline. A tap station would be constructed at that point to connect it to the KRGT line. A gas metering station would be required at the tap point to measure and record gas volumes from the KRGT metering station. As proposed, the total length of the natural gas pipeline would be approximately 35.3 miles.

## PROJECT IMPACTS OUTSIDE THE STATE BODER

By virtue of the proposed HHSEGS location in California immediately adjacent to the Nevada border, unique circumstances presented themselves during the course of staff's analyses in terms of potential project impacts in Nevada from HHSEGS' construction and operation within California. Because CEQA review does not stop at the borders of the State of California, CEQA applies to any *exercise of powers* by a California state or local agency. Accordingly, projects impacts *outside* the state of California that are caused by a project under review *inside* the state of California are appropriately reviewed, especially as they relate to cumulative effects.

## 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 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 its list of Cumulative Projects. **Table 2** below presents a master list of the projects considered part of the HHSEGS cumulative setting.

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*.)

Accordingly, staff in each technical section of this PSA determined which of the projects from the Cumulative Projects list could create impacts specific to their technical area. Using unique sets of criteria specific to each area, staff then evaluated whether the cumulative effect were significant, and if so, whether the project's contribution to that

combined effect would be "cumulatively considerable[3]". Therefore, this PSA will identify and analyze the impacts of all aspects and phases of HHSEGS, including the combined effect the proposed project will have in conjunction with other projects.

**Table 2 -- 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 |
| **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. |

[3] "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 |
|---|---|---|---|---|
| **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. |

## PROPOSED HHSEGS PROJECT OBJECTIVES

The specific objectives of the Hidden Hills Solar Electric Generating System are:

- 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 Renewable Portfolio Standard (RPS) goals via interconnecting directly to the California Independent System Operator (CAISO) Grid through the Hidden Hills Valley Electric Association Line and the Valley Electric Association (VEA) electrical transmission system terminating at the El Dorado substation.
- 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 manner that will avoid or minimize significant environmental impacts to the greatest extent feasible.
- Obtain site control and use within a reasonable time frame.

## CEQA PROCESS

The Energy Commission's siting regulations require Energy Commission 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, Energy Commission 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)). Energy Commission 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., title 20, § 1744(b)).

Energy Commission staff conducts its environmental analysis in accordance with the requirements of the California Environmental Quality Act (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., title 14, § 15251 (j)).

Energy Commission staff's impact assessment in the Final Staff Assessment (FSA), including the recommended conditions of certification, is an important piece of evidence that the Committee assigned to oversee this proposed HHSEGS project will consider in reaching a decision on the proposed project and making its recommendation to the full Energy Commission. But the staff assessment is only part of the evidence the Committee will consider.

At the public evidentiary hearings (scheduled[4] to begin in Fall of 2012), all parties will be afforded an opportunity to present evidence to the Committee and to rebut the testimony of other parties, thereby creating a hearing record on which a final decision on the project can be based. The evidentiary hearing before the assigned Committee also allows for 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.

[4] The latest schedule filed by *staff* indicates a mid- September, 2012 commencement of Evidentiary Hearings: http://www.energy.ca.gov/sitingcases/hiddenhills/documents/2012-04-16_Staff_Status_Report_04.pdf

# PUBLIC NOTICES, OUTREACH, AND PUBLIC AND AGENCY INVOLVEMENT

## PUBLIC COORDINATION

The Energy Commission collaborated with a number of state and federal agencies in their efforts to facilitate robust public participation in the regulatory review of HHSEGS. To reach this goal, Energy Commission staff conducted ten Workshops to informally discuss several technical issues related to the proposed project; determine if HHSEGS should be approved for construction and operation; and, if so, under what set of conditions. These workshops formed the basis of discovery 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 these workshops prior to each meeting and posted them accordingly.

## 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. **Biological Resource Figures 1 – 5** provides views from various locations on the proposed project site; these pictures were taken during the November 3, 2011 Site Visit and an October 27, 2012 staff field trip and workshop[5].

## ENERGY COMMISSION STAFF'S PUBLIC OUTREACH

Energy Commission staff 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 11-AFC-2. Each notice contained a link to the Commission-maintained HHSEGS project website (http://www.energy.ca.gov/sitingcases/hiddenhills/index.html).

## 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**

[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

In addition to these local libraries, copies of the AFC 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 Workshops in the following California communities: Shoshone and Tecopa (Inyo County), and Sacramento. These ten publicly-noticed workshops were conducted 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. During each of these workshops, specific time for public participation was allocated, and public comment was taken. These workshops provided a public forum for the applicant, interveners, staff and cooperating agencies to interact regarding project issues. Additionally, two **PSA Workshops** will be conducted on the following dates at two separate locations:

| **Thursday, June 14, 2012** | **Wednesday, June 27, 2012** |
|---|---|
| **Pahrump Public Library** | **Bishop High School** |
| **Pahrump, Nevada** | **Bishop, California** |

Specific information related to the HHSEGS proceeding, including details on public participation for the PSA Workshops, 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 might be affected by the proposed project. Staff continues to seek cooperation and or comments from regulatory agencies that administer LORS which may be applicable to proposed project. These agencies may include, as applicable, 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 the Preliminary 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, a second meeting was conducted on December 2, 2011 in Tecopa, California, regarding comments and specific concerns particularly related to groundwater, biological resources and socioeconomic impacts. During this meeting, tribal representatives made a special request of staff; to have staff's resource specialists for water and biology make themselves available in the future in order to answer specific tribal questions and concerns regarding these important technical disciplines. Accordingly, on January 19, 2012, Energy Commission staff from the biology, land use, visual resources and water resources joined cultural resource staff and siting division management at a day-long, round-table meeting in Shoshone, California to discuss the proposed HHSEGS project and receive information.

## SUPPLEMENTAL STAFF ASSESSMENT – Cultural Resources

There are a few discrete, but critical, outstanding Cultural Resource issues that require resolution through further analysis, precluding inclusion of the **CULTURAL RESOURCES** section in this **PSA.** Accordingly, the preliminary Cultural Resources staff assessment will be published in a **Supplemental Staff Assessment (SSA)**, to be filed on or before June 15, 2012. Following a 30-day comment period, discussion at the June 27, 2012 PSA Workshop in Bishop, California, inclusion of all *Response to Comments* and associated section updates, the Cultural Resources section will be included with all other technical sections in a completed, Final Staff Assessment (FSA), to be filed on August 1, 2012.

# RESPONSE TO COMMENTS

Several organizations, public agencies and members of the public who have not filed or become official intervenors in the HHSEGS proceeding have nonetheless submitted comments related to this project (see **Table 3** – Public Comments). While this PSA has 22 separate technical sections, for purposes of **Table 3**, topics were divided into nine categories, plus a column for those who "requested to participate" in the HHSEGS proceeding (i.e., they were added to the Energy Commission's "listserve" for the

[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/

HHSEGS proceeding, which automatically alerts email recipients anytime new information is posted on the Energy Commission's Hidden Hills webpage). Within most technical sections of this **PSA,** there appears a "RESPONSE TO COMMENTS" section. Comments not responded to within the PSA will be addressed within the respective technical sections of the forthcoming Final Staff Assessment (FSA). The FSA will also contain staff responses to PSA comments filed by the applicant, intervenors and public agencies, as well as address issues that may arise at the June 14, 2012 PSA Workshop in Pahrump, Nevada, or the June 27, 2012 PSA Workshop in Bishop, California.

**Table 3 – Public Comments**

| NAME | DATE(S) | | ALTERNATIVES | AIR / HEALTH | BIOLOGY / BOTANY / WILDLIFE | CULTURAL / NATIVE AMERICAN | SOCIOECONOMIC / FISCAL / ENV. JUSTICE | TRAFFIC / LAND USE | WATER & SOIL RESOURCES | VISUAL RESOURCES | HAZMAT / FIRE / WORKER SAFETY | REQUEST TO PARTICIPATE / ADD TO LISTSERVE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Armargosa Conservancy | 12/29/2009 | | | | X | | | | X | | | X |
| Bill Christian, The Nature Conservancy | 2/03/2012 | | | | X | | | | X | | | X |
| Cindy MacDonald[7] | 1/23/2012<br>3/29/2012 | | X | X | X | X | X | X | X | X | X | X |
| Inyo County, California | Various[8] | X | X | X | X | X | X | X | X | X | X | X |
| Kern, Inyo Mono Building Trades Council, AFL-CIO | 1/23/2012 | X | | | | | X | | | | | X |
| Nevada Department of Wildlife | 12/19/2012 | X | | | X | | | | | | | X |
| Nye County Water District | 2/15/2012 | | | | | | | | X | | | X |
| Native American Organizations[9] | 12/2/2011<br>1/19/2012 | | | X | X | X | X | | X | X | | X |
| Nye County, Nevada | 3/08/2012 | X | | | | | X | X | X | | | X |
| Southern Inyo Fire Protection District | 2/15/2012<br>5/01/2012 | X | | | | | | X | X | | X | X |

[7] Ms. MacDonald filed for Intervenor status on 5/08/12 (tn: 65120), which was granted on 5/15/12.

[8] Letters from Inyo County docketed on: 12/06/2011, 2/22/2012, 2/24/2012, 2/29/2012, 3/20/2012, 4/05/2012

[9] Includes following tribal organizations who participated in one or more Energy Commission meetings held: 8/2/2011 in Pahrump, NV; 12/2/2011 in Tecopa, CA; and, 1/19/2012 in Shoshone, CA -- Big Pine Band, Bishop Paiute, Timbisha Shoshone, Lone Pine Paiute Shoshone, Moapa Paiute, Las Vegas Paiute, Pahrump Paiute, Tecopa Paiute

## 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 this mission. The Order requires the United States Environmental Protection Agency (US 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 the appropriate 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. A minority population is identified when the minority population or the below-poverty-level population of the potentially affected area is:

1. greater than 50%; or

2. present in one or more US Census blocks where a minority population of greater than 50% exists.

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. Staff followed each of the above steps in the development of the PSA, considering potential impacts from HHSEGS on a potential environmental justice population. Staff determined that neither the construction nor operation of the proposed HHSEGS project would involve environmental impacts that could contribute to a disproportionate impact on an environmental justice population. Accordingly, no further environmental justice analyses are necessary. (please see **Socioeconomics Figure 1**)

## PRELIMINARY STAFF ASSESSMENT CONCLUSIONS

Based upon the information provided, discovery achieved and analyses completed to date, with key exceptions described below, staff concluded that the project complies with all laws, ordinances, regulations and standards (LORS), and with the implementation of its recommended mitigation measures (described in each technical section's conditions of certification), potential environmental impacts of the HHSEGS project will be mitigated to levels of less than significant. Therefore, in all but 6 of the 21 technical sections of this PSA, the proposed project complies with the requirements of the California Environmental Quality Act (CEQA). 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 is able to conclude that with implementation of proposed conditions of certification, the project will 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, staff considers there to be a number of unresolved issues that require resolution or further clarification so that staff can complete the Final Staff Assessment and come to final conclusions, including: uncertainty of project features; potential regulatory conflicts; analysis of avian impacts from solar flux and reflectance; additions to Desert Kit Fox, American Badger and Burrowing Owl conditions; ongoing surveys for special-status plants; and, field verification of state waters and desert wash plant communities.
- **Land Use:** 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** and **Worker Safety / Fire Protection:** at this time, due to the absence of agency (Inyo County and Southern Inyo Fire Protection District) review of the Site Security and Fire Risk Assessment plans submitted by the applicant, certain components of these two sections' analyses related to law enforcement and emergency services impacts were left incomplete, and therefore impacts were *undetermined* in the conclusion of these two PSA sections.
- **Transmission System Engineering (TSE):** additional information is necessary and required in regard to specific issues related to inconsistencies between the California Independent System Operator's Phase I and II studies and the Hidden Hills AFC's plans for electrical transmission. Accordingly, staff is *undetermined* regarding environmental impacts pending an expected Navigant study on the electrical transmission system for the Valley Electric Association Hidden Hills Transmission Project, which is the subject of an existing Bureau of Land Management environmental review process, for which HHSEGS is considered a "connected action".
- **Visual Resources:** staff concludes that the proposed project, after implementing all recommended conditions of certification, would still have significant and unavoidable adverse *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.

## LORS COMPLIANCE / ENVIRONMENTAL IMPACTS AND MITIGATION

**Table 4 -- Summary of HHSEGS PSA Technical Analyses**

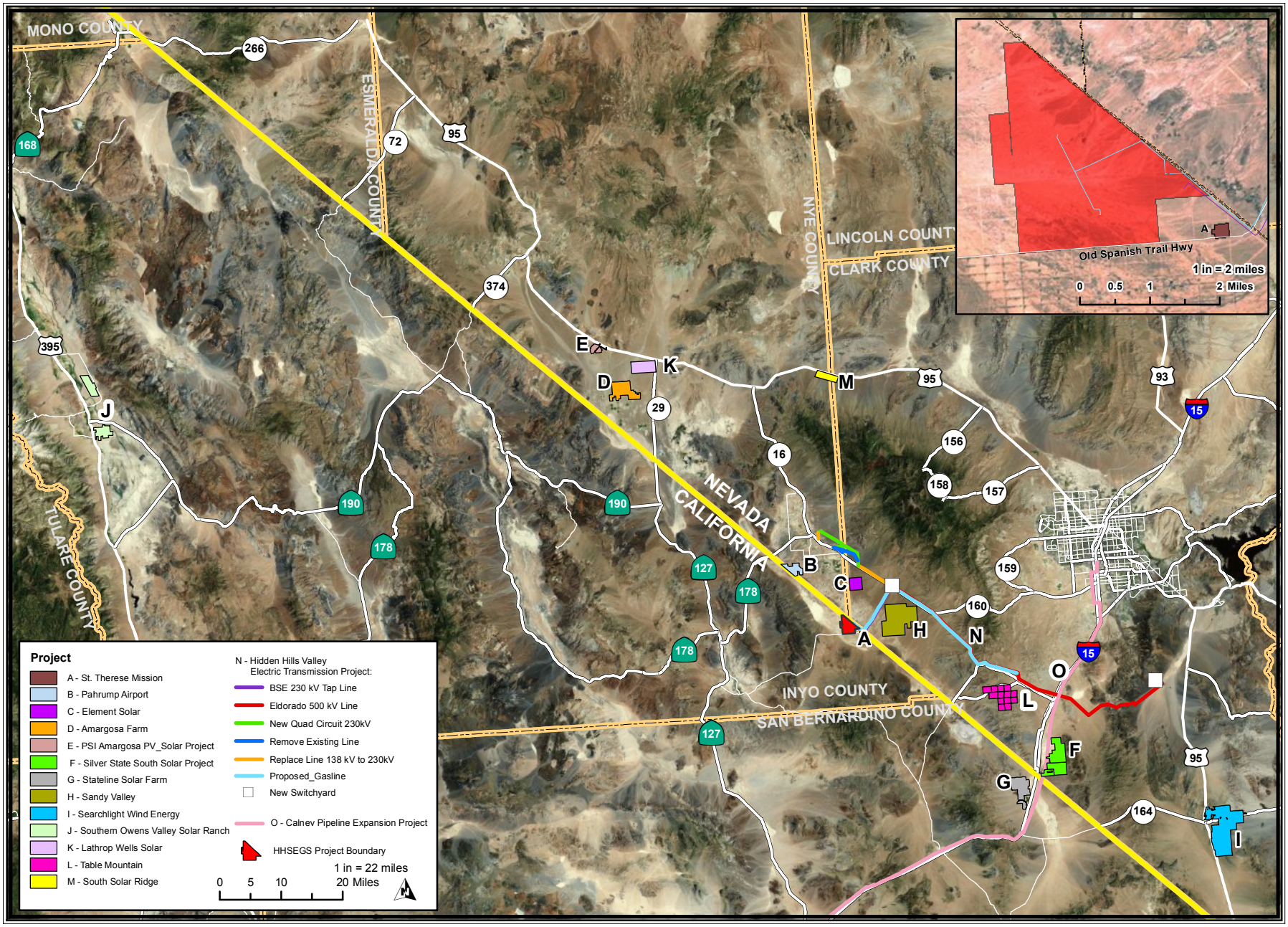
| Technical Area | Complies with local, state and federal LORS | Impacts mitigated to level below significant |
|---|---|---|
| Air Quality / GHG | Yes | Yes |
| Alternatives | Not Applicable | Not Applicable |
| Biological Resources | Unresolved | Unresolved |
| Efficiency | Not Applicable | Not Applicable |
| Facility Design | Yes | Yes |
| Geology and Paleontology | Yes | Yes |
| Growth Inducing Impacts | Yes | Yes |
| 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 | Undetermined |
| Soils and Surface Water | Yes | Yes |
| Traffic and Transportation | Yes | Yes |
| Transmission Line Safety and Nuisance | Yes | Yes |
| Transmission System Engineering | Yes | Undetermined |
| Visual Resources | **No** | **No** |
| Waste Management | Yes | Yes |
| Water Supply | Yes | Yes |
| Worker Safety and Fire Protection | Yes | Undetermined |

## SUMMARY

This Preliminary Staff Assessment is a document of the Energy Commission staff that has been developed and written with input from other governmental agencies, including Inyo County, the US Fish & Wildlife Service and the California Department of Fish & Game. In summary, this PSA finds that, with key exceptions noted above, the Hidden Hills Solar Electric Generating System is in conformance with all LORS, and where project impacts were identified, suggested mitigation will offset direct, indirect, and cumulative impacts to a level of less than significant.

**CUMULATIVE PROJECTS - FIGURE 1**

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

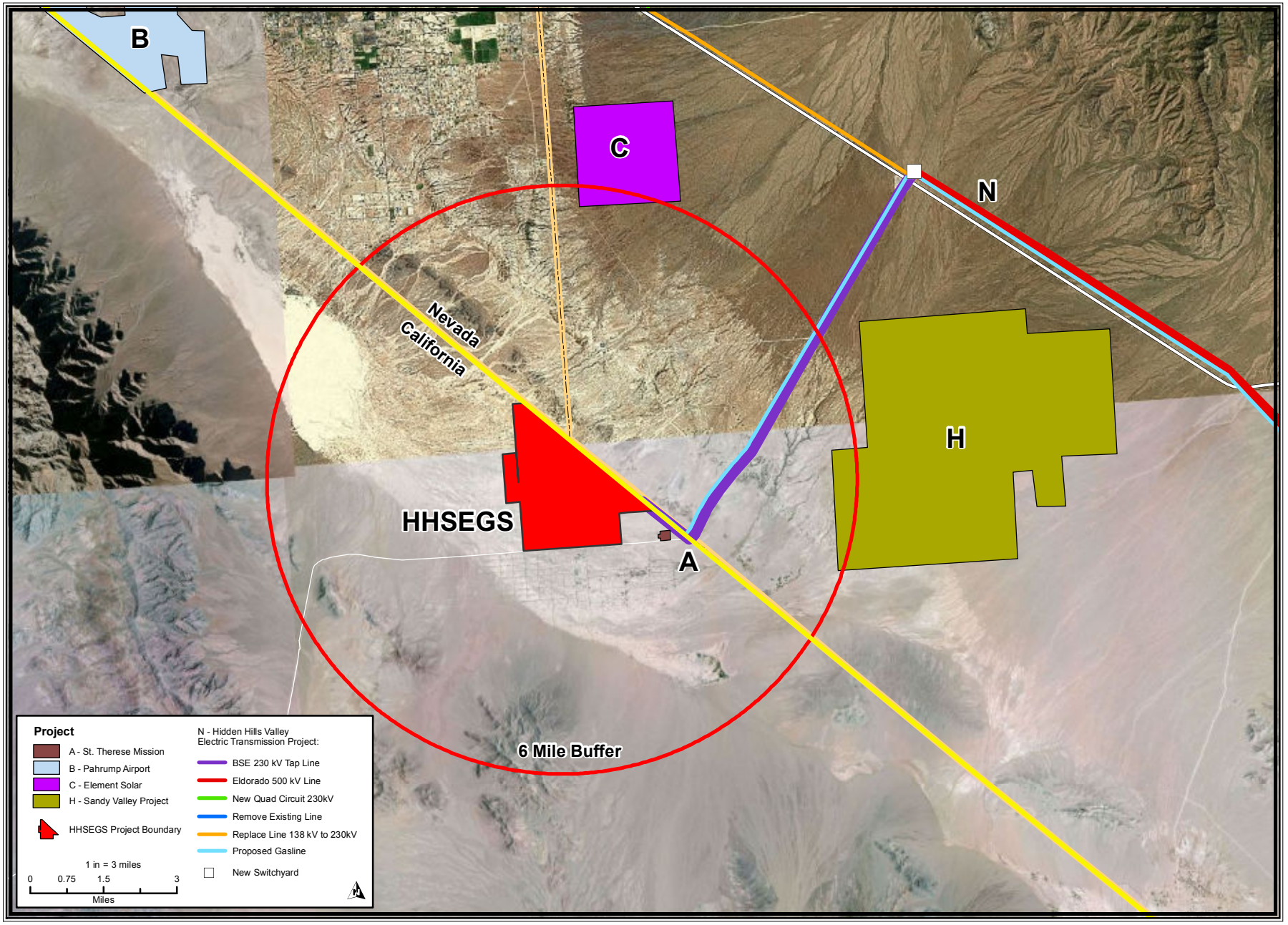



**CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

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

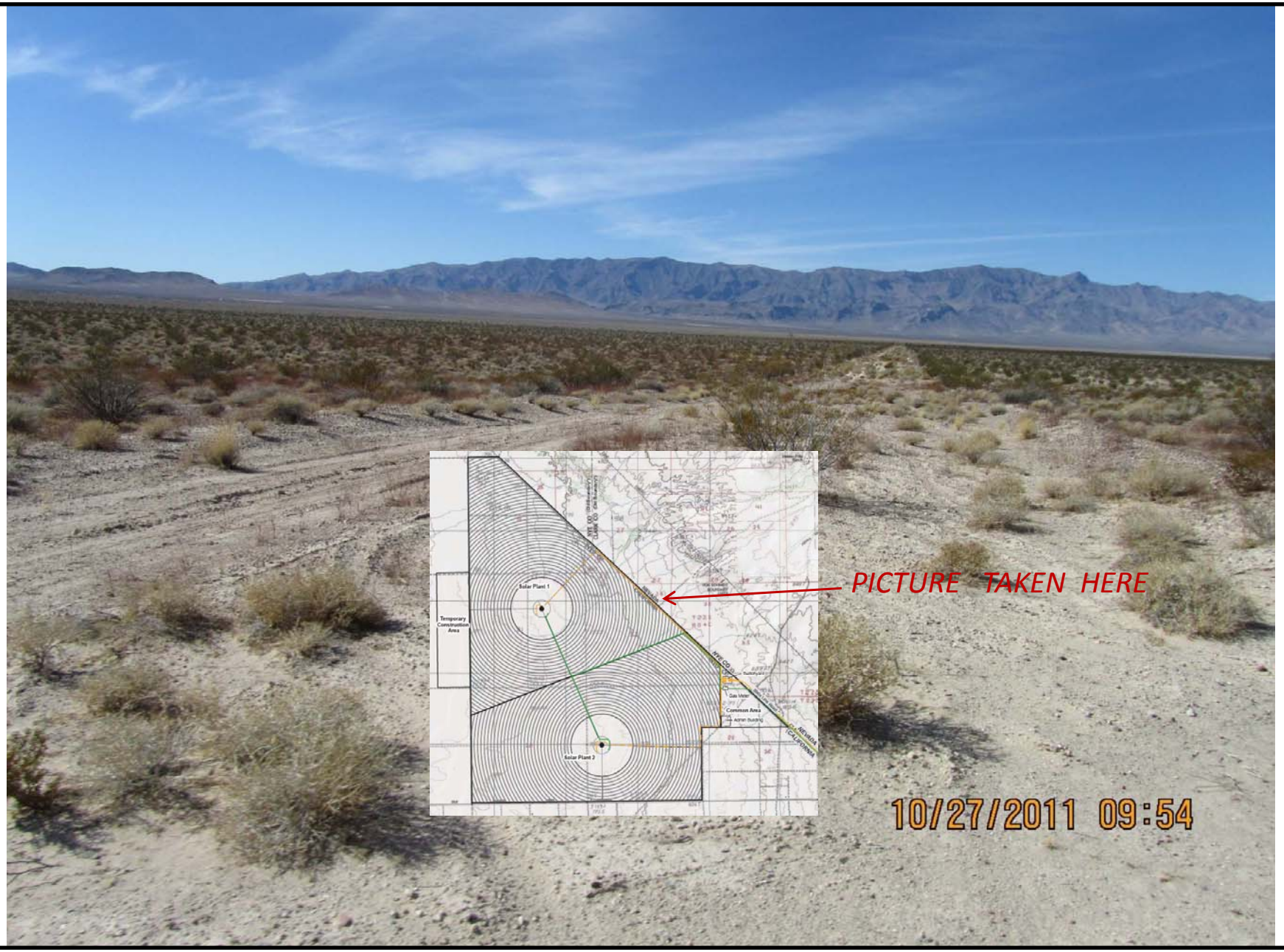



**CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

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

**BIOLOGICAL RESOURCES - 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.



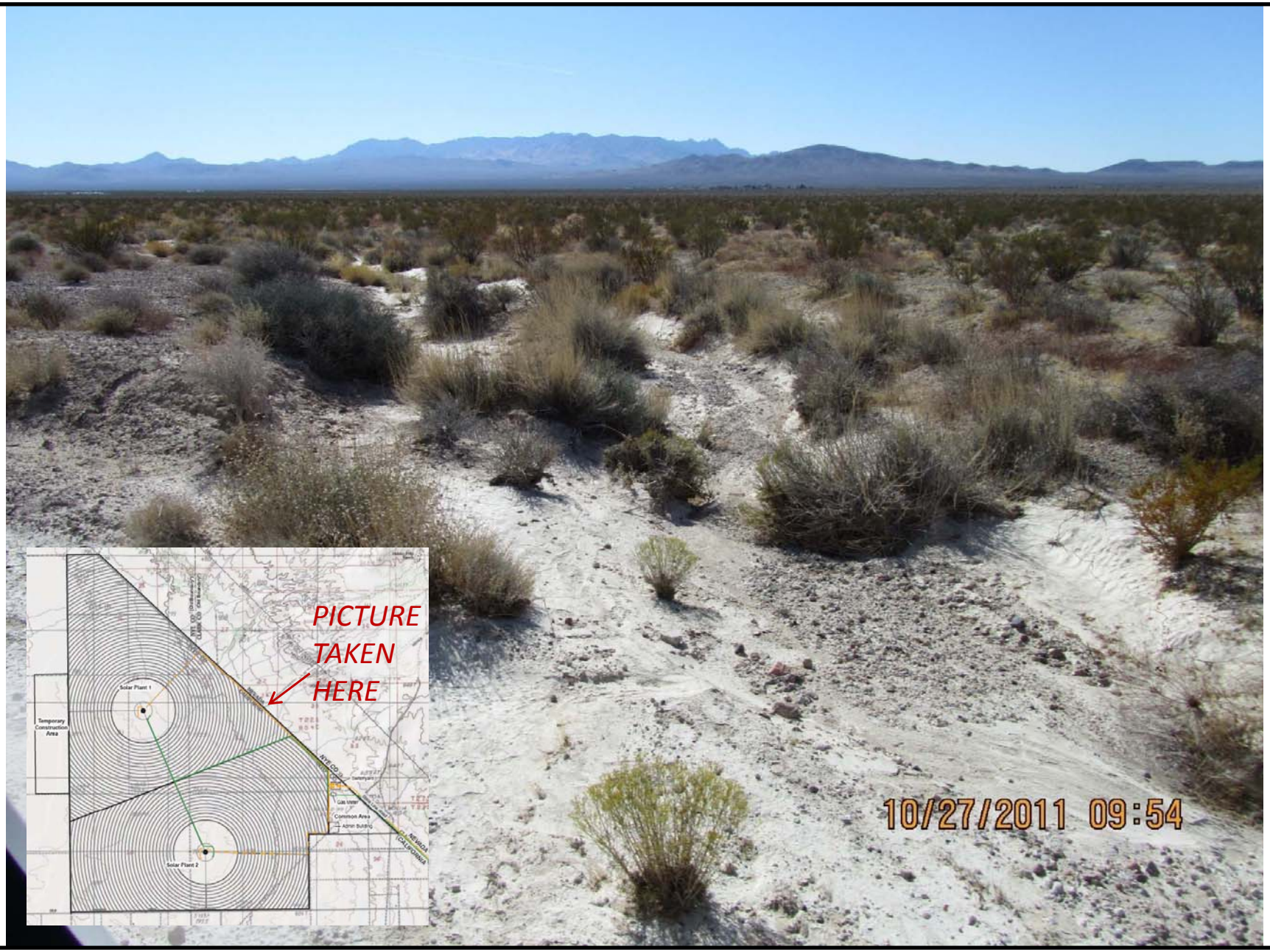



**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: tn:62873 M. Monasmith Photos

**BIOLOGICAL RESOURCES - 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.



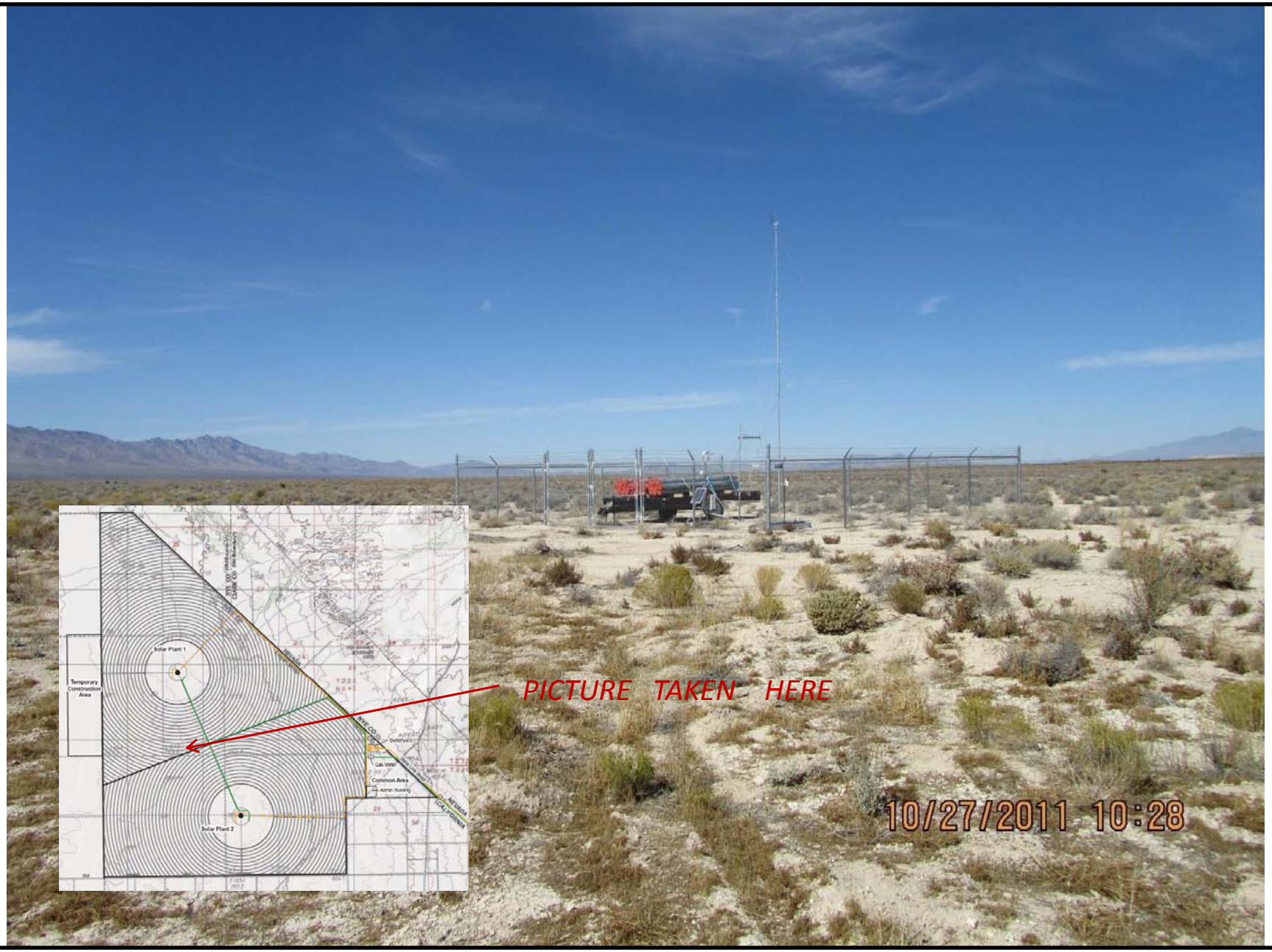



**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: tn:62873 M. Monasmith Photos

**BIOLOGICAL RESOURCES - 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.



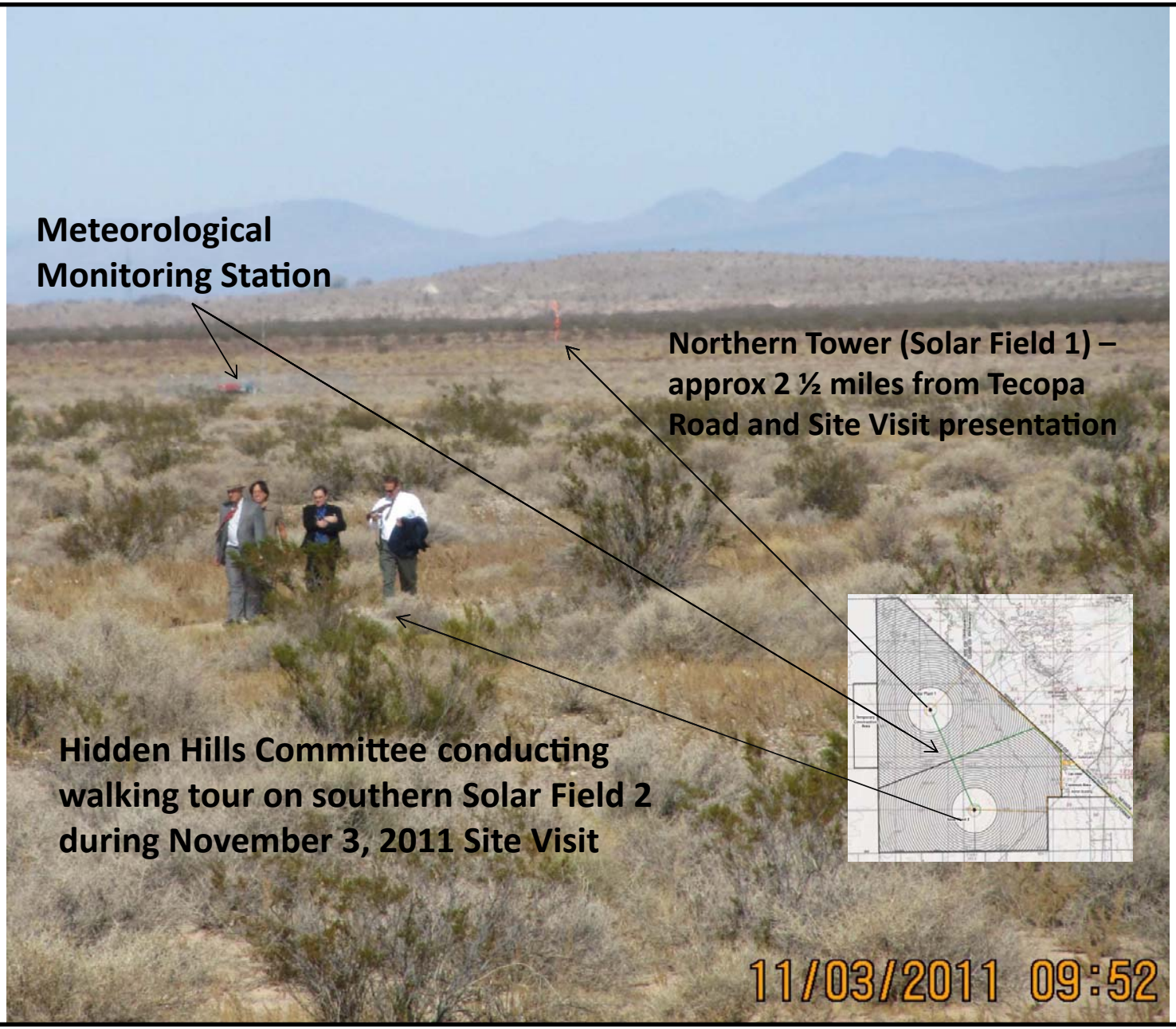



**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: tn:62873 M. Monasmith Photos

**BIOLOGICAL RESOURCES - 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

# INTRODUCTION

## PURPOSE OF THIS REPORT

This Preliminary Staff Assessment (PSA) 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 PSA is a staff document. It is neither a Committee document, nor a draft decision. The PSA 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 PSA 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 PSA presents preliminary conclusions 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 PRELIMINARY STAFF ASSESSMENT

The PSA 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; 2) biological resources; 3) facility design; 4) geology and paleontology; 5) growth inducing impacts; 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.

The staff prepares a PSA 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, and comments made at the workshops.

Staff will provide a comment period 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 will conduct one or more community workshops to discuss its findings, proposed mitigation, and proposed compliance-monitoring requirements. Based on the workshops and written comments, staff may refine its analysis, correct errors, and finalize conditions of certification to reflect areas where agreements have been reached with the parties, and publish a Final Staff Assessment (FSA).

The FSA is only one piece of evidence that will be considered by the Committee (two Commissioners who have been assigned to this project) in reaching a decision on whether or not to recommend that the full, five-member Energy Commission approve the proposed project. At the public hearings, 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.

### LIBRARIES

On August 17, 2011, the Energy Commission staff sent the HHSEGS AFC 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.

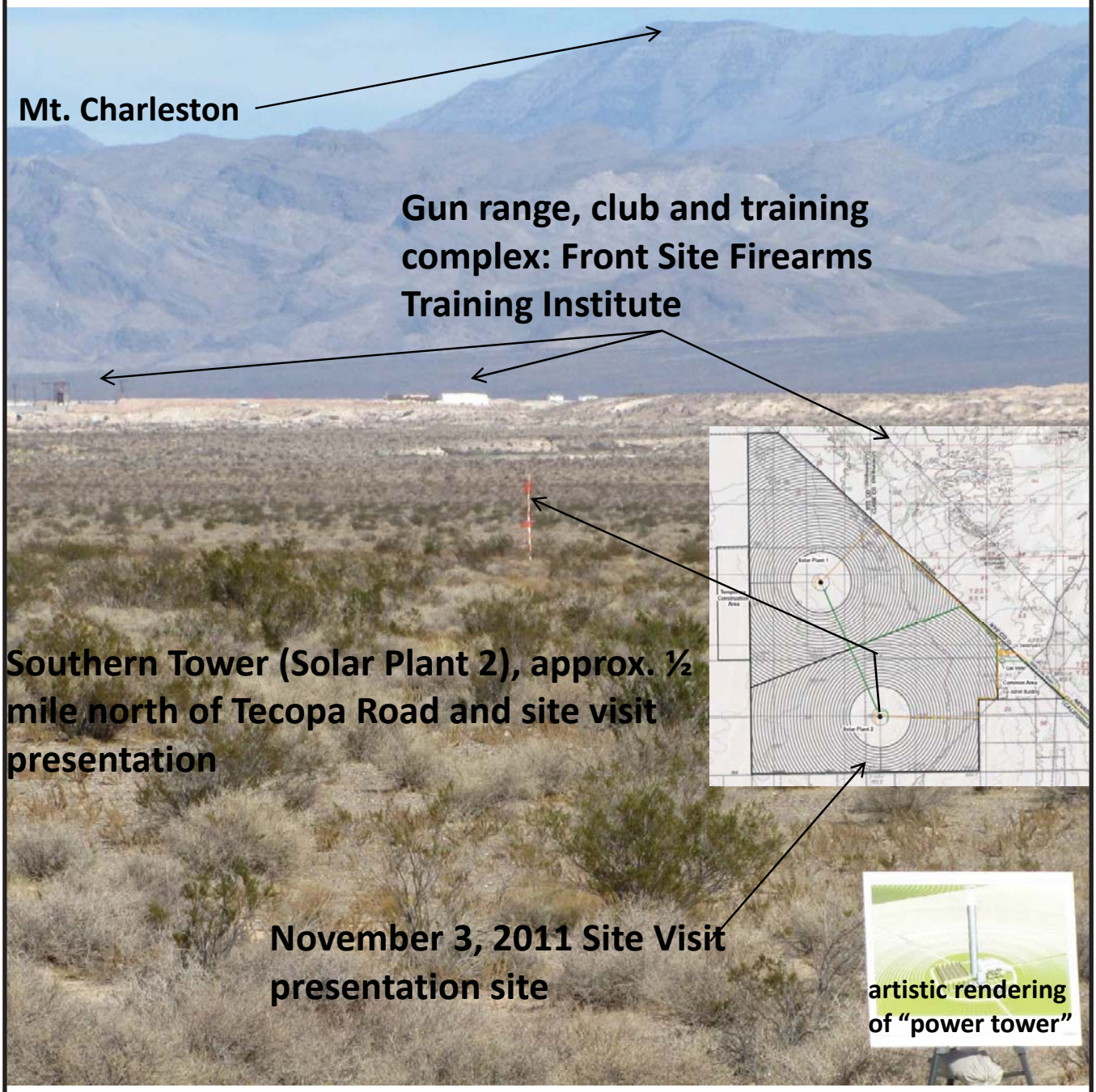
### INITIAL OUTREACH EFFORTS

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 **PSA**.

**BIOLOGICAL RESOURCES - FIGURE 5**
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

Mike Monasmith

## INTRODUCTION

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 3,277 acres of privately owned land leased in Inyo County, California, adjacent to the Nevada border. The project site is approximately 8 miles southeast of Pahrump, Nevada, 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**).

## 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 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 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

[1] San Bernardino Base and Meridian

approximately 8 miles north of the project area.

Project access would be from 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, 20-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 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 project is 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 Hidden Hills Transmission Project – see **Project Description Figure 3**) 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.

The Energy Commission and BLM staff coordinates many aspects of their respective CEQA and NEPA regulatory review processes, including the technical disciplines of Biological Resources and Water Resources. 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.

## 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.

## Solar Plants

The following provides further details regarding the two 270-MW solar plants.

- The SRSG located at the top of the 620 foot tall solar power tower is approximately 130 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 **PSA** 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.

## Electrical Transmission System

Two distinct transmission options are being considered because of a unique situation concerning Valley Electric Association (VEA). Under the first option, the project would interconnect via a 230-kilovolt (kV) transmission line to a new VEA-owned substation (Tap Substation) at the intersection of Tecopa Road[2] and Nevada State Route (SR) 160 (the Tecopa/SR 160 Option). The Tecopa Road/SR 160 option would require an approximately 10-mile long generation tie-line from the HHSEGS switchyard to the proposed Valley Electric Association's Tap (Gamebird) substation. The Eldorado generator-tie line option would follow the same 10 mile long single 230kV circuit to the Tap substation and would continue as a 230kV circuit for approximately 53.7 miles to the Eldorado substation in Boulder City, Nevada. (**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.

## Natural Gas Supply System

A 12- to 16-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 travel on the Nevada side southeast along the state line, then northeast along Tecopa Road until it crosses under SR 160. From this location a 36-inch line would turn southeast and continue approximately 26 miles, following the proposed Eldorado Option transmission line corridor (**Project Description Figure 3**), to intersect with the Kern River Gas Transmission (KRGT) pipeline. A tap station would be constructed at that point to connect it to the KRGT line. A gas metering station would be required at the tap point to measure and record gas volumes from the KRGT metering

[2] The road is also called Tecopa Highway and Old Spanish Trail Highway. The names are generally used interchangeably.

station. As proposed, the total length of the natural gas pipeline would be approximately 35.3 miles.

## 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 **PSA** for more specifics related to fire response and emergency services for the proposed 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 **PSA** 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 **WASTE MANAGEMENT** section of this **PSA** 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 first quarter of 2013 to the third 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 | First Quarter 2013 |
| Begin construction | First Quarter 2013 |
| Startup and commissioning | First Quarter 2015 |
| Commercial operation | Second Quarter 2015 |
| Solar Plant 2 | |
| Fencing and tortoise clearance | First Quarter 2013 |
| Begin construction | Second Quarter 2013 |
| Startup and commissioning | Second Quarter 2015 |
| Commercial operation | Third Quarter 2015 |

There would be an average workforce of approximately 634 construction craft people, supervisory, support, and construction management personnel onsite during construction. The peak construction site workforce level of 1,033 is expected to occur in month 14 and can be reviewed in the **SOCIOECONOMICS** section of this **PSA.**

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 during heliostat assembly from 6:00 p.m. to 4:00 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 **PSA**.

# 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. Where available, 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 **PSA** 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 20 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.

# PROJECT CLOSURE

At some point in the future, the project will cease operation and 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 situation and project setting that exist at the time of closure. Laws, Ordinances, Regulations and Standards (LORS) pertaining to facility closure are identified in the sections dealing with each technical area. Facility closure will be consistent with LORS in effect at the time of closure.

There are at least three circumstances in which a facility closure can take place: planned closure, unplanned temporary closure and unplanned permanent closure**.**

## Planned Closure

In order to ensure that a planned facility closure does not create adverse impacts, a closure process that provides for careful consideration of available options and applicable laws, ordinances, regulations, standards (LORS) and local/regional plans in existence at the time of closure, will be undertaken. To ensure adequate review of a planned project closure, the project owner shall submit a proposed facility closure plan to the Energy Commission for review and approval at least 12 months (or other period of time agreed to by the Compliance Project Manager (CPM) prior to commencement of closure activities.

The plan shall:

1. identify and discuss any impacts and mitigation to address significant adverse impacts associated with proposed closure activities and to address facilities, equipment, or other project related remnants that will remain at the site;

2. identify a schedule of activities for closure of the power plant site, transmission line corridor, and all other appurtenant facilities constructed as part of the project;

3. identify any facilities or equipment intended to remain on site after closure, the reason, and any future use; and

4. Address conformance of the plan with all applicable laws, ordinances, regulations, standards, and local/regional plans in existence at the time of facility closure, and applicable conditions of certification.

## Unplanned Temporary Closure/On-Site Contingency Plan

In order to ensure that public health and safety and the environment are protected in the event of an unplanned temporary facility closure, it is essential to have an on-site contingency plan in place. The on-site contingency plan will help to ensure that all necessary steps to mitigate public health and safety impacts and environmental impacts are taken in a timely manner.

The on-site contingency plan shall provide for taking immediate steps to secure the facility from trespassing or encroachment. In addition, for closures of more than 90 days, unless other arrangements are agreed to by the CPM, the 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**.)

In addition, consistent with requirements under unplanned permanent closure addressed below, the nature and extent of insurance coverage, and major equipment warranties must also be included in the on-site contingency plan. In addition, the status

of the insurance coverage and major equipment warranties must be updated in the annual compliance reports.

In the event of an unplanned temporary closure, the project owner shall notify the CPM, as well as other responsible agencies, by telephone, fax, or e-mail, within 24 hours and shall take all necessary steps to implement the on-site contingency plan. The project owner shall keep the CPM informed of the circumstances and expected duration of the closure.

## Unplanned Permanent Closure/On-Site Contingency Plan

The on-site contingency plan required for unplanned temporary closure shall also cover unplanned permanent facility closure. All of the requirements specified for unplanned temporary closure shall also apply to unplanned permanent closure. In addition, the on-site contingency plan shall address how the project owner will ensure that all required closure steps will be successfully undertaken in the event of abandonment.

**PROJECT DESCRIPTION - FIGURE 1**

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



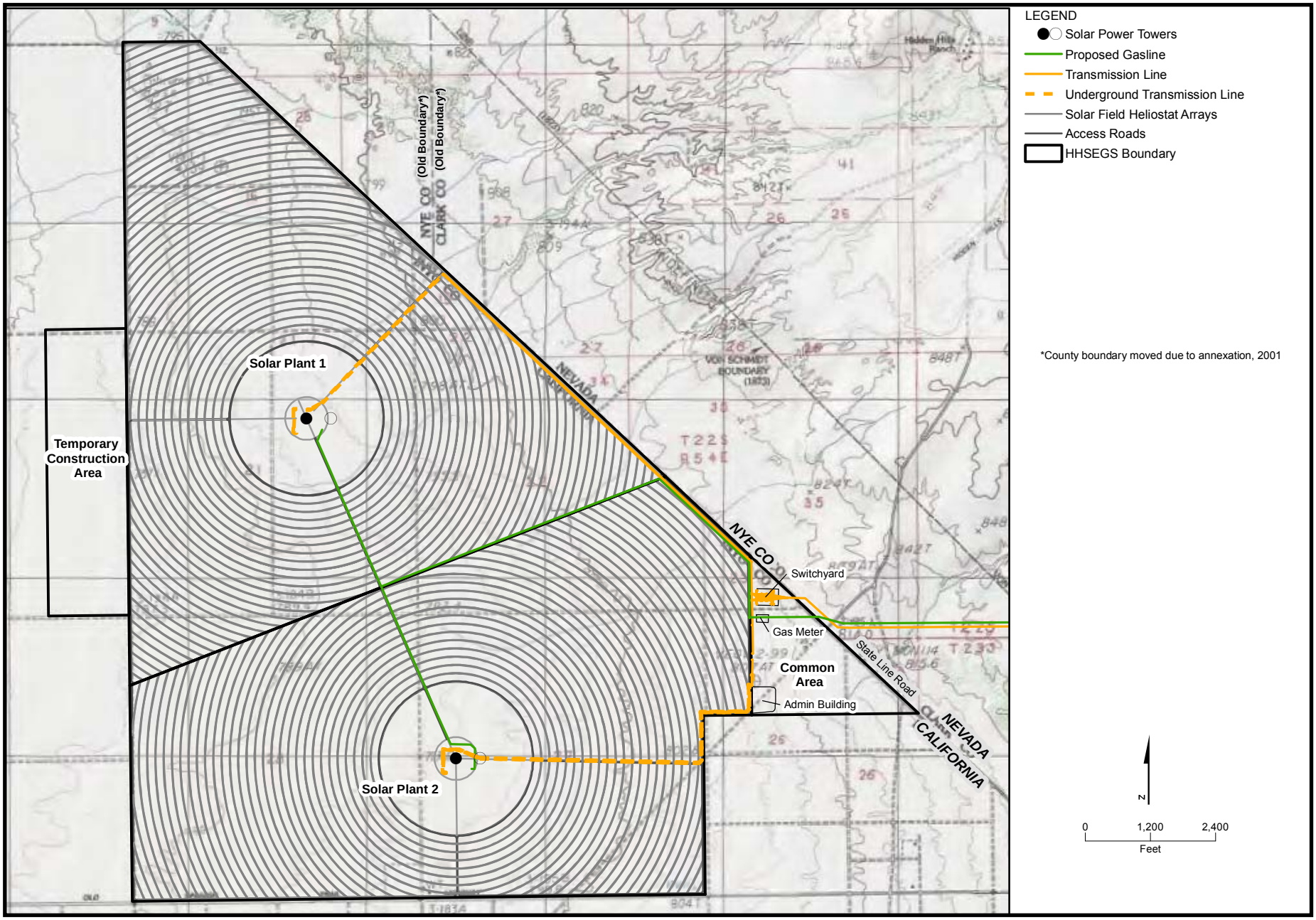

PROJECT DESCRIPTION

**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



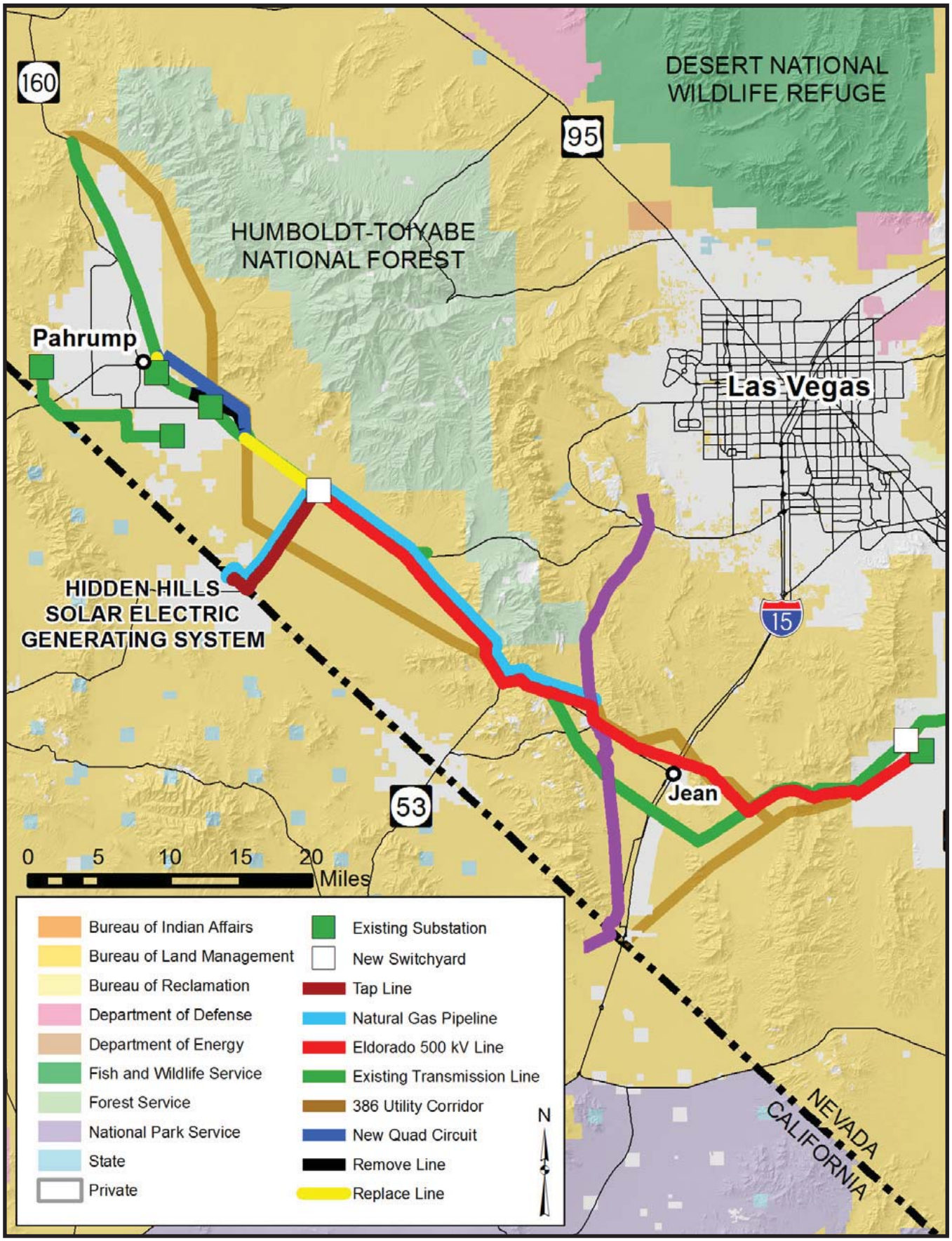

PROJECT DESCRIPTION

**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

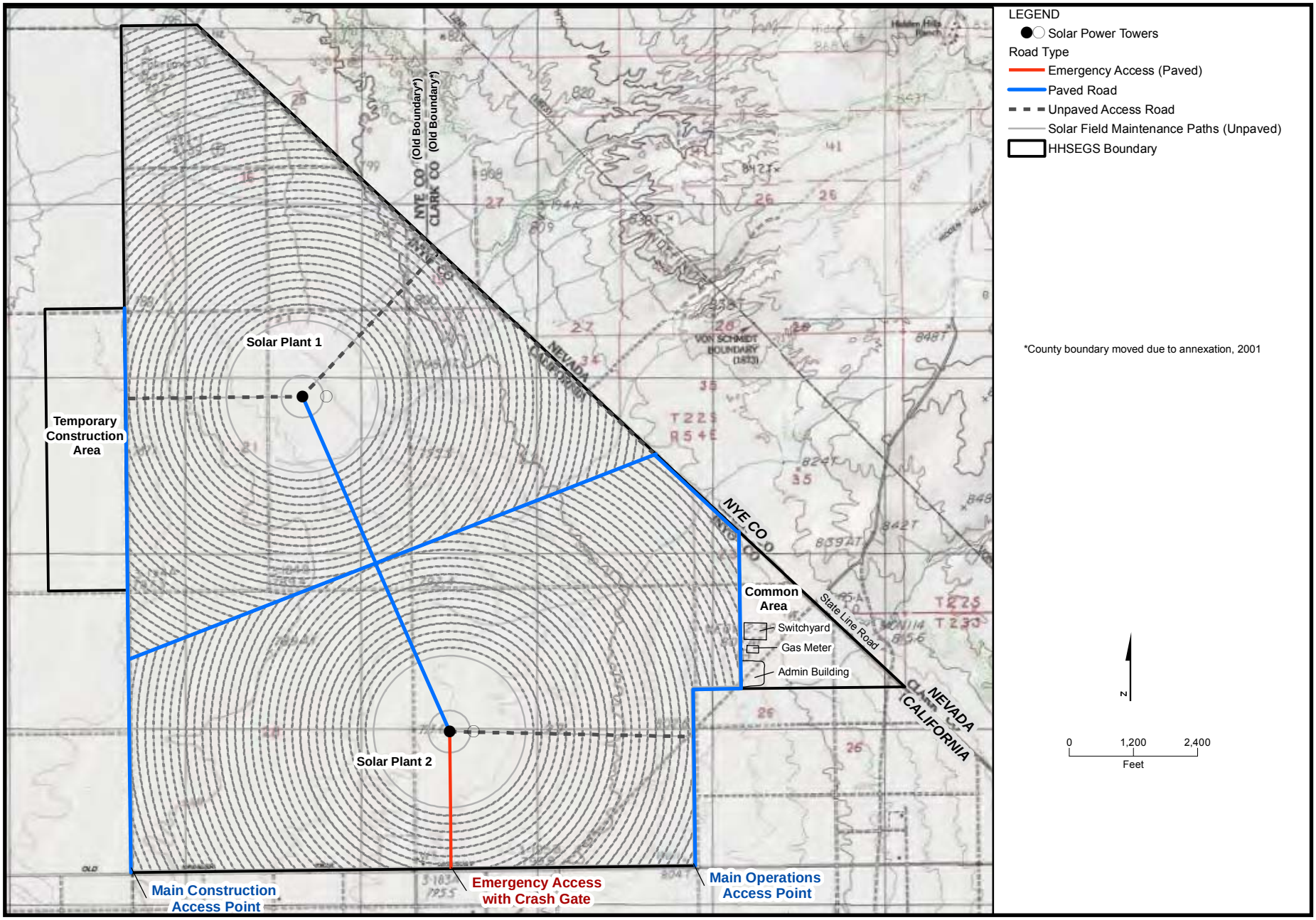



**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

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

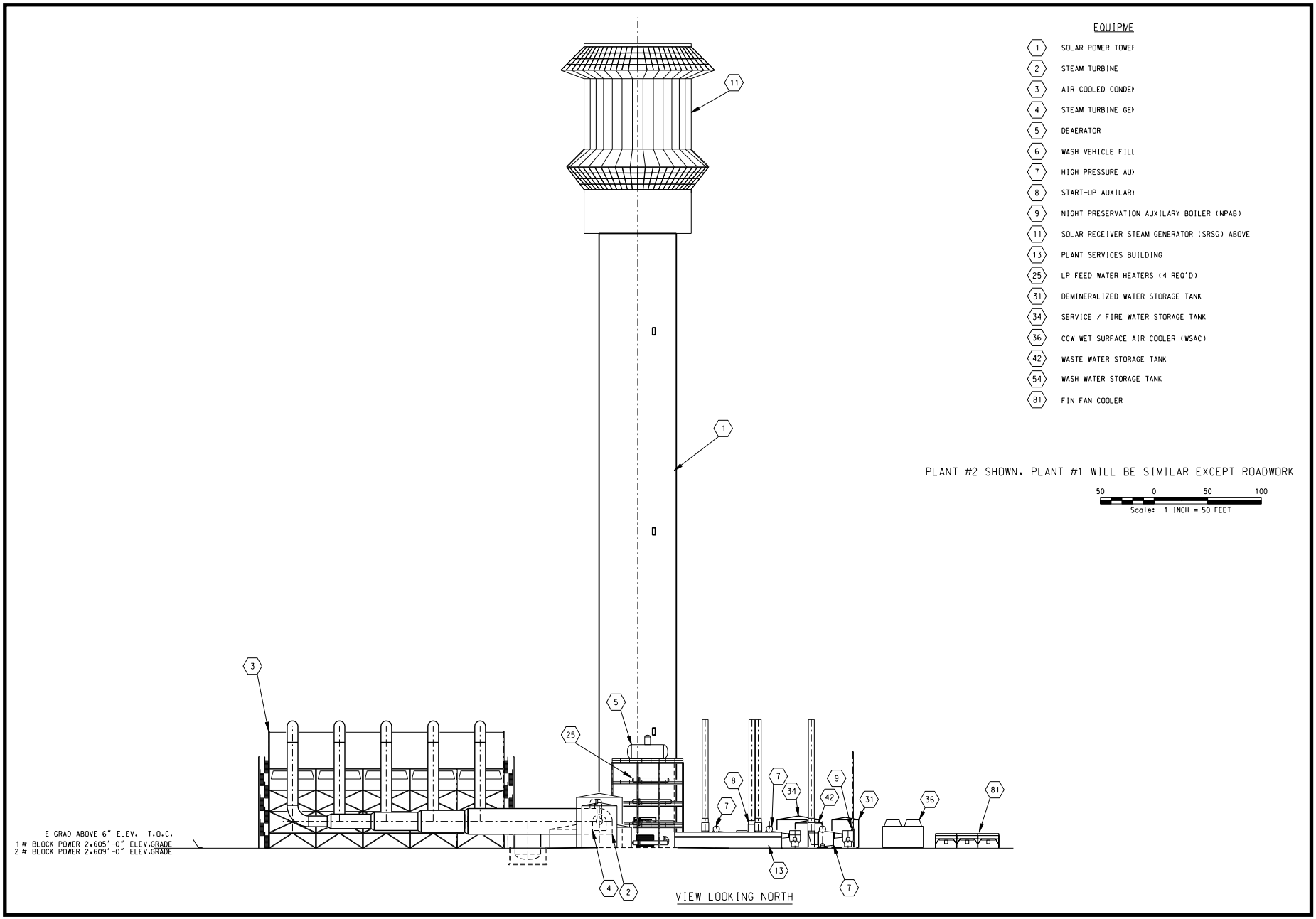



**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: AFC, August 2011, Figure DR, CH2MHILL

**PROJECT DESCRIPTION - FIGURE 5**

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



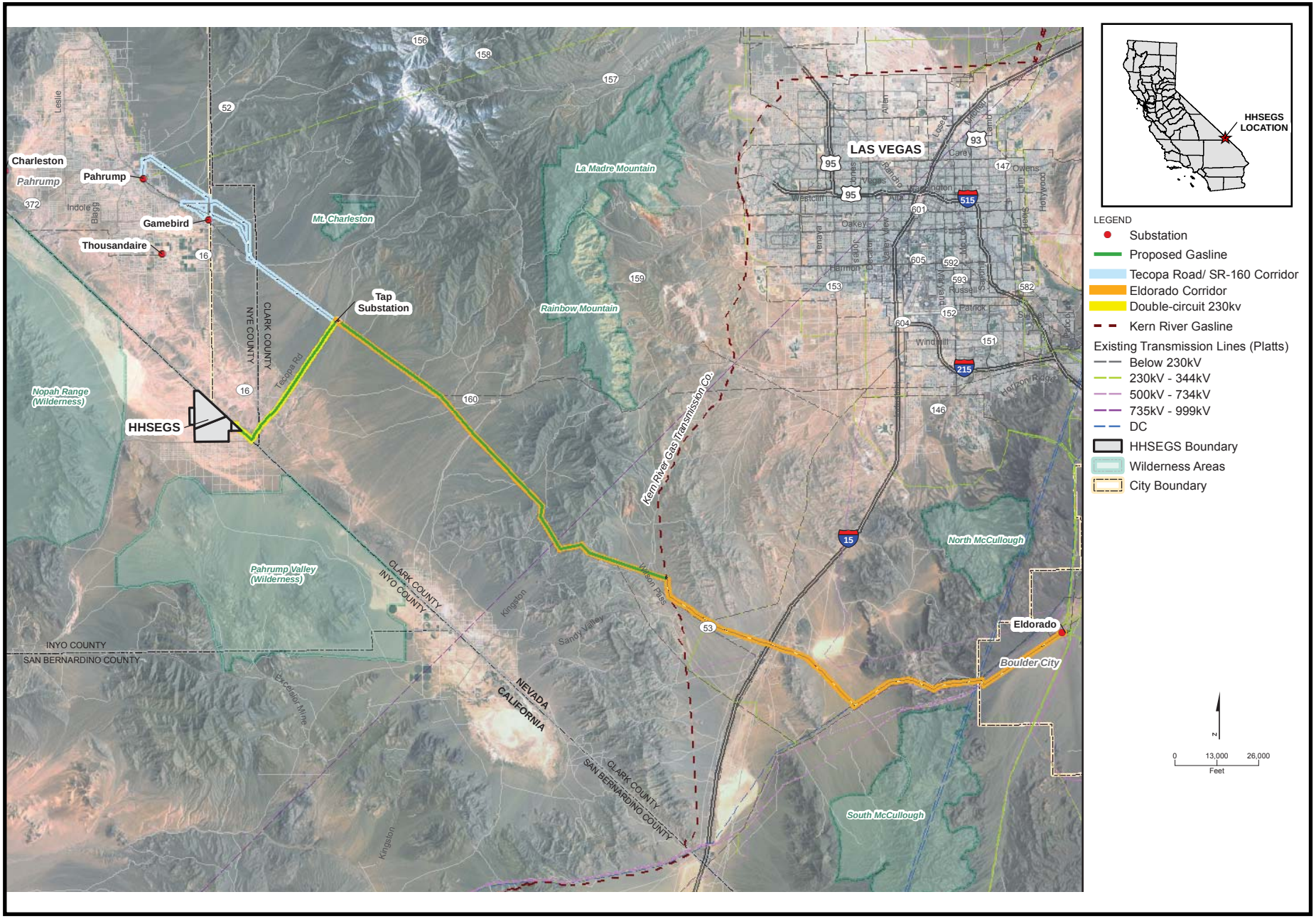

PROJECT DESCRIPTION

**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




**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

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

PROJECT DESCRIPTION

# Environmental Assessment

# AIR QUALITY

Jacquelyn Leyva

## SUMMARY OF CONCLUSIONS

Energy Commission staff (staff) believes 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. Conditions of certification referred to herein serve the purposes of compliance with LORS and mitigating 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 nor 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

On August 5, 2011, BrightSource Energy (Applicant) submitted an Application for Certification (AFC) to construct and operate the Hidden Hills Solar Electric Generating System (HHSEGS). HHSEGS 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 8 miles south of Pahrump, Nevada, and approximately 45 miles west of Las Vegas, Nevada.

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 located on the southeastern corner of the site to accommodate an administration, warehouse, and maintenance complex, and an onsite switchyard. A

[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.-

temporary construction laydown and parking area on the west side of the site would occupy approximately 180 acres.

Each solar plant would use heliostats, which are elevated mirror arrays guided by a tracking system mounted on a pylon. Their purpose is to focus the sun's rays on a solar receiver steam generator (SRSG) located atop a solar power tower near the center of each solar field. The solar power tower technology for the HHSEGS project design incorporates a 750-foot-tall solar power tower that allows the heliostat rows to be placed closer together, with the mirrors at a steeper angle. The desired goal of the layout is to reduce mirror shading and allow more heliostats per acre.

This analysis evaluates the expected air quality impacts from the emissions 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). Lead is not analyzed as a criteria pollutant, but lead and other toxic air pollutant emissions impacts are analyzed in the **Public Health** section of this PSA. 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 climate change and greenhouse gas (GHG) emissions from the project are discussed in an **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.<br><br>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.<br><br>This project's proposed emissions are below NSR and PSD applicability thresholds. |
| 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.<br>**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.<br>**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. |

| Applicable LORS | Description |
|---|---|
| **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. |
| Global Warming Solutions Act and other GHG reduction measures | Reduce emissions of GHGs; operator must purchase and surrender GHG allowances. |
| **Local (Great Basin Unified Air Pollution Control District, GBUAPCD)** | |
| Rule 200, 209, 210, 216, 220 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 and would be applicable to the construction period 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. |
| 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 the southeastern Inyo County, on the edge of California's southwest 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 in the

The most recent meteorological (weather) data, collected at the Pahrump, Nevada monitoring station located 16 miles north-northwest of the project site, was for the 2006 through 2010 time period. 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 with the wind direction heading 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 Elco, NV (located 334 miles north of the proposed site).

### 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. The nearest residences to the HHSEGS property boundary are 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.
There is also a project called the St. Therese Mission, a commercial facility under construction approximately 0.5 mile southeast of the HHSEGS site. Because this development is planned to include a chapel, garden, restaurant, a visitor's center that will include a children's playground, and a residential unit; this future development will be treated as a sensitive receptor.

The proposed project site is located in 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.

## 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 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 is under the jurisdiction of 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 98$^{th}$ percentile of the daily concentrations must not exceed 35 µg/m3.
[b] To attain this standard, the 3-year average of the 98$^{th}$ percentile of the daily maximum 1-hour average must not exceed 100 ppb.
[c] To attain this standard, the 3-year average of the 99$^{th}$ percentiles of the daily maximum 1-hour average must not exceed 75 ppb.
ppm= parts per million
Source: ARB 2011a

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 2010 (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 2010) 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 2011a.
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[d] | Limiting AAQS |
|---|---|---|---|---|---|---|---|---|---|
| Ozone | Jean, NV | 1 hour | ppm | 0.092 | 0.092 | 0.087 | 0.082 | 0.082 | 0.09 |
| Ozone | Jean, NV | 8 hours | ppm | 0.083 | 0.088 | 0.078 | 0.079 | 0.076 | 0.07 |
| PM10 [a] | Jean, NV | 24 hours | µg/m$^3$ | 62 | 60 | 96 | 81.3 | 49 | 50 |
| PM10 [a,b] | Jean, NV | Annual | µg/m$^3$ | 12.1 | 12.7 | 14 | 12.4 | 8.5 | 20 |
| PM2.5 | Jean, NV | 24 hours | µg/m$^3$ | 11.4 | 13.7 | 13.8 | 13.0 | 13.5 | 35 |
| PM2.5 | Jean, NV | Annual | µg/m$^3$ | 3.52 | 4.0 | 4.9 | 4.0 | 3.5 | 12 |
| CO | Barstow, | 1 hour | ppm | 3.5 | 1.4 | 1.4 | 0.89 | 0.89 | 20 |
| CO | Barstow, | 8 hours | ppm | 1.19 | 0.7 | 1.2 | 0.89 | 0.89 | 9.0 |
| $NO_2$ | Trona, CA | 1 hour | ppm | 0.050 | 0.055 | 0.062 | 0.049 | 0.052 | 0.18 |
| $NO_2$ | Trona, CA | 1 hour (98$^{th}$ | ppm | .042 | .046 | .043 | .039 | .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 | No | 0.25 |
| $SO_2$ | Trona, CA | 24 hours | ppm | 0.004 | 0.005 | 0.005 | 0.003 | 0.003 | 0.04 |
| $SO_2$ | Trona, CA | Annual | ppm | 0.000 | 0.000 | 0.000 | 0.001 | 0.001 | 0.03 |

Source: ARB 2012, U.S. EPA 2012 Notes:
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.
d. 2011 data has not been finalized and is expected to be ready May 2012, therefore was not included in this data set.

## Ozone

The area is classified attainment of the federal 8-hour ozone standard and is classified as nonattainment of the state ozone standards. 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.

The current federal 8-hour ozone attainment status was determined in 2004 based on the former 8-hour ozone standard of 0.08 ppm, and would have considered state lines and monitoring station locations, where the data shown is from Nevada, not California. The State of California has recommended to U.S. EPA that the southern portion of Inyo County be designated nonattainment of the new federal ozone standard (ARB 2009d). However, in a recent letter from the U.S. EPA to the Great Basin Unified Air Pollution Control District, U.S. EPA has decided to designate the area of southern Inyo County as unclassifiable with an 8-hour ozone design value of 0.072 ppm. In April 2012, the U.S. EPA classified Inyo County as "unclassifiable/attainment" of 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 2010. 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

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

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.

## 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 will 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 | 13.8 | 35 | 39% |
| | 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 2010]) 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.

The pollutant modeling analysis was limited to the pollutants listed above in **Air Quality Table 5**; therefore, recommended background concentrations were not determined for the other criteria pollutants (ozone, lead, etc.) or background values determined for other ambient standards (visibility reducing particulates).

## PROJECT DESCRIPTION

The proposed HHSEGS would be comprised of 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. The approximate disturbed acreage would be approximately 2,960 acres. Both solar plants would share a common administration building, an operation and maintenance building, and a substation and would cover approximately 103 acres. Another 180 acres is needed during the construction period for lay down and staging activities. Established dirt roads account for any additional acres. The HHSEGS total project footprint amounts to approximately 3,277 acres (approximately 5.12 square miles).

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 PSA.

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. Because of their low heat input, the nighttime preservation boilers are exempt from GBUAPCD permitting requirements (District Rule 201.F, exempting "Steam generators…that have a maximum heat input rate of less than 15 million British Thermal Units (BTU) per hour (gross), and are fired exclusively with natural gas…").[3]

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.

Two distinct transmission options are being considered because of a unique situation concerning Valley Electric Association (VEA). Under the first option, the project would interconnect via a 230-kilovolt (kV) transmission line to a new VEA-owned substation (Tap Substation) at the intersection of Tecopa Road[4] and Nevada State Route (SR) 160 (the Tecopa/SR 160 Option). The other option is a 500-kV transmission line that interconnects to the electric grid at the Eldorado Substation (the Eldorado Option), in Boulder City, Nevada.

A 12- to 16-inch-diameter natural gas pipeline would be required for the project. It would exit the HHSEGS site at the California-Nevada border and travel on the Nevada side southeast along the state line, then northeast along Tecopa Road until it crosses under SR 160. From this location, a 36-inch line would turn southeast and continue approximately 26 miles, following the proposed Eldorado Option transmission line corridor, to intersect with the Kern River Gas Transmission (KRGT) pipeline. A tap station would be constructed at that point to connect it to the KRGT line. As proposed, the total length of the natural gas pipeline would be approximately 35.3 miles (HHSG 2011a).

[3] (AFC HHSEGS 2011a)

[4] The road is also called Tecopa Highway and Old Spanish Trail Highway. The names are used interchangeably.

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**). A detailed environmental impact analysis of the transmission and natural gas pipeline alignments will be prepared by BLM (HHSG 2011a).

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

- Begin construction: fourth quarter 2012
- Startup and testing: fourth quarter 2014 for Solar Plant 1; first quarter 2015 for Solar Plant 2
- Commercial operations: first quarter 2015 for Solar Plant 1; second 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 and recycled for use at each of the two plants, and domestic wastewater would be disposed 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 power plant 1 and another at HHSEGS power 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 will be EPA-certified, non-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

The Construction of HHSEGS, from perimeter fencing to site preparation and grading to commercial operation, is expected to take place approximately from the fourth quarter of 2012 to the third quarter of 2015 (29 months total). Major milestones are listed in **Air Quality Table 6** (although the construction order may change). Construction of the common area facilities would occur concurrently with the construction of the first plant.

There would be an average workforce of approximately 634 construction craft people, supervisory, support, and construction management personnel onsite during

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

construction. The peak construction site workforce of 1,033 is expected to occur in month 16 (see HHSG 2001a, Appendix 5.14, page 14).

Noisy construction activities occurring within 500 feet of existing noise-sensitive areas would only be allowed only during 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 during heliostat assembly from 6:00 p.m. to 4:00 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, 7 days per week.

**Air Quality TABLE 6**
**Project Schedule Major Milestones**

| Activity | Date |
|---|---|
| **Solar Plant 1 and Common Area** | |
| Fencing and tortoise clearance | Fourth Quarter 2012 |
| Begin construction | First Quarter 2013 |
| Startup and commissioning | First Quarter 2015 |
| Commercial operation | Second Quarter 2015 |
| **Solar Plant 2** | |
| Fencing and tortoise clearance | Fourth Quarter 2012 |
| Begin construction | Second Quarter 2013 |
| Startup and commissioning | Second Quarter 2015 |
| Commercial operation | Third 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 | 1,357.8 | 1.5 | 2,778 | 345.9 | 55.4 | 42.9 |
| Maximum Daily Emissions | 1,742.2 | 2.2 | 2,970.3 | 375.2 | 246.2 | 80.6 |
| | 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 | 30.9 | 0.01 | 302.3 | 32.3 | 1.5 | 1.0 |
| Maximum Annual Emissions | 65.1 | 0.1 | 320 | 34.9 | 14.1 | 3.7 |

Source: AFC (HHSEGS 2011a), and supplemental data submitted April 2, 2012 (CH2 2012p).
Notes:
a. Emissions include fugitive dust
b. Max daily emissions occur during month 8.

These emission estimates appear reasonable in terms of the onsite equipment and offsite vehicle use and the offsite vehicle fugitive dust emissions. However, the onsite fugitive dust emissions estimate may be underestimated given the amount of activity on the site and appropriate level of control for the applicant's proposed mitigation measures (specifically watering unpaved roads). Staff recommends additional mitigation measures, specifically the use of soil binders on unpaved roads and other inactive disturbed surfaces during construction, so that the applicant's fugitive dust emissions estimate and associated impact analysis will be reasonable for this project.

## PROJECT OPERATION

The 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) (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 plants online. The boiler would have a steam production rate of 174,000 lb/hr at 770°F and 750 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 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 full-load hours of use per year and each nighttime preservation boiler would have a maximum of 5,003 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 to be located in the common area; all 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 entire HHSEGS project) and one 398-bhp diesel-fueled emergency generator for the common area; each 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.
- One emergency generator engine operates at a time and for one-half hour of duration for testing purposes.

B. Maximum Daily Emissions

- The auxiliary boilers would not operate for more than 5 hours of equivalent full load hours and only up to a total of 7.5 hours per day, including startup loads.
- The nighttime preservation boilers will not operate for more than 12 hours per day during summer months and no more than 16 hours per day during winter months.
- Each emergency generator engine operates half an hour each for testing purposes.
- Each emergency fire pump engines operate half an hour each for testing purposes.

C. Maximum Annual Emissions

- Each auxiliary boiler was modeled assuming 1,208 full-load hours of use per year.
- Each nighttime preservation boiler assumes a maximum of 5,003 full load hours of use per year.
- Each emergency generator engines operate 50 hours per year for readiness testing purposes.
- Each emergency fire pump engines 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**.

Similar to the construction emissions estimate, staff believes that the onsite fugitive dust emissions estimate may be underestimated given the amount of activity on the site and appropriate level of control for the applicant's proposed mitigation measures (specifically watering of unpaved roads).

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[6] 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 onsite auxiliary equipment (boilers, cooling tower, fire pump engine, etc.) and the

[6] 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.

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 11059) 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 2010, 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 2010 that was used in a more refined $NO_2$ impact modeling analysis using the Plume Volume Molar Ratio Method (PVMRM), available with AERMOD that integrates the Ozone Limiting Method (OLM) with the downwind plume stoichiometry.

## Proposed Project

### Construction Impacts Analysis

The HHSEGS project would be constructed in two phases over approximately 29 months total. 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 ($98^{th}$ 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 | 13.8 | 17 | 35 | 49% |
| | 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 will not occur at the same time as the maximum background concentration, the actual maximum combined impact will 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 applicant has proposed to use the following mitigation measures:

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

B. Vehicle speeds will be limited to 10 miles per hour within the construction site on unpaved roads.

C. All construction equipment vehicle tires will be washed or cleaned free of dirt prior to entering paved roadways.

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

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

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

G. All paved roads within the construction site will 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 will 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 will 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 will be provided with a cover, or the materials will 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 will be used on all construction areas that may be disturbed. Any windbreaks used will remain in place until the soil is stabilized or permanently covered with vegetation.

L. Construction equipment will be shut down to avoid excessive idling emissions.

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

N. Construction equipment will be maintained in top service shape.

O. Construction equipment used will 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 polymer based, or equivalent, soil stabilizers on the site's unpaved roads and inactive disturbed surfaces during construction.

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 CEQA 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 CEQA impacts of PM10 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 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 will 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 | 99% |
| | 1-hr federal[d] | 141 | -- | 166[d] | 188 | 88% |
| | Annual | 0.1 | 7.5 | 7.6 | 57 | 13% |
| 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 | 13.8 | 15 | 35 | 36% |
| | 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% |
| $SO_2$ | 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 98$^{th}$ 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

All PM2.5 is assumed to be formed from precursor emissions and is considered 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 will 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 so the small amount of operating NOx and SOx emissions that would be generated by this project would have a reduced 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 the auxiliary boilers includes Low-NOx burners and 20 percent flue gas recirculation (for NOx), good combustion practices (for CO), and to operate them 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) provides the following emission limits, for each of the (249 MMBtu/hour HHV) 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 them 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 expected final PDOC conditions (which are not expected until May 2012) will be included in the Final Staff assessment and these are expected to require the following emission limits, for each of the smaller (15 MMBtu/hour HHV) 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 (Tier 2) for 3,633 bhp engines. The specific emission levels for the selected engine are currently unknown but they will be no higher than following Tier 2 emission standards:

- $NO_x$: 4.8 grams per break horsepower (including non-methane hydrocarbons - NMHC/VOC)
- CO: 2.6 grams per break horsepower
- VOC: 0.16 grams per break horsepower
- $PM_{10}$: 0.15 grams per break horsepower
- $SO_2$: 15 ppm sulfur content fuel

*Fire Water Pump Engines*

The applicant has proposed use of a Tier 3 Engines that should 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 not proposed any specific emission controls 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 meets 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 at the time of purchase 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 on stabilized unpaved roads as long as no visible dust plumes are observed, to address fugitive PM emissions from the site;
- Apply and maintain a non-toxic soil binder[7] to the onsite unpaved roads to create a durable stabilized surface;
- 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 use of engines that meet model year EPA/ARB Tier emission standards for the year purchased.

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 minority population surrounding the site (see **Socioeconomics Figure 1**)**.** Since the staff-proposed CEQA mitigation measures reduce the project's air quality impacts to a point where they are 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 will be adverse CEQA-related air quality impacts during decommissioning they are expected to be less than significant.

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

## 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. However, for the federal 8-hour ozone standard, until the U.S. EPA acts on the redesignation, the district is required to prepare and adopt an ozone attainment plan for submittal to the U.S. EPA describing how it will achieve attainment with the federal 8-hour standard. The portion of the region where the project

site is not specifically subject to the provisions, until a redsignation or a status of attainment is officially classified. In a recent letter from the EPA to the Great Basin Unified Air Pollution Control District, EPA has decided to designate the area of southern Inyo County as unclassifiable with an 8-hour ozone design value of 0.072 ppm. The revised federal 8-hour ozone standard attainment/nonattainment designations are scheduled to be completed by Spring 2012[8]. An official status is not known at this time.

For purposes of federal air quality planning, currently the entire GBUAPCD is attainment area with respect to national ambient standards for ozone; however, in early 2009 ARB submitted its recommendations for area designations for the revised federal 8-hour ozone standard. This recommendation included the southern Inyo County (including the project area) to remain unclassified/attainment for ozone. 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.

### Particulate Matter

The District is nonattainment for the state PM10 air quality standard. California has adopted standards that are far more stringent 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, it is unlikely that the project would 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

[8]http://www.gbuapcd.org/ozone/20111012CARBUpdatedAmbientOzoneRecommendedAreaDesignations.pdf

"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 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 while adverse cumulative impacts would likely occur, 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 will eventually be built and operated in the desert southwest, staff believes it is appropriate to construct and operate all desert renewable projects with

[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).

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, which may be one of many in the area and greater southeastern region.

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 Preliminary Determination of Compliance (PDOC) for the HHSEGS May 9 2012. Compliance with all District rules and regulations was demonstrated to the District's satisfaction in the PDOC. The District's conditions are presented in the 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 will 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 Preliminary Determination of Compliance and the Energy Commission's affirmative finding for the project. In the PDOC, 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.

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 will 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. Best Available Control Technology would be implemented, and emission reduction credits (ERCs) are not required to offset the

project's emissions 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 final PDOC May 9, 2012. This Preliminary Determination of Compliance (PDOC) 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 will 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 is expected to comply with this rule.

### Rule 402- Nuisance

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

### Rule 403 - Breakdown

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 conditions **AQ-SC3** and **AQ-SC7** and District condition **AQ-8**, the facility is expected to 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% 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 will 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.

## CONCLUSIONS

Staff makes the following conclusions about the HHSEGS:

- The project would not have the potential to 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 potential 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, will mitigate these potentially CEQA-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 that Condition of Certification **AQ-SC9** is needed to ensure that the emergency engines meet applicable model year emission standards.
- Staff concludes the project's construction activities would likely contribution to significant CEQA 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 CEQA 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 CEQA 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 PM10 standards, and attainment or unclassified for the state and federal $CO_2$, $NO_2$, $SO_2$, and PM2.5 standards.

3. The project will 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 will 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 will reduce the project's impacts to a level that is less than significant.

6. The Great Basin Unified Air Pollution Control District will issue a Preliminary Determination of Compliance (PDOC) finding that HHSEGS would comply with all applicable district rules and regulations for project operation. A draft of the district's ATC 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, AQ-3 though AQ-8**, and **AQ-34** through **AQ-44** for the common area.

7. The analysis contains an adequate analysis of the project's contributions to cumulative air quality impacts.

8. Implementation of the Conditions of Certification listed below would ensure that the HHSEGS will 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-SC10** are all CEQA-only mitigation measures and associated construction and operating conditions.

**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 entire project site and linear facility construction. 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, 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 30 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 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 at a minimum of one per mile 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 Monthly Compliance Report (**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 additional mitigation measures will be accomplished within the time limits specified. The AQCMM or Delegate shall implement the following procedures for additional 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 additional 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 Monthly Compliance Report (**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-SC5** Diesel-Fueled Engine Control: The AQCMM shall submit to the CPM, in the Monthly Compliance Report, 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 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 the CPM is informed within 10 working days of the termination and a replacement for the equipment item in question meeting the level of control required occurs within 10 work days of 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) if 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.

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

A 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 list shall include the owner of the equipment and a letter from each owner indicating that the equipment has been properly maintained; and

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-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 vehicle emission standards for the model 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 portion of roadways to solar equipment maintenance vehicles only. In addition, vehicle speed shall be limited to no more than 10 miles per hour on these unpaved roadways, 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.

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.

**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 manual 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 emergency generator and fire pump engines procured for this project will meet or exceed the NSPS Subpart IIII emission standards for the model year that corresponds to their date of purchase.

**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.

## 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 (only applies to Hidden Hills Power Plant 1 and 2, not the Common Area):**

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 applicant. [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.

**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 **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 Annual 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 Power Plant 1, and HHSEGS Power 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 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 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:** During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CPM.

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

**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 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;

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

D. initial start-up testing hours;

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

F. 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 Monthly Compliance Report 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 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 Annual Operation Report.

**AQ-32 Plant-wide Emission Records**

Emission records for the plant-wide NOx PEMS, required by Condition **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 **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 |
| 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 |
| PDOC | Preliminary Determination Of Compliance |
| 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) |
| 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. HHSEGS would be a concentrating solar power plant, and would be comprised of 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 improvement of the annual average GHG emission rates for both California and the western United States generation resources. 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 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 interconnected 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 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 the natural gas fueled 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.
- 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 fossil-fired power plants 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 plants, would not worsen current conditions, and would not result in impacts that are cumulatively CEQA significant.

[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.

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 is therefore not 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

## INTRODUCTION

The generation of electricity using fossil fuels, even in an auxiliary boiler or back-up generator at a thermal solar plant, produces air emissions known as greenhouse gases 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, 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 residence time in the atmosphere and ability to warm the planet.

GHG emissions are not 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, such as AB 32, California's Global Warming Solutions Act.

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

[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).

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.

**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 the 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 is being developed to achieve approximately 20 percent of the GHG reductions expected 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.) |
| Title 20, California Code of Regulations, section 2900 et seq. | The 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). |

## 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 that will 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.

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 staff is developing regulatory language to implement its plan and holds ongoing public workshops on key elements of the recommended GHG reduction measures, including market mechanisms. The mandatory reporting requirements apply to this project.

Examples of strategies that the state might pursue for reducing GHG emissions in California, in addition to those recommended by the Energy Commission and the Public Utilities Commission, were identified in the California Climate Action Team's Report to the Governor (CalEPA 2006). The scoping plan approved by ARB in December 2008 builds upon the overall climate change policies of the Climate Action Team report and shows the 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 system that includes the electricity sector (ARB 2008). Mandatory compliance with cap-and-trade requirements commenced on January 1, 2012, although enforcement has

[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 term greenhouse gases (GHGs) and global climate change (GCC) are used interchangeably.

been delayed until 2013. Senate Bill 2 (Simitian, Chapter 1, Statutes of 2011-12) expresses the intent to have 33 percent of California's electricity supplies by renewable sources by 2020 and the Hidden Hills Project would contribute to this goal. The scoping plan also includes a strategy to greatly expand use of combined heat and power (cogeneration) facilities.

It is possible 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 effect for the least cost). For example, the ARB proposes a 40 percent reduction in GHG 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 the 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.

In addition to these programs, California is involved in the Western Climate Initiative, 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). The timelines for the implementation of this program 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.

HHSEGS will likely be required to participate in California's greenhouse gas cap-and-trade program once the program begins to operate. 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 will 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 the market cap is ratcheted down over time,

[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

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, will be consistent with California's landmark AB 32 Program, which reduces California's GHG emissions down 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. 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 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.

**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 (HHSEGS 2012o or q)

Notes:
a. Includes emissions from workers commuting to work site.

[16] See CEC 2009b, page 95.

b. One metric tonne (MT) equals 1.1 short tons or 2,204.6 pounds or 1,000 kilograms.

### 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 for auxiliary boiler and twelve to sixteen hours per day for 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. Staff was not able to determine the degree to which mirror washing should be included in the documentation of operating emissions so operating emissions are show both with and without mirror washing. GHG emissions from mobile equipment may not count towards operating emissions.

The proposed project would be permitted, on an annual basis, to emit approximately 61,628 metric tonnes of $CO_2$-equivalent per year if operated at its maximum permitted level, and mirror washing is included. The $CO_2$ emissions result from a project capacity factor of 43 percent, well below the trigger for the SB1368 Emission Performance Standard of 60 percent capacity factor. Regardless, the new HHSEGS facility would emit at 0.043 MTCO2/MWh, which would easily meet the SB1368 Greenhouse Gas Emission Performance Standard of 0.5 MTCO2/MWh, if it applied.

## Assessment Of Impacts And Discussion Of Mitigation

Staff assesses the cumulative effects of GHG emissions caused by both construction and operation. As the name implies, construction impacts result from the emissions occurring during the construction of the project. The operation impacts result from the emissions of the proposed project during operation.

### Construction Impacts

Staff believes that the small GHG emission increases from construction activities would not be significant for several reasons. First, the period of construction will be short-term and the emissions intermittent during that period and not ongoing during the life of the project. Additionally, control measures that staff recommends to address criteria pollutant emissions, such as limiting idling times and requiring, as appropriate, equipment that meets the latest criteria pollutant emissions standards, would further minimize greenhouse gas emissions to the extent feasible. The use of newer equipment will 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 future ARB regulations to reduce GHG from construction vehicles and equipment.

**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 | |
| 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 (HHSEGS 2012[x])
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

### Direct/Indirect Operation Impacts and Mitigation

Operational impacts of the proposed project are described in detail in a later section titled "**Project Impacts on Electricity System**" since the evaluation of these effects must be done by considering the project's role(s) in the integrated electricity system. In summary, these effects include reducing the operation and greenhouse gas emissions from the older, existing power plants; and, potentially displacing and accelerating higher-GHG generation retirements and replacements, including facilities currently using once-through cooling.

## 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 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

Ultimately, ARB's AB 32 regulations may address both the degree of electricity generation sector emissions reductions (through cap-and-trade), and the method by which those reductions will be achieved (e.g., through cap-and-trade or command-and-control). However, the exact approach is still under development. That regulatory approach may 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 likely to be more effective in reducing GHG emissions overall from the entire electricity sector.

ARB has adopted cap-and-trade requirements that went into effect in January 2012, but 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.

This project would be subject to ARB's mandatory reporting requirements and potentially other future requirements mandating compliance with AB 32 that are being developed and implemented by ARB. How the project would comply with these ARB requirements is speculative at this time, but compliance would be mandatory. 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 the information to demonstrate compliance with any future AB 32 requirements that could be 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 would meet 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:

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

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

Finally, while the HHSEGS combusts natural gas for the purposes of freeze protection and to initiate and sustain output during periods of low solar irradiance, the latter displaces higher-emission generation, and reduces the need for energy and ancillary services from natural gas-fired resources, potentially obviating the need for their construction/operation.

### The Role of the HHSEGS in Energy Displacement

As California moves towards an increased reliance on renewable energy by implementing the RPS, non-renewable 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 energy, an increase of roughly 55,000 GWh over 2010 levels.[17]

Given an RPS, renewable energy displaces energy from coal- and natural gas-fired generation. The construction and operation of the HHSEGS will 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,

[17] 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)

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 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.

While the HHSEGS will combust natural gas, as thus emit GHGs as part of its operations it will produce far less emissions than the coal- and natural gas-fired resources it will 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).[18]

## The Role of the HHSEGS in Capacity Displacement

The HHSEGS will provide up to 500 MW of 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.[19] 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 EPS and the SWRCB's OTC policy.

### 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**.

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

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

**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.

### Retirement of Generation Using Once-Through Cooling

The State Water Resource Control Board's (SWRCB) policy on cooling water intake at 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 assigned compliance dates,[20] some of which will require replacement.[21] The units with compliance dates on or before the end of 2020 are presented in **Greenhouse Gas Table 6.**

## GHG Emissions During Plant Operation

The HHSEGS will produce GHG emissions during operations, combusting natural gas in order to provide freeze protection 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, 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 will produce little if any energy and gas-fired resources will have to be dispatched to provide reserves. Similarly, gas-fired generation will 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 evening hours, as well as to sustain

[20] 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.

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

output under less-than-ideal conditions on extreme load days not only reduces the need to dispatch gas-fired generation but may, in some cases, obviate the need to build it.

**Greenhouse Gas Table 6**
**OTC Units with SWRCB Compliance Dates on or before December 31, 2020**[22]

| 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 |

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 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

[22] 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)

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.).

## 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.
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 61,628 MTCO2E as shown in **Greenhouse Gas Table 3**.
3. HHSEGS will 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 will be 61,467[23] MTCO2, which constitutes an emissions performance factor of 0.043[24] 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.
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. There is no evidence in the record that construction or operation of HHSEGS will be inconsistent with the loading order.
15. HHSEGS will displace generation from higher-GHG-emitting power plants.
16. HHSEGS will replace power from coal-fired power plants that will 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 will reduce overall GHG emissions from the electricity system.

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

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

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# BIOLOGICAL RESOURCES

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## 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 species, wetlands and other waters of the U.S., and 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 – 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, and April 6, 2011, discussions with representatives of the U.S. Fish and Wildlife Service (USFWS) from Nevada and California, California Department of Fish and Game (CDFG), and representatives from the U.S. Bureau of Land Management (BLM) from both Nevada and California, and eight staff workshops for the project conducted in October, November, and December of 2011, and January, February, March, and April 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, fencing of the site would eliminate, by exclusion, 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, and a broader area encompassed by the Northern and Eastern Mojave Desert Planning Area (NEMO)[1], and extending into the Pahrump, Nevada environs. At this time, staff has yet to receive all information necessary to make a complete analysis of impacts. Where possible, staff has proposed impact avoidance and minimization measures as well as compensatory mitigation, through habitat acquisition, to offset direct, indirect, and cumulative impacts to 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

[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.

ordinances; however, proposed mitigation measures may change as staff receives new information regarding project design and construction methods, impacts to avian species from solar flux, continuing special-status plant surveys, and other unresolved issues summarized below. The results of these additional surveys and information requests will be presented and fully analyzed in the Final Staff Assessment (FSA).

## SUMMARY OF IMPACTS TO SPECIAL-STATUS WILDLIFE

**Common Wildlife and Nesting Birds**: Construction of the HHSEGS project will adversely affect common wildlife and nesting birds due to ground disturbance, operation of the facility, and the placement 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 by the exclusionary fencing, and would be subject to increased risks of road kill and repeated disturbance from human activities during construction and operation. The project exclusion fencing will also exclude species from the entire 3,277-acre project site, resulting in loss of habitat and disruption of movement within the area. To reduce project-related direct and indirect impacts on wildlife to less than significant, conditions of certification **BIO-1** through **BIO-8** require a Designated Biologist, and prescribe minimization measures and best management practices to reduce wildlife mortality, limit road use, and require dust abatement. Condition of Certification **BIO-14** requires pre-construction nesting bird surveys, and **BIO-18** requires preparation and implementation of a Weed Management Plan to prevent the loss of habitat values, and measures to protect wildlife from weed management activities. Habitat loss would be mitigated by the application of Condition of Certification **BIO-12** (Desert Tortoise Compensatory Mitigation) however; overall effects to wildlife within the project perimeter are expected to be significant.

Construction and operation of the project is expected to significantly impact avian species. It is currently unclear how avian species will respond to the project once operational, since this technology has not been implemented and studied for such a large scale project. Therefore, staff cannot fully assess the potential for collisions and mortality associated with these structures and associated heat flux at this time. As a result, staff has proposed Condition of Certification **BIO-15** (Avian, Bat, and Golden Eagle Protection Plan), which would require the applicant to prepare and implement a Bird Monitoring Study to monitor the death and injury of birds from collisions with facility features such as reflective mirror-like surfaces and from heat, and bright light from concentrating sunlight. In addition, while some disturbance-tolerant birds are expected to continue foraging on the project site once it is developed, it is unknown at this time the degree to which the site may be used by avian species. This analysis will be further refined in the FSA.

**Desert Tortoise**: Implementation of the Hidden Hills Solar Energy Generating project will result in significant direct and indirect impacts to desert tortoise (federally and state listed threatened species). Construction of the proposed project would result in the permanent loss of approximately 3,277 acres of occupied desert tortoise habitat. This includes 1,611 acres of Mojave Desert scrub, 1,647 acres of shadscale scrub, and 19 acres of disturbed areas. The project site is expected to support between 6 to 33 adult/subadult tortoises and between 3 to 34 juvenile tortoises. Between 46 and 158 desert tortoise eggs are also expected on the site. The proposed project would result in

direct mortality to between 46 to 158 eggs and between 3 to 29 juvenile desert tortoises. Staff estimates that the applicant will be required to translocate between 6 to 38 desert tortoises. If translocation occurs, an estimated 18 to 114 tortoises would require handling, radio tagging, and long term monitoring. Potential translocation sites have yet to be identified by the applicant or responsible agencies. The translocation of tortoises and other construction related impacts of the proposed project pose substantial effects to this species. Conditions of certification **BIO-1** through **BIO-9** require protections of desert tortoise and other biological resources in and near the project area, and conditions of certification **BIO-10** through **BIO-12**, which are specific to desert tortoise. To reduce effects of the large scale land use conversion, staff, in consultation with the California Department of Fish and Game (CDFG), is requiring compensatory mitigation. This compensatory mitigation is designed to fully mitigate impacts as required under the California Endangered Species Act (CESA), and requires a full mitigation finding, which usually contemplates a mitigation ratio greater than 1:1 to compensate for loss of high-value habitat (i.e., acquisition or preservation of more than one acre of compensation lands for every acre lost). On past energy projects considered by the Energy Commission, the CDFG has required a 3:1 compensation ratio to meet the CESA full mitigation standard for good quality habitat such as that found on portions of the project site. The higher ratio reflects the project impacts to good quality occupied habitat and recognizes 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.

Staff proposes compensation at a 3:1 ratio is proposed for loss of desert tortoise habitat supporting Mojave Desert scrub, and a 1:1 ratio for habitat supporting shadscale scrub to achieve full mitigation under CESA for habitat loss and other significant impacts to desert tortoises.

Based on these ratios, the total acreage of desert tortoise compensation land acquisition and protection would be 6,480 acres. The total cost of acquisition, protection, and enhancement is estimated at $22,197,240.00. This amount would be provided in the form of a financial security prior to the start of any project-related ground disturbing activity so the compensatory mitigation can be accomplished within 18 months of the start of construction.

**Burrowing Owl**: Project construction will result in the direct loss of foraging habitat for the burrowing owl (a state species of special concern). This species was observed onsite and several burrows have been detected within the project area. Condition of Certification **BIO-17** provides impact minimization and avoidance measures for this species, and prescribes that the applicant must develop a Burrowing Owl Mitigation Plan. Depending on how owls use the site and if nesting is occurring, owl relocations may be required and would be structured to accommodate the wintering or breeding birds. Condition of Certification **BIO-12**, compensatory mitigation for desert tortoise, would offset burrowing owl habitat loss provided the species occurs on or near the potential relocation sites. If desert tortoise mitigation lands do not meet the criteria for burrowing owls, separate compensatory mitigation has been proposed for burrowing owls as part of **BIO-17**. However, staff recognizes there are ongoing concerns with displacing owls from a large development parcel. Staff is coordinating with the applicant

and CDFG regarding possible methods to passively relocate this species from the project site.

**Golden Eagle & Migratory Birds**: Golden eagles, 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 remove approximately 3,277 acres of foraging habitat for golden eagle and migratory birds. New golden eagle regulations proposed by the USFWS indicate the USFWS may consider this loss to constitute substantial interference with normal breeding, feeding, or sheltering behavior, which would be considered a "take." Condition of Certification **BIO-15 r**equires preparation of an Avian, Bat, and Golden Eagle Protection Plan. Although the federal government may issue a take permit for golden eagle, the direct take of golden eagles would in direct conflict with the state's mandate to "fully protect", and therefore would not be authorized The USFWS has also raised concerns regarding potential collision threats associated with solar and renewable technologies. To address potential impacts to from 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 Plan). This requires a monitoring and reporting program that would document and report potential collision and heat flux exposure within the proposed solar fields. 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, this condition will likely require substantial revision in the FSA to reflect ongoing discussions with USFWS, CDFG, and Energy Commission staff. However, staff believes significant residual impacts to avian species would remain after implementation of conditions of certification.

**Nelson's Bighorn Sheep**: Nelson's bighorn sheep is known to occur in the nearby Nopah Ranges, Kingston Range, and Clark Mountains, and the project area is likely used for periodic intermountain movement; however, the project site would not be located in a designated movement linkage area for this species. Construction of the project is not expected to reduce the availability of seasonal forage for Nelson's bighorn sheep but could limit movement of the animals in the project area due to the placement of perimeter fencing. In addition, bighorn sheep could be subject to construction disturbance if moving or foraging near the site. 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) that compliments groundwater elevation monitoring recommended by **Water Resources** staff (**WATER SUPPLY-6**) that, together, would protect local groundwater-dependent species and habitats. Condition of Certification **BIO-24** requires remedial action if the monitoring detects impending impacts that threaten local groundwater-dependent species and habitats.

**American Badger and Desert Kit Fox**: American badgers and desert kit fox were detected on the HHSEGS project site and the area supports suitable foraging and

denning habitat for these species. Kit fox are a protected furbearing mammal, and American badger is a state species of special concern. Construction of the proposed project is expected to result in direct effects to badgers and kit fox which occur on the project site. Because of the large size of the project, numerous badgers or kit foxes may be affected. Animals confined within the exclusionary fence will be subject to ongoing long-term impacts that may result in mortality from road kill, loss or alteration of foraging habitat, overlapping territories and barriers to dispersal. Avoidance of badgers and kit fox alone will not mitigate the direct, indirect, and operational effects of the project. Condition of Certification BIO-16 will require the applicant, in conjunction with CDFG and Energy Commission staff, to prepare a management plan for desert kit fox and American badger. The plan would include an adaptive management approach emphasizing flexibility in passive relocation methods, ground-disturbance schedule, and treatment of possible disease outbreak. Development of final condition language is pending CDFG review and approval at this time. Final condition details will be available in the FSA. Condition of Certification **BIO-12**, the compensatory mitigation plan for desert tortoise habitat, would 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, Waters, and Vegetation

**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** (Designated Botanist Qualifications and Duties) and **BIO-7** (Biological Resources Mitigation Implementation and Monitoring Plan) would ensure full implementation of the Weed Management Plan. Fire prevention measures to address the increased flammability of vegetation from the spread of non-native annual grasses are included in **BIO-18**; additional fire prevention measures were added to **BIO-7** (General Impact Avoidance and Minimization Measures) and **BIO-6** (Worker Environmental Awareness Program). **BIO-18** includes measures for protecting offsite biological resources from collateral or non-target harm from weed management activities.

**Special-status Plants**: Twenty-one occurrences of 10 special-status plant species would be directly or indirectly eliminated by the project. 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, shading, disease, disrupted dispersal pathways, and other factors.

All 10 species are considered at-risk or vulnerable to regional (statewide) extinction by NatureServe; a consortium of natural heritage programs and conservation data centers throughout North America, and the International Union for the Conservation of Nature

(IUCN). Two of the ten species (Pahrump Valley buckwheat and Nye milk-vetch) are also globally rare or at-risk. Pending results of the applicant's spring 2012 special-status plant surveys already underway, staff currently considers impacts to five of the ten species to be significant and potentially immitigable if: 1) the project would eliminate a substantial portion (greater than 20 percent) of the total documented occurrences in California, and 2) there are no opportunities for offsite compensatory mitigation.

Condition of Certification **BIO-19** contains measures for avoiding and minimizing impacts to special-status plant occurrences in close proximity to the project disturbance area. **BIO-20** (Special-status Plant Compensatory Mitigation) provides guidelines and performance standards for compensatory mitigation by acquiring, preserving, and enhancing offsite occurrences, at a ratio of 3:1 or 2:1 based on statewide extinction risk. Compensatory land acquisition costs include stewardship fees for 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, decommissioning ORV trails, protection from herbivores, managing public access, enforcement); and monitoring the implementation, effectiveness and compliance with the conservation goals and objectives of the mitigation.

Significant indirect impacts to special-status plants during operation would be minimized to a level less than significant through the following new conditions and new measures added to improve existing conditions: fire prevention measures added to **BIO-8** (General Impact Avoidance & Minimization Measures), **BIO-18,** and **BIO-6** (Worker Environmental Awareness Program); improvements were made to Condition of Certification **BIO-18** (Weed Management Plan); and a new condition, **BIO-21** (Designated Botanist) that, combined with **BIO-7** (Biological Resources Mitigation Implementation and Monitoring Plan) will ensure full implementation of all conditions. Integration of special-status plant compensation lands with desert tortoise habitat compensation lands is acceptable only if the mitigation lands meet all selection criteria required in **BIO-20**.

**Desert Washes**: A total of 28.33 acres of jurisdictional Waters of the State, including single-thread and braided, compound channels, were delineated on the proposed project site. Of these 28.33 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. The U.S. Army Corps of Engineers issued a jurisdictional determination on December 14, 2011 (CH2 2011f). The state waters delineation is currently under review but has not been field-verified.

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. Potential indirect impacts to the 4.51 acres of washes delineated upstream of the project's eastern boundary due to underground and overhead transmission construction, potential erosion (head-cutting), on-going human disturbance, glare, lighting, and road maintenance would also diminish the function and value of washes in close proximity.

Condition of Certification **BIO-22** (State Waters Compensatory Mitigation and Impact Avoidance and Minimization Measures) specifies impact avoidance and minimization measures for protecting adjacent offsite waters. **BIO-22** also requires compensatory mitigation for onsite waters by acquiring, preserving, and enhancing ephemeral streams, similar to those on the project site, on lands within the local hydrologic unit. 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 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 would result in a drawdown of the water table, which may adversely affect nearby mesquite woodlands, mesquite dune scrub, and active springs, including 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. Loss or drawdown of springs or a decline in the health and habitat values of the mesquite habitats would significantly impact the many special-status species that are dependent on, or strongly associated with these rare desert habitats. Condition of Certification **BIO-23** (Groundwater-dependent Vegetation Monitoring) and groundwater elevation monitoring required in **WATER SUPPLY-6**, would ensure that a significant drawdown would be detected before it resulted in significant impacts. Condition of Certification **BIO-24** (Remedial Action for Impacts to Groundwater-dependent Biological Resources) requires remedial action if the monitoring detects impending significant impacts to groundwater-dependent species and habitats. With implementation of these mitigation measures, impacts to groundwater-dependent biological resources would be reduced to a level less than significant.

The **Water Resources** section of this Preliminary Staff Assessment 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 1,611 acres of shadscale scrub and 1,647 acres of Mojave Desert 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 proposed

project groundwater pumping include mesquite riparian woodlands, and mesquite coppice dunes.

## UNRESOLVED ISSUES

**Potential Regulatory Conflicts:** There are a number of unresolved issues related to the assessment and development of adequate compensatory mitigation for desert tortoise at this time. Currently, the Energy Commission, CDFG, and USFWS staff is working to resolve regulatory conflicts regarding potential translocation areas for this species. Because the proposed project is located directly adjacent to the Nevada border many of the desert tortoises that occur in the project footprint likely utilize home ranges that span portions of both California and Nevada. While translocation to sites in Nevada may allow some of the animals to maintain a portion of their home range; transporting desert tortoise, a state listed species, across the state border may pose legal and regulatory challenges for the State of California. Currently the CDFG is evaluating whether a legal mechanism exists to sanction such an action. The CDFG and staff are also evaluating whether suitable candidate sites may occur within California. Conversely, USFWS is not bound by state requirements and considers translocation to suitable lands in Nevada to constitute a reasonable minimization measure at this time. Further discussion and coordination between the regulatory agencies regarding translocation will continue and be discussed further in the FSA.

**Field Verification of State Waters Delineation:** CDFG has reviewed the applicant's state waters delineation report but has not yet conducted a field verification of features delineated as "jurisdictional" and "non-jurisdictional features". CDFG has reviewed Condition of Certification **BIO-22** (State Waters Compensatory Mitigation) but the total acres of required compensatory mitigation shown in **BIO-22** could change after CDFGs field verification of the delineation. Staff has requested clarification from the applicant on desert wash vegetation in the project area to determine if the rare plant community – creosote bush-galleta grass association – occurs on the project site, as inferred from two recent data responses. If present, staff would amend **BIO-22** to include 2:1 compensation for this plant community that is both regionally and globally rare.

**Uncertainty of Project Features:** Applicant has yet to finalize the alignment and construction methods for the transmission line, as well as the location of the switchyard. Applicant's last filing indicated a switchyard location in Nevada; however, at the public workshop on April 27, 2012, Mr. Clay Jensen, BrightSource Energy, Inc. stated that the alignment is still undergoing refinement. The applicant recently informed staff on May 4, 2012 that the switchyard would likely remain in California and within the common area. Construction practices and final alignment of the transmission line and switchyard could affect state waters on the project site and may need to be reassessed.

**Analysis of Avian Impacts From Solar Flux:** Staff has requested additional information regarding potential operational impacts to avian species and exposure to solar flux. These data requests were released for the Rio Mesa Solar Electric Generating Facility project, a BrightSource Energy project with the same technology and design, and will clarify the potential areas of the project site with the potential to affect birds. Staff anticipates this issue will require additional time to resolve because several technical specialties including glint and glare, engineering, biology, and worker safety must collaborate to determine the scope and types of potential impacts. Avian

tolerance to solar flux is not understood by resource agencies nor well studied independently, therefore assessment of impacts and development of suitable mitigation and possible impact minimization procedures have not been developed. Staff believes avoidance of exposure to solar flux is not possible, but other offsite mitigation may be feasible. At this time, staff has insufficient data to make a determination of the project's conformance with state and federal LORS.

**Additions to Desert Kit Fox, American Badger, and Burrowing Owl Conditions:** These species will require an adaptive management approach emphasizing flexibility in passive relocation methods, ground-disturbance schedule, and treatment of possible disease outbreak for desert kit fox. Development of final condition language is pending ongoing coordination with the CDFG. Final condition details will be presented in the FSA.

**Ongoing Surveys for Special Status Plants:** The applicant is conducting additional surveys in spring 2012 geared to finding additional offsite occurrences, which could lessen the significance of impacts by reducing the proportion of the total statewide population affected; extinction risk, which is assessed regionally and globally, is based, in part, on the proportion of total documented occurrences of a species within its global or regional range that are affected. The field survey report will not be available until mid-June; however, the raw field data is expected sooner. The survey report will include information on ownership and management opportunities for offsite mitigation. Staff anticipates substantial changes to the determinations if many new occurrences are found offsite, and if there are no opportunities for offsite mitigation for some species.

## 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, section 330.5(a)(26)) | Requires the permitting and monitoring of all discharges to surface water bodies. 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. 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 |

| Applicable LORS | Description |
|---|---|
| | 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 violation of 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 90-542; 16 U.S.C. 1271 et seq.) | Created by Congress in 1968, this act designates certain rivers or portions of rivers to be preserved in free-flowing condition, in order to conserve scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values for the public good. |

| Applicable LORS | Description |
|---|---|
| **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, American badger(?), 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, included 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. |
| 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. |
| 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. |
| 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. |
| Lake and Streambed Alteration Agreement (Fish and Game Code sections 1600 and following) | 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 designated by CDFG in which 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. |

| Applicable LORS | Description |
|---|---|
| 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 | 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 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 has lead federal agency status, and is therefore preparing an Environmental Impact Statement (EIS), which directs the assessment and mitigation of proposed projects. 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 also supplement staff analysis and conditions regarding aspects of desert tortoise management in California, dictating methods and location of relocation, husbandry topics, and a suite of protective measures from onset of construction through project decommissioning and post-project monitoring. See the "Special-Status Plants and Wildlife Species" subsection of this PSA section for more information.

The Energy Commission does not provide CEQA analysis for project features located in Nevada, including transmission and gas lines. These elements will be analyzed by the Bureau of Land Management (BLM), and available for public review when the draft EIS is published in 2012. 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 PSA 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 PSA section for further details regarding staff's approach 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 Pahrump Valley. Charleston View, an unincorporated community, is immediately south of the site, and the closest incorporated city is the town of Pahrump, located 19 miles to the east, 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 U.S. Bureau of Land Management (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 and the Northern and Eastern Mojave Planning Area 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. The exact location of the switchyard, transmission line, and method of construction (trenching or boring) has yet to be determined.

#### Solar Power Plant Process and Equipment

The proposed project would use heliostats (mirrors elevated on pylons) to focus the sun's ray's on proposed Solar Plant 1 and Solar Plant 2 collector towers. The two central power towers are each 750 feet. Within the towers, solar energy is reflected by the heliostats onto solar receiver steam generator 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.

Solar Plants 1 and 2 would each require solar array fields (heliostats), a power block, natural gas boilers to supplement power generation, emissions control and monitoring, plant cooling systems, and ancillary facilities.

#### Natural Gas Pipeline

The majority of pipeline construction would occur in Nevada, with natural gas supply for connection at the Kern River Gas Transmission (KRGT) pipeline approximately 35.3 miles

southeast of the site. A gas metering station would be required at the tap point to measure and record gas volumes from the KRGT metering station. Pipeline diameter would range from 36-inch gas pipeline ( generally westward along the proposed Eldorado Option transmission line corridor to the intersection of Tecopa Road and SR 160) to 12- to 16-inch (along the west side of Tecopa Road to the state line and then northwest to the HHSEGS site). The gas pipeline would enter the site in the common area where it would connect with an onsite gas metering station.

### Transmission System Interconnection and Upgrades

The applicant is currently considering two distinct options for routing of transmission lines, the Tecopa Road/SR 160 option, and the Eldorado option. The Eldorado option would entail over 63 miles of construction of new transmission lines, from the project site along Tecopa Road/SR160 to the proposed new tap station to the existing El Dorado Substation in Boulder City, Nevada.

The Tecopa Road/SR 160 option would require construction of 10 miles of gen-tie line to the proposed tap station. This option would also require construction of an approximately 29 mile transmission line from the tap substation to the Eldorado line. A final alignment will be discussed in the FSA.

### Water Supply and Discharge

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 wells would supply both solar plants and would be used for make-up water, mirror wash water, and 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.

### Drainage, Erosion, and Sediment Control

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 stormwater 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 percent 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. 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 stormwater prior to leaving the project site boundary. Stone filters and check dams are not intended to alter drainage patterns but to minimize soil erosion and promote sheet flow.

A stormwater retention area has been proposed to catch sheet flow on the western side of the project, to ensure consistent pre-and post-project water flows. At a public workshop held April 27, 2012, the applicant stated that more information regarding the

location, size, and duration of the retention pond would soon be available. A complete discussion of the final stormwater management project design will be presented in the FSA. See the **Soil and Water** section for more information.

## 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 3 miles south of the project site. The Nopah Wilderness Area boundary is approximately 4 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 2 miles east of the project's southeastern corner. BLM lands north and west of the project are in the California BLM Barstow District. The Northern and Eastern Mojave Desert Planning Area (NEMO) 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 elevational relief than the Sonoran Desert region of California in eastern Riverside and Imperial counties. The mean annual precipitation is approximately 4 to 6 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 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.

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 larger, single-thread desert washes enter the site from the east near the state line, and trend southeast to northwest towards the playa, as does the complex network of smaller, braided, distributary

channels that also occur on the project site. 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 site quality is somewhat degraded by a grid of excavated roads constructed for a now-abandoned residential subdivision, particularly in the western two-thirds of the site. The grid of roads extends into the eastern portion of the project site but the habitat between the roads is mostly undisturbed. A total of 19 acres were mapped as disturbed habitat on the project site. The surface hydrology has been somewhat altered by the network of roads, which divert and redistribute a portion of the runoff from smaller channels away from the habitat downslope of the roads. Noxious weeds and other invasive non-native plants were mapped across the entire project site, and may have been introduced during road construction. Nevertheless, the site also supports a wide variety of special-status plants and animals. The greatest density and diversity of special-status species is found in the eastern portion of the site, including the state and federal Threatened desert tortoise. A total of 10 special-status plant species were documented on the project site (HHSEGS 2011a).

## SPECIAL-STATUS PLANT AND WILDLIFE SURVEYS

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 (CNPS 2012), and the Consortium of California Herbaria (CCH 2012).

General botanical surveys, which included vegetation mapping, special-status plant surveys, an inventory of all plant species observed, and an assessment and characterization of plant communities began in fall 2010 and included two seasons of onsite and offsite surveys, and a late season survey. A reconnaissance-level survey was conducted within a one-mile radius surrounding the project in 2011 and 2012. Surveys for common wildlife species were conducted concurrently with protocol special-status wildlife and general botanical surveys; all wildlife sign and sightings were recorded.

The following description of biological resources presents the results of the applicant's biological surveys of the project site and project vicinity, as well as observations from site visits; input from the public, consultation with recognized experts, interveners, and resource agencies; and staff's independent research in support of this PSA. Special-status species are discussed below, and include species covered under CESA and/or CEQA. Species affected only by the construction of project components in Nevada are not included below.

## 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' is a more encompassing term that includes plant communities, desert washes, and habitats defined by their geology, such as dunes.

Two plant communities were mapped on the project site: Mojave Desert scrub and shadscale scrub. The western half of the project site occurs at the toe of the alluvial fan and edge of the basin sink in siltier and more saline soils. It supports a saltbush scrub dominated by shadscale (*Atriplex confertifolia*).The eastern half of the project, toward the middle portion of the alluvial fan in gravelly, well-drained soils, is mapped as a Mojave Desert scrub of creosote bush and white bursage (*Ambrosia dumosa*).The project site also includes a small area of disturbed habitat, such as roads, structures, and agricultural lands.

Mojave Desert scrub and shadscale scrub also dominate the one-mile buffer surrounding the project site. The one-mile buffer also includes scattered patches of mesquite thicket; a groundwater-dependent woodland dominated by honey mesquite (*Prosopis glandulosa*) (CH2 2011g, Figure DR48-1). The mesquite woodlands are generally confined to the fault zone that parallels the California-Nevada stateline, supported by shallow groundwater forced to the surface by juxtaposed lake and basin-fill deposits (Belcher & Sweetkind 2010).

These plant communities are discussed in more detail below. The total 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 | 1,611 |
| Shadscale scrub | 1,647 |
| Disturbed (excluding roads) | 19 |
| **Total upland and state and federal waters** | 3,277 |
| Desert Washes/Waters of the US | 0.4 |
| Desert Washes/Waters of the State | 28.33 |

### Mojave Desert scrub

A total of 1,611 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 1 to 4 feet in height, dominated by creosote bush and white bursage. Common associated shrubs include rabbit-thorn (*Lycium pallidum* var. *oligospermum*) and shadscale. This community also supports a large variety of mostly native herbaceous forbs and grasses, and provides valuable habitat for a wide variety of common and special-status wildlife. Ten species of special-status plants were also documented within this community-type.

Creosote bush and white bursage-dominant communities have a NatureServe state-rank of 5, 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 but the expression of this community in the project area is not considered a rare natural community.

### Shadscale Scrub

A total of 1,647 acres of shadscale scrub occurs within the project site (HHSEGS 2011a). Shadscale scrub is comprised of low-growing, salt-tolerant shrubs that are widely spaced and often have lower overall species diversity. Most shrubs are less than two feet in height. This plant community typically occurs on poorly-drained flats with heavy, 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.

Fewer special-status plants were found in the shadscale scrub, which dominates the lower elevation (western) half of the project site, in siltier and more saline soils. Special-status wildlife were also found in lower abundance in this area. The western half of the site is also somewhat more disturbed; the invasive weed halogeton (*H. glomeratus*) is also more abundant in this area (HHSEGS 2011a).

Shadscale-dominant natural communities have a Nature Serve rarity 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 19 acres of disturbed habitat occurs on the project site (HHSEGS 2011a). This includes roads and other sparsely vegetated, weedy areas that were previously graded. An abandoned 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. Tumbleweed (*Amaranthus albus*) and the invasive weed Russian knapweed *(Acroptilon repens*) are common in the disturbed areas.

## SENSITIVE NATURAL COMMUNITIES

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. The may be sensitive because they are regulated (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.

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 NatureServe ranking. Communities with a state or global rank of 1, 2, or 3 are considered critically imperiled to vulnerable to extinction within their range in California.

Some of these communities are also globally at-risk. The NatureServe global and state ranks do not reflect other concerns, *e.g*., whether the habitat is designated critical habitat for a listed species. Some *alliances* (i.e., a description of the community based on its dominant species) that are common have rare associations, such as the galleta grass association of the creosote bush alliance, or creosote scrub with a high level of diversity in the shrub layer, or with an important component of stem succulents like Mojave yucca (*Yucca schidigera*) or various cacti (Sawyer et al. 2009).

Clarification has been requested of the applicant on desert wash vegetation in the project area to determine if a creosote bush-galleta grass association – a rare plant community – occurs on the project site, as inferred from two recent data responses (CH2 2012). If present, the impact will be assessed in the FSA and conditions relating to desert wash compensatory mitigation will be revised to include compensation this community.

To date, sensitive natural communities known to occur in the project area and study area surrounding the project include:

- Mesquite dune scrub
- Mesquite woodland
- Desert washes (Waters of the State)

The desert washes on the project site, sometimes referred to as ephemeral or episodic streams, all or a portion of which are regulated under California Fish and Game Code, are described in the subsection “Desert Washes”, following the discussion of mesquite woodlands and dune scrubs, invasive weeds, special-status plants, and groundwater-dependent ecosystems.

**Mesquite Woodlands and Mesquite Dune Scrub**

Over 4,000 acres of mesquite woodlands were mapped within the five-mile radius study area. No mesquite woodlands were mapped within the project boundary, with the exception of a few scattered trees (CH2 2011g, Figure DR48-1). No mesquite occur within the project boundaries except for a few widely scattered few individuals. Mesquite woodlands and mesquite dunes scrubs are depicted on the project vegetation maps as “mesquite thickets”.

The mesquite-dominated habitats closest to the project occur as lower-growing shrublands on approximately 3 meter high sandy *coppice dunes*. 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. However, 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. Plants associated with coppice dunes in the project vicinity include honey mesquite (*Prosopis glandulosa* var. *torreyana*), creosote bush, Mormon tea (*Ephedra* spp.), and four-wing saltbush (*Atriplex canescens*). 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). The dunes also 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).

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.

Beyond the project boundary and along the broad fault zone east of the project, mesquite also occurs as taller, lush riparian woodlands along washes supported by shallow groundwater, and in some cases by discharging seeps and springs. “Mesquite bosque” is another term erroneously applied to mesquite woodlands in California; however, “bosques” describe the taller “mesquite gallery forests” that occur only along the lower Colorado River, and may not occur in California at all (Stromberg 1993; Holland 1986). In California, mesquite grow primarily as shrubby, dense thickets around springs, in washes, and at playa margins; however, single-trunked shrubs of greater stature occur in a few areas. All mesquite-dominated habitats are rare in California (Sawyer et al. 2009); however, mesquite dune scrubs are a rarer type of mesquite-dominated habitat (CDFG 2003), and they provide habitat values that are distinct from other mesquite types, particularly for burrowing fauna and dune-endemic insects that would not be present in mesquite washes or riparian areas.

Honey mesquite dominates both mesquite types; four-wing saltbush is a common associate on the coppice dunes. The invasive salt cedar (*Tamarix* sp.) is also present in some of the mesquite-dominated washes. These groundwater-dependent communities are discussed in more detail in the subsection “Groundwater-Dependent Ecosystems”.

Plant communities dominated by mesquite are considered rare and sensitive plant communities in California (CDFG 2003; Sawyer et al. 2009). They have a state NatureServe rank of S3.2 in California meaning they are rare and occurrences threatened by a variety of factors (Sawyer et al. 2009; Master et al. 2009), predominantly groundwater pumping and urbanization (Crampton et al. 2006). Mesquite dune scrub is an uncommon type of mesquite habitat (CDFG 2003; Crampton et al. 2006). Mesquite habitats are a recognized conservation priority in Nevada and in the Clark County Multiple Species Habitat Conservation Plan (MSHCP), Mesquite-Acacia Conservation Management Strategy (CMS), the Pahrump Valley and Stump Spring stands are specifically noted (*ibid.*).

## INVASIVE WEEDS

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.

Eleven 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, particularly along roads or seasonally moist areas. Red brome may be the most widespread – and flammable – but the infestations of halogeton in the project area and vicinity may be the largest infestations in the state. The species documented onsite are described below, as well as additional weed species of concern to local agricultural commissioners.

### *Russian knapweed (Acroptilon repens)*

Russian knapweed was found in two locations on the project site; the abandoned 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.

### *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).

### *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.

### *Malta starthistle (Centaurea melitensis)*

Malta starthistle was not found on the project but it is another identified priority for local agricultural commissioners. Similar to yellow starthistle (*Centaurea solstitialis*), it invades disturbed and open areas, including grasslands, open woodlands, agricultural fields and roadsides. 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 toxic to horses. While Malta star-thistle is less invasive than yellow starthistle, but it still spreads quickly by producing great quantities of seed that is easily carried on tires and is often spread by contaminated straw and hay.

### *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.

### *Field bindweed (Convolvulus arvensis)*

Field bindweed was found in low abundance at one location in the 250-foot buffer. This deep-rooted perennial is difficult to control and tends to invade roadsides and agricultural areas.

### *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 is a prolific seed producer in which the seeds may remain viable in the soil for 10 years or longer. It is poisonous to livestock. Though common in Nevada, halogeton is not as widespread in California, but the CDFA (2010) has given it an “A” rating, meaning that eradication is a priority. This species should be eradicated if observed.

### *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. This species is a common invasive in Nevada. 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 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. Although all invasive plants share the trait of being adapted to disturbed habitat, Russian thistle or tumbleweed (*Salsola tragus*) particularly tends to be restricted to roadway shoulders and other sites where the soil has been recently disturbed. There is a high potential that Russian thistle could become established in the construction area and this species should be eradicated if observed.

### *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. This species should be eradicated if observed.

### *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. Cal-IPC has declared this plant moderately invasive (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.

## COMMON WILDLIFE

The HHSEGS project area is in the Pahrump Valley located 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 and soil structure. Dry lakebeds, seeps, ephemeral drainages, and mesquite bosques 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 western portions of the site appear to support increased densities of native species. More disturbed areas including graded roads, the abandoned orchard and areas heavily colonized by weedy annuals provide lower habitat value and tend to support lower species diversity than otherwise intact native plant communities.

### Invertebrates

Desert ecosystems are known to support a broad group of invertebrate life. As in all ecosystems, invertebrates at the project site play a crucial role in a number of biological processes. They serve as the primary or secondary food source for a variety of fish, bird, reptile, and mammal predators; they provide important pollination vectors for numerous 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 despite the windy conditions during the April 2012 site visit.

Desert fairy shrimp are known from saline lakes in the region and various species of gastropod can be associated with desert seeps and springs. Currently, the site does not appear to support seeps or perennial water sources but these resources may be present at Stump Spring and other off-site locations.

Native harvester ants (*Pogonomyrmex spp.*) were detected on the project site. Although not detected during staff 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 present in those locations.

### 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 among some of the other snakes 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.

### Mammals

Mammals were well represented on the HHSEGS project site and a variety of species were observed during surveys conducted by the applicant. Vegetation on the project site such as the Mojave Desert scrub, shadscale scrub, and native annuals provide

foraging and breeding habitat for many mammalian species including pocket mouse (*Perognathuslongimembris*), 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. Both the applicant and staff noted numerous kit fox complexes on the project site and badger sign was evident in many areas. Wide ranging carnivores such as bobcat (*Felis rufus*) 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. 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 mammologist. 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 is used by a variety of common and sensitive bat species. Some of these species include the California myotis (*Myotis californicus*), big brown bat (*Eptesicus fuscus*), western pipistrelle (*Pipistrellus hesperus*), Townsend's big-eared bat (*Corynorhinus townsendii*), long-legged myotis (*M. volans*), Mexican free-tailed bat(*Tadarida brasiliensis*), and pallid bat (*Antrozous pallidus*). Ongoing survey results at the site could detect additional species, which would be reported in the FSA. Bat roosts were not detected on the HHSEGS project site.

### *Exotic Species*

Cattle and sheep grazing are permitted activities within portions of the Pahrump Valley and the project site has been subject to some level of 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 Place the HHSEGS site also appears to support 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 area 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 ample foraging opportunities. 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 on an IBA; the closest IBA is the East Mojave Peak IBA, located approximately 5.5 miles south of the project site. This IBA lies within the Kingston Mountain range. Joshua tree woodlands and pinyon-juniper vegetation are located within this IBA, and various species such as Bendire's thrasher (*Toxostoma bendirei*), juniper titmouse (*Baeolophus ridgwayi*), and Scott's oriole (*Icterus parisorum*) are found here. Of the afore-mentioned species, only the Bendire's thrasher was reported onsite, and the applicant believes it to be a misidentification (HHSEGS 2011a). Other IBA's in the greater region include the Shoshone-Tecopa IBA, associated with the Amargosa River and containing Grimshaw Lake. This IBA is approximately 18 miles from the project site, and draws birds to 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 the flowing 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 habitat in what is otherwise arid habitat or desert ranges. 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 associated greater metapatch of mesquite thickets in washes and on coppice dunes east of the project, and the Amargosa River 20 miles to the west supply rare riparian, spring, and wetland habitat. Many wildlife species benefit from the mesquite groves, which supply foraging, nesting, and breeding habitat for birds, forage and brood habitat for bats, as well as a host of thriving mammalian, reptile, and invertebrate populations. The system of mesquite thickets along the state border in Nevada are believed to crucially important to the greater ecosystem. Over 30 species of migratory birds are known to these areas, with the phainopepla (*Phainopepla nitens*) being a particular 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, for the purpose of planning simultaneously for development and conservation.

Migratory birds have been detected on and adjacent to the site. The applicant has committed to ongoing point-count surveys in order to better quantify bird and raptor use of the site. To date, the migrant purple martin has been detected on the project site; many other migrants are expected to be detected during applicant's ongoing surveys, and will be discussed further in the FSA.

Birds observed utilizing scrub communities in the project area included burrowing owl (*Athene cunicularia*), lesser nighthawk (*Chordeiles acutipennis*), horned lark (*Eremophila alpestris*), western meadowlark (*Sturnella neglecta*), sage sparrow (*Amphispiza belli canescens*), migrant or wintering Brewer's sparrow (*Spizella breweri*), chipping (*Spizella passerina*), and white crowned sparrows (*Zonotrichia leucophrys*).

In addition, LeConte's thrasher (*T. lecontei*), black-throated sparrow (*Amphispiza bilineata*), California quail (*Callipepla californica*), cactus wren (*Campylorhynchus brunneicapillus*), northern mockingbird (*Mimus polyglottos*), and Scott's oriole were also detected. Raptors were also well represented and 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 by in flight above the site and in adjacent areas, and perching adjacent to the site.

## SPECIAL-STATUS PLANT AND WILDLIFE SPECIES

Special-status species include those listed as threatened or endangered under the federal or state endangered species acts, species proposed for listing, California species of special concern, and other species that have been identified by the USFWS or CDFG or another agency as unique or rare. **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.

**Biological Resources Table 3**
**Special-status Plant Species Known to Occur or Potentially Occurring in the HHSEGS Area**

| Common Name | *Scientific Name* | Status[1] State/Fed/CNPS/BLM |
|---|---|---|
| Mormon needle grass | *Achnatherum aridum* | __/__/2.3 |
| Ivory-spined agave | *Agave utahensis* var. *eborispina* | __/__/1B.3/S |
| Clark Mountain agave | *Agave utahensis* var. *nevadensis* | __/__/4.2 |
| Desert ageratina | *Ageratina herbacea* | __/__/2.3 |
| Ripley's aliciella | *Aliciella ripleyi* | __/__/2.3 |
| Coyote gilia | *Aliciella triodon* | __/__/2.2 |
| Inyo onion | *Allium atrorubens* var. *cristatum* | __/__/4.3 |
| Nevada onion | *Allium nevadense* | __/__/2.3 |
| Pink-funnel lily | *Androstephium breviflorum* | __/__/2.2 |
| White bear poppy | *Arctomecon merriamii* | __/__/2.2 |
| Borrego milk-vetch | *Astragalus lentiginosus* var. *borreganus* | __/__/4.3 |
| Providence Mountain milk-vetch | *Astragalus nutans* | __/__/4.3 |
| Nye milk-vetch | *Astragalus nyensis* | __/__/1B.1 |
| Preuss' milk-vetch | *Astragalus preussii* var. *preussii* | __/__/2.3 |
| Gravel milk-vetch | *Astragalus sabulonum* | __/__/2.2 |
| Tidestrom's milk-vetch | *Astragalus tidestromii* | __/__/2.2 |
| Scaly cloak fern | *Astrolepis cochisensis* ssp. *cochisensis* | __/__/2.3 |

| | | |
|---|---|---|
| Pahrump silverscale | *Atriplex argentea* var. *longirichoma* | __/__/1B.1/S |
| Three-awned gramma | *Bouteloua trifida* | __/__/2.3 |
| Booth's hairy evening-primrose | *Camissonia boothii* ssp. *intermedia* | __/__/2.3 |
| Wheeler's skeleton weed | *Chaetadelpha wheeleri* | __/__/2.2 |
| California sawgrass | *Cladium californicum* | __/__/2.2 |
| Tecopa bird's-beak | *Cordylanthus tecopensis* | __/__/1B.2/S |
| Desert pincushion | *Coryphantha chlorantha* | __/__/2.1 |
| Hall's meadow hawksbeard | *Crepis runcinata* ssp. *hallii* | __/__/2.1 |
| Gilman's cymopterus | *Cymopterus gilmanii* | __/__/2.3 |
| Purple-nerve spring parsley | *Cymopterus multinervatus* | __/__/2.2 |
| Torrey's jointfir | *Ephedra torreyana* | |
| Harwood's eriastrum | *Eriastrum harwoodii* | __/__/1B.2/S |
| White-flowered rabbitbrush | *Ericameria albida* | __/__/4.2 |
| Narrow-leaved yerba santa | *Eriodictyon angustifolium* | __/__/2.3 |
| Pahrump Valley buckwheat | *Eriogonum bifurcatum* | __/__/1B.2/S |
| Reveal's buckwheat | *Eriogonum contiguum* | __/__/2.3/S |
| Juniper sulphur-flowered buckwheat | *Eriogonum umbellatum* var. *juniporinum* | __/__/2.3 |
| Hairy erioneuron | *Erioneuron pilosum* | __/__/2.3 |
| Hot springs fimbristylis | *Fimbristylis thermalis* | __/__/2.2 |
| Kingston Mountains bedstraw | *Galium hilendiae* ssp. *kingstonense* | __/__/1B.3/S |
| Desert bedstraw | *Galium proliferum* | __/__/2.2 |
| Ash Meadows gumplant | *Grindelia fraxinipratensis* | __/T/1B.2/SS |
| Prickle-leaf | *Hecastocleis shockleyi* | __/__/3 |
| Copperwort | *Iva acerosa* | __/__/4.2 |
| Kingston Mountains ivesia | *Ivesia patellifera* | __/__/1B.3/S |
| Cooper's rush | *Juncus cooperi* | __/__/4.3 |
| Inyo blazing star | *Mentzelia inyoensis* | __/__/1B.3/S |
| Wing-seed blazing star | *Mentzelia pterosperma* | __/__/2.2 |
| Spiny-hair blazing star | *Mentzelia tricuspis* | __/__/2.1 |
| Red four-o'clock | *Mirabilis coccinea* | __/__/2.3 |
| Utah mortonia | *Mortonia utahensis* | __/__/4.3 |
| crowned muilla | *Muilla coronata* | __/__/4.2 |
| Amargosa nitrophila | *Nitrophila mohavensis* | E/E/1B.1/SS |
| Spiny cliff-brake | *Pellaea truncata* | __/__/2.3 |
| Armagosa beardtongue | *Penstemon fruticiformis* var. *amargosae* | __/__/1B.3/S |
| Stephen's beardtongue | *Penstemon stephensii* | __/__/1B.3/S |
| Utah beardtongue | *Penstemon utahensis* | __/__/2.3 |
| Spine-noded milk-vetch | *Peteria thompsoniae* | __/__/2.3 |
| Death Valley round-leaved phacelia | *Phacelia mustelina* | __/__/1B.3/S |
| Parish's phacelia | *Phacelia parishii* | __/__/1B.1/S |
| Goodding's phacelia | *Phacelia pulchella* var. *gooddingii* | __/__/2.3 |
| Small-flowered rice grass | *Piptatherum micranthum* | __/__/2.3 |
| Desert popcorn-flower | *Plagiobothrys salsus* | __/__/2.2 |
| Death Valley sage | *Salvia funerea* | __/__/4.3 |
| Johnson's bee-hive cactus | *Sclerocactus johnsonii* | __/__/2.2 |
| Desert wing-fruit | *Selinocarpus nevadensis* | __/__/2.3 |

| | | |
|---|---|---|
| Rusby's desert-mallow | *Sphaeralcea rusbyi* var. *eremicola* | __/__/1B.2/S |
| Plummer's woodsia | *Woodsia plummerae* | __/__/2.3 |

**California Native Plant Society**
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**
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.

**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 of the proposed project area and vicinity, 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 | *Parastrellus hesperus* | __/__/__ |
| 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

Protocol-level surveys for special-status plants were conducted on the project site and within a 250-foot buffer in spring 2011. Reconnaissance-level surveys of the one-mile buffer were also conducted in spring 2011. Surveys for late-season special-status plants were conducted on the project site, within the 250-foot buffer, and the 180-acre temporary construction laydown in October 2010, following significant rain events in July and early October.

No state or federally listed plant species occur within the project area, but 10 special-status plant species were found onsite that are on the CNPS List 1B or CNPS List 2. CNPS List 1B species are rare, threatened or endangered throughout their range in California and elsewhere. Except for being common beyond the boundaries of California, CNPS List 2 species would be listed as 1B. Most of the CNPS List 2 species found on the project site have a highly restricted range in California but all have distribution outside California.

The applicant also conducted surveys offsite in spring 2011 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 Pahrump Valley, Stewart Valley, Chicago Valley, California Valley, and the Ash Meadows area. Additional occurrences of all 10 species were found offsite.

The status, distribution, range and habitat preferences of the special-status plants found onsite are described below.

### Pink-flowered androstephium (*Androstephium breviflorum)*

Pink-flowered androstephium is a perennial herb (bulb) with a California distribution represented by approximately 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 is ranked by CNPS as a List 2 species, meaning CNPS has determined it is rare, threatened, or endangered in California but more common outside California. Pink-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).

### Nye milk-vetch (*Astragalus nyensis)*

Nye milk-vetch was not known to occur in California until it was discovered onsite during the project 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 as a List 1B.1, meaning CNPS has determined it is rare, threatened, or endangered in California and elsewhere. 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. It is a Sensitive species in Nevada (*ibid.*a). 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 within the project's proposed offsite transmission line corridor.

### 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 CNPS List 2; 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). During offsite surveys conducted for this project, Preuss' milk-vetch was found in several new locations in Inyo County and along the transmission line corridor in Nevada. It 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. Seven individuals were mapped on the project site. Additional occurrences were found in southern and central Pahrump Valley in Nevada.

Based on observations of *Astragalus* spp. fruits on the windward side of shrubs and in depressions 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 is a CNPS List 2. It 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.

### 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 is ranked by CNPS as a List 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 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. Tidestrom's milk-vetch 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.

It was added to the CNPS Inventory in January 2009 and now has 38 recent occurrences, including two on the project site, and seven historic 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 an annual herb now known from 17 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. No new occurrences were found in Nevada along the proposed transmission alignment. Wheeler's skeletonweed is ranked by CNPS as a List 2; it also occurs in Nevada and Oregon. It occurs in sandy soils on desert dunes, Mojave Desert scrub, and Great Basin scrub from 2,788 to 6,234 feet elevation.

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). The Consortium of California Herbaria (*ibid.*) includes 38 records for this species, of which six are duplicates of CNDDB records. 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 for this project, Wheeler's skeletonweed was found in several additional new locations in southern Pahrump Valley.

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.

### Purple-nerve springparsley (*Cymopterus multinervatus)*

Purple-nerve springparsley 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 ranked by CNPS as a List 2; this species also occurs in Nevada, Arizona, New Mexico, Utah, Texas, and Baja California. It 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.

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 in the Pahrump Valley in Inyo County, California, and in Nye County, Nevada.

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).

### Pahrump Valley buckwheat (*Eriogonum bifurcatum)*

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. 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.

Pahrump Valley buckwheat, a CNPS List 1B.2 and BLM Sensitive species, has been described as endemic to the Pahrump, Stewart, Mesquite and Sandy valleys, and common near the. Population census information from Nevada (NNHP 2010a) report 18 occurrences in Nevada representing approximately 1,609 or more acres (*ibid.*).

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.

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*.

### 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 is ranked by CNPS as a List 2; it occurs in Inyo and San Bernardino counties in California, and in Nevada, Arizona, and Utah. It occurs in 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 project's proposed offsite transmission line corridor in Nevada and at several additional new offsite locations in central Pahrump Valley, Stewart Valley, Chicago Valley, and California Valley.

### Desert Wing-Fruit (*Selinocarpus 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 is ranked by CNPS as a List 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.

Seven new occurrences were found in California during the project surveys, one of which occurs on the project site. No individuals of this species were observed in the 250-foot buffer but several new occurrences were found along the project's proposed offsite transmission line corridor. During offsite surveys conducted for this project, desert wing-fruit was found in several new locations in southern and central Pahrump Valley in Inyo County. It was mapped in the southwestern portion of the project site in shadscale scrub and Mojave Desert scrub habitats.

### Torrey's Mormon-tea (*Ephedra torreyana*)

Torrey's Mormon-tea 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 as a List 2.1. Torrey's Mormon-tea is often confused with another Mormon-tea: *Ephedra trifurca*. Torrey's Mormon-tea differs in that its cones are always sessile, while cones of *E. trifurca* usually have short, scaly peduncles and are rarely sessile. Also, the seeds of *E. torreyana* are scabrous, while those of *E. trifurca* are smooth. Five occurrences of Torrey's Mormon-tea are now recorded in California on BLM lands along the California-Nevada border. Torrey's Mormon-tea is also found in Arizona, Colorado, Nevada, New Mexico, Texas and Utah, and is not ranked in any of those states (NatureServe 2012). Occurrences are not directly threatened by solar

development at this time. The applicant is conducting additional surveys in spring 2012 to determine if Torrey's Mormon-tea was over-looked during the surveys of the project site in 2011. If current records in California are later found to be an under-representation of its actual distribution and frequency, its status will be re-evaluated by CNPS.

*Ephedra* 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, microphyll woodland, seeps and springs, spring pools, mesquite woodlands, desert dry wash (riparian) woodland, desert wash scrubs, palm oases, alkali meadows, and spring mounds.

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 is affected by complex geologic structures from faulting and fracturing that can enhance or impede flow (*ibid.*).The 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.

The local shallow aquifer from which the project would pump groundwater 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).

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).

The DVRFS regional groundwater flow system includes several large valleys, including the Amargosa Desert, Pahrump Valley, and Death Valley. The valley floors are local depositional centers that usually 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).

The study area for groundwater-dependent ecosystems encompassed a 5-mile radius centered on the project site (CH2 2011g, Figure DR48-1); a boundary based on the applicant's estimated groundwater drawdown (HHSEGS 2011a, Appendix 5.15D). Seven active or recently active springs 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 beyond the 5-mile radius but are not discussed in detail because of their distance from the proposed project wells and project effects.

BLM reports that Stump Spring is discharging and supports three shallow, seasonal pools that range between 30 and 70 feet long, and 1 to 2 feet deep (Poff pers. comm.). The remaining springs are not reported to have recovered since the heavy agricultural pumping of the last century.

BLM Southern Nevada District hydrologist and other BLM staff recently visited six sites identified as potential springs based on an aerial photo review. Another seven sites, including five documented springs and two potential springs were not visited because they occur on private land (Poff 2012). BLM found that three of the six sites had active *seasonal* seeps or springs. Two of these supported healthy wetland-riparian vegetation; the third spring appears to have at least minor intermittent flow that was significantly greater historically.

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), is less clear. 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 other groundwater-dependent species and habitats connected to the larger, regional groundwater basin (DVRFS). **Water Resources** staff's analysis of impacts to local groundwater resources, and the Amargosa River, located 20 miles west, is contained in the **Water Resources** section of this PSA.

### Local Groundwater-dependent Ecosystems - Stump Spring ACEC, Unnamed Seasonal Springs, and Associated Mesquite Woodlands

Shallow groundwater along the Stateline Fault, which runs along the eastern project boundary at the California-Nevada state line, supports a broad, but discontinuous zone groundwater-dependent woodlands and dune scrubs within the fault zone 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. These include shrubby mesquite thickets on tall coppice mounds ("mesquite dune scrub") up to approximately 10 feet in height, to taller, lush riparian woodlands along the washes,

which are incised into the surrounding fan surface to depths up to 10 feet. Their position below the base of the dunes may afford these habitats better access to groundwater and account for their taller habit. The coppice dunes and associated mesquite dune scrub occur in close proximity to the project boundary, as little as 500 feet from the project boundary and less than a mile from the proposed pumping wells. Over 4,000 acres of groundwater-dependent mesquite habitats occur within the 5 mile study area (CH2 2011g, Figure DR48-1).

At least four active seeps and springs also occur within 5 miles of the project in association with the fault zone. The proximity of the seeps and springs to the mesquite significantly increases their value to wildlife. 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 woodlands and mesquite dune scrubs in the region are discussed in detail below. The washes are incised into the surrounding fan surface to depths of as much as 10 feet, which allows better access to the groundwater table, and accounts for the denser and taller habit of the mesquite woodlands; however, the dune scrubs provide valuable habitat that is quite distinct from the woodlands and supports a different suite of wildlife and habitat values.

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).

Stump Spring, one of the four active springs within the study area, is located south of Tecopa Road approximately 2.5 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 has been documented recently to extend from December to July. Lush, dense mesquite woodland occurs along an extensive network of washes that extend beyond the ACEC boundary. The ACEC also supports good examples of mesquite dune scrub on coppice dunes.

### *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. 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 1 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 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).

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.

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). The seasonal open water habitat at Stump Spring increases the value of the adjacent mesquite habitats to wildlife, including special-status species. **Biological Resources Table 5**, below, lists wildlife described in the Mesquite-Acacia CMS as having a moderate to strong affinity to (and in some cases dependence on) mesquite. These species have potential to occur in the mesquite woodlands adjacent to the project and/or at Stump Spring at least seasonally. 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). Desert tortoise 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)** | | |
| *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* | Significant decline in US range | __/__/__ |

| Common Name (Scientific name) | Species Population Trend[2] | Status[3] Fed/State/Other |
|---|---|---|
| *bilineata*) | | |
| **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)

The mesquite dune scrubs that occur near the northeast boundary of the project site, closest to Pahrump, are in varying stages of stress (CH2 2011g, Figures DR49-1 and 2); the impacts of decades of groundwater pumping in proximity to the stands are evident in the die-back and low stature. The decline of groundwater elevations in area wells is also greater in the northern portion of the valley, near Pahrump (Harrill 1986; Comartin 2010). The groundwater-dependent resources at Stump Spring ACEC, at the south end of the valley, have good vigor and mesquite recruitment, which has not been observed elsewhere in the study area except in the spring-fed washes (Poff pers. comm. 2012). This area also contains several widely spaced, remnant patches of cottonwood (*Populus fremontii*) and Goodding's willow (*Salix gooddingii*), all of which are dead, dying, or in a state of severe stress, perhaps due to heavy groundwater use in the middle part of the last century in the Pahrump area (Crampton et al. 2006).

The significance of the Stump Spring cultural resources are discussed in the Cultural Resources section of this PSA and in a May 18, 2012 submittal by the applicant on the area paleo resources (Data Response Set 1D-7). The dunes are estimated to have developed along the Stateline 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. This has not been established by radiocarbon analysis; however. A similar hypothesis is made in the applicant's recent paleo resource submittal. 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 do not occur within the cone of depression, or potential drawdown area estimated by staff in **Water Supply Figure 23** but are believed to be supported by the deeper, regional flow paths (the "regional aquifer") that underlie the basin-fill aquifer (shallow aquifer).

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 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;
- Water that passes through the aquifer comes to the surface as springs, seeps, or as broad diffuse discharge areas such as playas or salt flats, and support a wide variety of rare and sensitive plant communities.

## Desert Washes

The U.S. Army Corps of Engineers (USACE) and the California Department of Fish and Game (CDFG) 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, and where the lateral limit of a jurisdictional stream ends at the *ordinary high water mark* (OHWM) of the stream. 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. 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., riparian habitat, 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 (*ibid.*).

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 encompassing the project area. In a December 14, 2011 correspondence from the USACE Ventura Regulatory Field Office, the Corps determined that only two of the 69 features, totaling 0.42 acres, were subject to USACE jurisdiction (CH2 2011f).

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.*).

On March 23, 2012, the applicant submitted a Preliminary Delineation of Jurisdictional Waters of the State (CH2 2012g) regulated under Fish and Game Code Section 1600 *et seq*. The delineation report concluded that 28.33 acres of state jurisdictional waters are located within the project boundary, including 80 single-thread streams totaling 23.82 acres and an additional 5.85 acres of braided streams. A total of 4.51 acres of state waters were delineated upstream of the project boundary within the 250-foot buffer. At the western edge of the project site, the slope gradient flattens out and the streams dissipate and lose definition; no features were delineated downstream of the project.

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 (CH2 2012g).

The delineation has not yet been field verified by the CDFG Bishop field office. Features delineated as “non-jurisdictional” features 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 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 PSA).

According to the delineation reports, the ephemeral streams on the project site "dissipate quickly as the slope gradient diminishes from east to west, and often interconnect with other nearby washes either by natural forces or by unintentional diversion along the network of unpaved roadways on the project site." (CH2 2011f) Evidence of recent flow included shelving and other ordinary high water indicators, fluvial-deposited litter and debris, mud cracks, vegetation disturbance from flows, and heavy braiding.

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, a dry playa located approximately 3 miles northwest of the project site.

Waters on the project site are characteristic of alluvial fan distributary channel networks, where compound (or braided), discontinuous, and single-thread channels occur in combinations and in a distinctive pattern reflective of the depositional processes active on alluvial fans. The sparse vegetation, lack of soil, high erosion rates, localized runoff, and downstream decreases in stream flow lead to closely spaced channels in high drainage density (Bull & Kirkby 2002). 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 contrast to stream systems in non-arid climates. In general, alluvial fan channels become increasingly less defined as they flow down the fan (Vyverberg 2010), confinement is lost and the channels dissipate.

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).

## Special-status Wildlife Species

The applicant conducted several focused or protocol based surveys of the project site in 2010 and 2011. 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*

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 Sinaloa.

Based on genetic differences there are two recognized populations of desert tortoise in the United States; these include the Mojave and Sonoran populations (USFWS 2011). 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 (i.e., 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 2011). The proposed project is located in the Eastern Mojave Recovery Unit.

Range wide, desert tortoises occupy a variety of physical locations. These include 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 (*Pleuraphis rigida*) are common indicators of tortoise habitat (USFWS 1994b). However, the species is known to occur in a variety of desert scrub communities and microphyll woodlands (USFWS 1994b). Within these vegetation types, desert tortoises potentially can survive and reproduce where their basic habitat requirements are met.

One 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 2011). 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. Precipitation in this region occurs in the form of winter storms and large summer monsoons. 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 2011).

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 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 tortoise were identified above ground in small numbers equally between December and January and January and February encounters, 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 2011). Annual home ranges have been estimated between 10 and 450 acres and are age, sex, seasonal, and resource density dependent (USFWS 2011). 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 as much or 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 2011). 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 2011).

The decline of desert tortoise populations have been attributed to a number of factors including habitat loss or degradation from grazing, housing, mining, infrastructure, and 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 1980s. 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 2011). 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.

Protocol-level surveys were conducted in support of the HHSEGS project 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 east of the project site. 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 Application For Certification). 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 6** 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 Table 6**
**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 during the 2011 surveys, 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 desert tortoises 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's 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 6 and 33 adult and subadult desert tortoises (i.e., lower and upper 95 percent confidence value), the project site may support between 3 to 34 juvenile tortoises (i.e., a total population range between 9 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., 5 out of the 9 adult desert tortoises and 17 out of the 33 adult desert tortoises) the project site could theoretically support between 5 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 reproduction age or elected to produce eggs during any given year. The total 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 7.**

**Biological Resources Table 7**
**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).

### *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 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 not expected to occur on the project site. This species is not discussed further in this assessment.

**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, to occupied habitat. Potential indirect disturbances are associated with the disruption of the dune ecosystem source sand, 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 and is not discussed further in this document.

## 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 with friable soils. Badgers are generally associated with treeless regions, prairies, parklands, and cold desert areas. 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. Based on the large numbers of small rodent burrows observed on site, this species is expected to be common in the project area.

### *Desert Kit Fox*

Desert kit fox is an uncommon to rare permanent resident of arid regions of the southern portion of California. Kit fox 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 inhabit open level areas with patchy shrubs. 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 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. This species is widely distributed from the White Mountains in Mono County south to the Chocolate Mountains in Imperial County, and is known to occur in the Clark Mountains (CDFG 2012b).

Bighorn sheep are typically found on open, rocky, steep areas used for escape cover with available water and herbaceous vegetation for forage. Bighorn sheep are agile in steep, rocky terrain, allowing them to Basic to the biology of bighorn sheep is their agility on steep rocky terrain, an adaptation used to escape predators such as coyotes, eagles, and cougars (Wehausen 1992). 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.*).

Radio telemetry studies of bighorn sheep in various southwestern deserts, including the Mojave Desert of California, have found considerable movement of these 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).

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. The Amargosa River, Stump Spring, as well as surface water in Nopah and Kingston ranges are expected to be locally important to sheep. Stump Spring, located 8 miles from the Kingston Range and is approximately 2.5 miles east of the project site provides water from December to July. Generally speaking, this region is rich in intermittent and perennial springs, relative to other areas in the California desert (due to abundant faulting), and sheep take advantage of this.

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 used during intermountain movement and to support periodic 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, and was detected using Anabat acoustic technology during winter monitoring from December, 2011 to March, 2012.

### *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 detected over the project by the applicant during recent acoustic surveys. Roosting habitat does not exist on the project site.

### *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 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 observed on the project site.

## 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).

Habitats for this species typically include rolling foothills, mountain areas, and deserts. 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. Nesting habitat is not present on the project 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 commonly noted in flight, foraging over the site, and also were observed perching on power poles. Golden eagles are long lived and may use from 3 to 14 nests per territory. Also golden eagles may not breed every year so a single nest surveys cannot determine nest activity.

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. This species is present in the region and although applicant indicated the nests were not active,a single survey alone 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 between 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 Section16, and immediately west of the site. Burrowing owl sign was also detected during the 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.

Phase III, or winter surveys, were conducted by the applicant January 30, 2012 and February 2, 2012. 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 sightings. No fresh burrowing owl sign was observed during the surveys. Conflictingly, the phase III report also states that no observations of burrowing owls have ever been made on site. Based on the previous information provided by the applicant and surveys of the project site conducted by staff in April 2012, burrowing owls are considered present on the project site. The applicant has submitted a Draft Burrowing Owl Mitigation and Monitoring Plan which provided supplemental information clarifying the applicant's position on the expected use and distribution of burrowing owls on the project site (CH2 2012y). This report suggests that between three and five owls use the site for short term temporary use. However, the information provided by the applicant cannot determine if use of the site is limited to short term occupation, e.g. cannot determine based on the information provided whether the site supports breeding residents or is used as a migratory stopover.

### *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 m, 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 Stump Spring Area of Critical Environmental Concern in Nevada, and the Amargosa River, both upstream in Nevada, as well as downstream, in 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

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. Indirect impacts are also caused by the project, occur later in time, have propagated off the project site and into the project vicinity, are reasonably foreseeable and are directly related to the construction, operation, or closure and decommissioning of the project. 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 of construction and operation of the proposed project to biological resources 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 effectiveness of the mitigation. Mitigation strategies designed by applicant are discussed, and if considered appropriate, recommended. Where necessary, supplementary mitigation proposals are also introduced and recommended. Refer to **Biological Resources Table 8**, Overview of Significant Impacts and Conditions of Certification, and to following sections of this analysis for more information regarding CEQA analysis of the project, recommended conditions, and compliance with LORS. Where information is inadequate to support analysis of impacts, it is noted within the discussion and in the Summary of Conclusions. Conditions of certification have been proposed where possible; however, analysis and recommended mitigation could change in the FSA, based on new information received after publication of this PSA.

**Biological Resources Table 8** includes recommended conditions of certification for cumulatively considerable impacts. While a more comprehensive description of cumulative impacts is presented later in this PSA, the subject is introduced here, as recommended conditions are designed to encompass and mitigate for all project-related direct, indirect, and cumulative impacts. Cumulative impacts are a proposed project's incremental effect viewed over time together with the impacts from other past and present projects and projects in the reasonably foreseeable future whose impacts may compound or increase the incremental effect of the project.

## SUMMARY OF IMPACTS

**Biological Resources Table 8** summarizes the direct, indirect, and cumulative impacts to biological resources resulting from the proposed project, and includes suggested conditions of certification to mitigate these impacts.

**BIOLOGICAL RESOURCES Table 8**
**Overview of Significant Impacts and Conditions of Certification (COCs)**

| Impact | Conditions of Certification | Determination |
|---|---|---|
| **Mojave Desert scrub**<br>**Direct Impacts:** Permanent loss of 1,611 acres, | **BIO-12** requires offsite habitat acquisition and enhancement. | Less than significant with |

| Impact | Conditions of Certification | Determination |
|---|---|---|
| including 3,277 acres desert tortoise habitat, 1,611 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.<br>**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.<br>**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-8** requires implementation of impact avoidance and minimization measures.<br>**BIO-7** BRMIMP ensures implementation of all COCs.<br>**BIO-7** includes measures for dust control and fire prevention.<br>**BIO-18** requires implementation of weed management plan to prevent spread into adjacent habitat.<br>**BIO-21** requires a Designated Botanist to oversee measures for botanical resources for life of project. | COCs |
| **Shadscale Scrub**<br>**Direct Impacts:** Permanent loss of 1,647 acres, including 3,277 acres desert tortoise habitat, 1,647 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.<br>**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.<br>**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.<br>**BIO-8** requires implementation of impact avoidance and minimization measures, including fugitive dust control.<br>**BIO-6, BIO-8,** and **BIO-18-** include measures for fire prevention.<br>**BIO-18** requires implementation of weed management plan to prevent spread into adjacent habitat.<br>**BIO-7** BRMIMP ensures implementation of all COCs.<br>**BIO-21** requires Designated Botanist to oversee measures for botanical resources for life of project. | Less than significant with COCs |
| **Waters of the State/Waters of the US**<br>**Direct Impacts:** Permanent loss of habitat function and values for 28.33 acres of state waters (including 0.42 acres Waters of the US).<br>**Indirect Impacts:** Altered surface drainage patterns and groundwater recharge downslope; potential erosion/sedimentation from head-cutting upstream of project, loss or decreased habitat function and values for wildlife for 4.51 acres in 250-ft buffer upslope.<br>**Cumulative Impacts:** Contributes to cumulatively considerable loss of desert wash habitat function and values, fragmentation, erosion/sedimentation, altered surface drainage patterns, and the spread of invasive weeds into desert washes from past, present, and foreseeable future projects in the Pahrump watershed.<br>. | **BIO-22** requires acquisition of compensation lands within Pahrump Hydrologic Unit at a 2:1 ratio for vegetated washes. Indirect effects to 4.51 acres shall be mitigated at 0.5:1 ratio. The rare desert wash community, creosote bush-galleta grass association, if present would be mitigated at a 2:1 ratio. **BIO-22** also includes measures for minimizing impacts wherever possible to prevent downstream effects.<br>**BIO-18** requires implementation of weed management plan that would prevent spread of invasive weeds into offsite washes.<br>**BIO-7** BRMIMP ensures enforcement of all COCs.<br>**SOIL-1** includes measures for erosion and sediment control. | Less than significant with COCs |
| **Groundwater-dependent Ecosystems**<br>**Direct Impacts:** None. Effects of pumping may take many years to propagate to the sensitive resources located between one and five miles from the project wells. | **BIO-23** requires water table and vegetation monitoring at groundwater-dependent plant communities near the project site for life of the project. Includes threshold for remedial action. | Significant and immitigable unless avoided through long-term |

| Impact | Conditions of Certification | Determination |
|---|---|---|
| **Indirect Impacts:** Potential for significant indirect impacts to groundwater-dependent ecosystems (GDEs) from project pumping, including loss of habitat function and value for dependent wildlife, including special-status species; loss of a rare plant community; conflict with BLM ACEC management goals and Clark County conservation management strategy for Stump Spring, and conservation recommendations for Pahrump Mesquite Metapatch in Nye County; reduced plant cover which increases wind erosion, weedy species,; increased risk of fire; impacts to special-status species inhabiting the GDEs.<br>**Cumulative Impacts:** Even minor impacts cumulatively considerable due to ecological significance of habitat. | **WATER SUPPLY-6** requires groundwater elevation modeling that would detect declines that threaten dependent ecosystems before they result in significant impacts. **WATER SUPPLY-2** requires the acquisition and retirement of water rights to offset the project's contribution to the basin imbalance.<br>**BIO-24** requires implementation of remedial action (stop, modify or reduce pumping) if the groundwater elevation and vegetation indicator thresholds are met or exceeded. **BIO-6, BIO-8, and BIO-18** include measures for fire prevention to protect adjacent mesquite habitats and dune scrub.<br>**BIO-7** BRMIMP ensures enforcement of all COCs.<br>**BIO-21** requires Designated Botanist to conduct/supervise monitoring for life of project. | monitoring and adaptive action |
| **Special-status Plants***<br>**Direct Impacts:** Pending results of 2012 surveys, loss of significant portion of California range of 5 species; potentially immitigable if insufficient offsite mitigation opportunities and onsite avoidance is infeasible. Potential accidental impacts to nearby offsite plants during construction, and direct impacts would fragment the local population. Determinations for all species will be re-evaluated following completion of 2012 surveys.<br>**Indirect Impacts to offsite occurrences near project:** 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).<br>**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 in Pahrump Valley. | **BIO-19** requires avoidance and minimization measures during life of project to protect occurrences in close proximity to the project.<br>**BIO-21** requires Designated Botanist to oversee measures for special-status plants for life of project.<br>**BIO-20** requires compensatory mitigation for onsite occurrences through acquisition and preservation offsite at a ratio of 3:1 and 2:1. Pending results of the spring 2012 surveys, onsite avoidance may be recommended if there are insufficient opportunities for offsite mitigation If avoidance is infeasible, a conclusion of significant and immitigable impacts may be made.<br>**BIO-22** requires maintenance of existing surface drainage patterns downstream. **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.<br>**BIO-7** BRMIMP ensures enforcement of all COCs. | Pending results of spring 2012 surveys and re-analysis, impacts may be significant and potentially immitigable for 5 species; significant and mitigable for 4 of 5 remaining species; less than significant for 1 species. Additional information has been requested to assist in making determinations of significance |
| **Common Wildlife and Nesting Birds**<br>**Direct Impacts:** Potential mortality or disturbance during construction and operation, loss or fragmentation of habitat, displacement, and disruption of movement.<br>**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.<br>**Cumulative Impacts:** Contributes to cumulatively | **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.<br>**BIO-15** requires pre-construction monitoring and avoidance for nesting birds. | Less than significant with COCs |

| Impact | Conditions of Certification | Determination |
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| considerable loss of habitat, fragmentation, and indirect effects from past, present, and foreseeable future projects in the Pahrump Valley. | | |
| **Desert Tortoise**<br>**Direct Impacts:** Loss of 3,277 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.<br>**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.<br>**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.<br>**BIO-9** requires desert tortoise fencing and preconstruction clearance surveys.<br>**BIO-10** requires the capture and translocation of desert tortoise and the development and implementation of a prescriptive translocation plan.<br>**BIO-12** requires the acquisition of 6,480 acres of compensatory mitigation for the long term management of the species.<br>**BIO-13** requires the development of a Raven Management Plan and the payment of a raven fee.<br>**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 COCs |
| **Kit Fox and American Badger**<br>**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.<br>**Indirect Impacts:** Fragmentation of local population; introduction and spread of non-native invasive plants; increased risk of fire; noise, and light.<br>**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.<br>**BIO-9** requires desert tortoise fencing which will exclude badgers and kit fox from the project site.<br>**BIO-12** requires the acquisition of 6,480 acres of compensatory mitigation for desert tortoise; however land acquisition and management will reduce impacts to these species.<br>**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.<br>**BIO-22** requires compensatory mitigation for state waters which will reduce habitat loss to these species.<br>**BIO-18** requires a weed management plan be developed to minimize the spread of invasive plant species.<br>**BIO-23** requires monitoring of ground water to ensure impacts to ground water dependent vegetation does not result in habitat degradation for these species.<br>**BIO-24** requires water table and vegetation monitoring at groundwater-dependent plant communities near the project site for life of | Less than significant with COCs.<br><br>However, coordination with the CDFG regarding long term management issues for desert kit fox which may necessitate changes to analysis and COC in the FSA. |

| Impact | Conditions of Certification | Determination |
|---|---|---|
| | the project. Includes threshold for remedial action.<br>**BIO-24** requires implementation of remedial action (stop, modify or reduce pumping) if the groundwater elevation and vegetation indicator thresholds are met or exceeded. | |
| **Nelson's bighorn sheep**<br>**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.<br>**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.<br>**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.<br>**BIO-12** requires the acquisition of 6,480 acres of compensatory mitigation for desert tortoise; however land acquisition and management may preserve habitat for bighorn sheep.<br>**BIO-22** requires compensatory mitigation for state waters which will reduce habitat loss for this species.<br>**BIO-18** requires a weed management plan be developed to minimize the spread of invasive plant species.<br>**BIO-23** requires monitoring of ground water to ensure impacts to ground water dependent vegetation does not result in habitat degradation for these species.<br>**BIO-24** requires water table and vegetation monitoring at groundwater-dependent plant communities near the project site for life of the project. Includes threshold for remedial action. | Less than significant with COCs. |
| **Special Status Bats***<br>**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.<br>**Indirect Impacts:** the loss of foraging habitat due to type conversion, night time lighting that exposes bats to predation, and alteration in prey base. Degradation to Stump Spring AEC and associated mesquite thickets in Nevada.<br>**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.<br>**BIO-16** the development of an avian and bat plan.<br>**BIO-23** requires monitoring of ground water to ensure impacts to ground water dependent vegetation does not result in habitat degradation for these species.<br>**BIO-24** requires water table and vegetation monitoring at groundwater-dependent plant communities near the project site for life of the project. Includes threshold for remedial action. | Less than significant with COCs. |
| **Migratory/Special Status Resident Avian Species**<br>**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. | **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.<br>**BIO-8** also requires transmission lines and all electrical components to be designed, installed, and maintained in accordance | Feasible mitigation has not been identified; ongoing coordination with CDFG and USFWS, |

| Impact | Conditions of Certification | Determination |
|---|---|---|
| **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.<br>**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. | with the Avian Power Line Interaction Committee guidelines.<br>**BIO-15** the development of an avian and bat plan.<br>**BIO-16** requires pre-construction monitoring and avoidance for nesting birds.<br>**BIO-23** requires monitoring of ground water to ensure impacts to ground water dependent vegetation does not result in habitat degradation for these species.<br>**BIO-24** requires implementation of remedial action (stop, modify or reduce pumping) if the groundwater elevation and vegetation indicator thresholds are met or exceeded. | and receipt of data responses for the Rio Mesa Project will inform conclusions presented in the FSA. |
| **Golden Eagle**<br>**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.<br>**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.<br>**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.<br>**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.<br>**BIO-15** the development of an avian, bat, and golden eagle plan.<br>**BIO-16** requires pre-construction monitoring and avoidance for nesting birds.<br>**BIO-23** requires monitoring of ground water to ensure impacts to ground water dependent vegetation does not result in habitat degradation for these species.<br>**BIO-24** requires implementation of remedial action (stop, modify or reduce pumping) if the groundwater elevation and vegetation indicator thresholds are met or exceeded. | Less than significant with COCs. Coordination with CDFG and the USFWS to resolve concerns regarding eagle take and permit requirements is ongoing. A final determination will be available in the FSA; pending data requests. |
| **Wildlife Movement**<br>**Direct Impacts:** Placement of physical structures such as the solar arrays, buildings, or other facilities that block or impede movement. No direct impacts to known dispersal corridors.<br>**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.<br>**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. | No specific conditions proposed. | Less than significant. |

*Surveys for special status bats and special-status plants are ongoing, and refined information will be presented and fully analyzed in the FSA.

Several of the recommended conditions of certification would 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, referred to as "compensatory mitigation." The most significant of these is **BIO-12** (Desert Tortoise Compensatory Mitigation) and **BIO-17** (Burrowing Owl Impact Avoidance, Minimization, and Compensatory Measures). **BIO-20** (Special-Status Plant Compensatory Mitigation) requires compensatory mitigation for impacts to special-status plants, pending the completion of ongoing surveys, to be significant. **BIO-22** (State Waters Compensatory Mitigation and Avoidance & Minimization Measures) would require compensation for impacts to desert washes impacted by the project.

Potential compensation lands may support more than one of the affected resources. 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. However, the project owner would still be required to deposit a separate financial security for each compensatory mitigation obligation, prior to the start of ground-disturbing activities, in the event that compensation lands cannot be found that meet the criteria for multiple species or habitats.

## Calculation of Financial Security for Desert Tortoise Compensatory Mitigation

To satisfy Section 2081 of the California Endangered Species Act an applicant must provide financial assurances to guarantee that an adequate level of funding is available to implement all impact avoidance, minimization, and compensation measures. These financial assurances are generally provided in the form of an irrevocable letter of credit, 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.

In **Biological Resources Table 9**, below, calculations for acreage and estimated costs for desert tortoise compensation lands are provided, as described in Condition of Certification **BIO-12**. The table also provides acreages and estimated costs for burrowing owl compensation, as described in **BIO-17.** Estimated costs for compensation lands for state waters (**BIO-22**) are not provided, pending the results of CDFGs field verification of the waters delineation to determine the total jurisdictional acreage of affected desert washes. Similarly, no estimates are provided for special-status plant compensation lands pending ongoing survey results before making species-specific significance determinations. The spring 2012 survey report, expected mid-June, will include information to assist in determining whether compensatory mitigation will be necessary for offsite mitigation of special-status plants, as described in **BIO-20** (Special-status Plant Compensatory Mitigation).

**Biological Resources Table 9** also 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 transactions, 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, 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 for implementing mitigation actions, the budget includes 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 following estimated cost per acre for Desert Tortoise mitigation as a best available proxy.

**Biological Resources Table 9**
**Biological Resources Compensatory Mitigation**
**Summary of Compensation Lands Costs[1]**

| | Desert tortoise compensation | Burrowing owl compensation[11] | State Waters compensation | Special-status plant compensation |
|---|---|---|---|---|
| Number of acres | 6,480 | 600 | undetermined[11] | undetermined[11] |
| Estimated number of parcels to be acquired, at 40 acres per parcel[2] | 162 | 15 | -- | -- |
| Land cost at $1000/acre[3] | $6,480,000.00 | $600,000.00 | -- | -- |
| Level 1 Environmental Site Assessment at $3000/parcel | $486,000.00 | $45,000.00 | -- | -- |
| Appraisal at no less than $5,000/parcel | $810,000.00 | $75,000.00 | -- | -- |
| Initial site clean-up, restoration or enhancement, at $250/acre[4] | $1,620,000.00 | $150,000.00 | -- | -- |
| Closing and Escrow Cost at $5000/parcel[5] | $810,000.00 | $75,000.00 | -- | -- |
| Biological survey for determining mitigation value of land (habitat based with species specific augmentation) at $5000/parcel | $810,000.00 | $75,000.00 | -- | -- |
| 3rd Party Administrative Costs (Land Cost x 10%)[6] | $648,000.00 | $60,000.00 | -- | -- |
| Agency cost to accept land[7] [(Land Cost x 15%) x 1.17] (17% of the 15% for overhead) | $1,137,240.00 | $105,300.00 | -- | -- |
| **Subtotal - Acquisition and Initial Site Work** | $12,801,240.00 | $1,185,300.00 | -- | -- |
| **Long-term Management and Maintenance Fund (LTMM)** fee at $1450/acre[8] | $9,396,000.00 | $870,000.00 | -- | -- |
| **Financial Security Requirement Subtotal if the application-directed compensatory mitigation option** | **$22,197,240.00** | **$2,055,300.00** | -- | -- |
| **NFWF Fees** | | | | |

| | Desert tortoise compensation | Burrowing owl compensation[11] | State Waters compensation | Special-status plant compensation |
|---|---|---|---|---|
| Establish Project Specific Account[9] | $12,000.00 | $12,000 | -- | -- |
| Call for and Process Pre-Proposal Modified RFP or RPF[10] | $30,000.00 | $30,000.00 | -- | -- |
| NFWF Management fee For Acquisition and Enhancement Actions (Subtotal x 3%) | $384,037.20 | $35,559.00 | -- | -- |
| NWFW Management Fee for LTMM account (LTMM x 1%) | $93,960.00 | $8,700.00 | -- | -- |
| **Subtotal of NFWF Fees if NFWF option selected** | $519,997.20 | $86,259.00 | -- | -- |
| **TOTAL Estimated cost for deposit in project specific REAT-NFWF Account** | **$22,717,237.20** | **$2,141,559.00** | -- | -- |

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; mapping the parcels…..
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. The final mitigation obligations for burrowing owl, state waters and special-status plants will be provided in the FSA; pending additional information from the applicant and/or CDFG essential to analysis.

## General Construction Impacts to Common Wildlife

The project site would be constructed over a period of approximately 29 months. Construction would occur in phases commencing with Solar plant 1 followed by solar plant 2. Construction of the facility would result in large scale direct and indirect impacts to common wildlife. These effects could include mortality from trampling or crushing; increased predation when wildlife is flushed from cover; increased noise levels due to

heavy equipment; light impacts from construction during low-light periods; increased vehicular and human presence along access roads and desert washes; displacement due to habitat modifications, including vegetation removal, alterations of existing soil conditions; fugitive dust; and a modified hydrologic and sediment regime due to physical construction within onsite washes and the construction of the storm water management system (described further below). Indirect impacts to wildlife may also result from type conversion of habitat, the spread of invasive weeds, and an increase in subsidized predators from ravens and other predators attracted to the project area.

Direct mortality of small mammals; reptiles; eggs and nestlings of bird species with small, well-hidden nests; and other less mobile species could occur during construction. This action would result during habitat clearing and mowing, road construction, earth removal, grading, and equipment movement. Wildlife could become entrapped in open trenches during construction, especially if trenches remain open during inactive construction periods. Bird eggs and nestlings could be directly impacted by construction (specific impacts to nesting birds are discussed below in Migratory/Special-status Birds). More mobile species like birds and larger mammals are expected to disperse into nearby habitat areas during construction. However, the dispersal of wildlife from active construction zones would be hindered by the projects perimeter fencing (i.e., the tortoise exclusion fence).

Indirect effects on wildlife include the introduction or spread of non-native, invasive plant species, alterations to existing hydrological conditions, noise, and light.

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 structures intact (HHSEGS 2011a). Similarly, grading plans have been designed to promote sheet flow and maintain natural features, with one notable exception, the retention area, discussed further below. Although the project utilizes a “low impact design” which substitutes mowing for grading wherever possible, and maintains natural drainage features as possible; functional habitat values on the project site for most species of wildlife will be lost.

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 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 not be able to disperse from the project area. 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.

Construction-related effects to common wildlife are typically not considered significant under the CEQA. However, the large scale of the construction, the fact that many species of wildlife will remain trapped within the perimeter fence and the multi-year schedule would result in potential significant effects to common species without implementation of the mitigation measures.

The applicant has recommended general impact avoidance and minimization measures to reduce construction 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; inspecting for wildlife under vehicles, avoiding nesting birds; reducing the effect of fugitive dust on adjacent areas through dust control and reduced vehicle speeds; monitoring construction to reduce direct wildlife mortality; and the control of noxious weeds.

These conditions and mitigation measures include the following proposed conditions of certification: **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 would be reduced to less than significant levels through the implementation of conditions of certification **BIO-18** (Weed Management Plan), **BIO-23** (Ground Water Dependent Vegetation Monitoring), and **BIO-24** (Remedial Action for Adverse Effects to Groundwater dependent Biological Resources). Implementation of these measures would reduce impacts of the proposed project to less-than-significant levels under CEQA.

The applicant has provided general minimization measures to reduce impacts of the project from noise. Refer to the **Noise** section of the PSA for more information. Implementation of **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). Implementation of these measures including **BIO-15** requires a qualified biologist to conduct pre-construction surveys for nesting birds and implement noise buffers such that nesting birds would not be subject to noise in excess of 60 dBA during construction activities. With implementation of these conditions, impacts to nesting birds from proposed project construction activities would be less than significant. For a complete analysis of construction noise impacts, refer to the **Noise** section of this assessment.

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** to formalize temporary lighting measures during construction activity and on the laydown area. See the **Visual Resources** analysis in this PSA for more details about proposed Condition of Certification **VIS-2**. With implementation of this measure, construction lighting at the HHSEGS project would be reduced to less-than-significant levels under CEQA. Additional proposed conditions of certification are also recommended to address impacts to special status species; these are discussed in detail below.

## Impacts to Special-Status Wildlife

Habitat in the project area has the potential to support a variety of special-status wildlife including state and federally listed species. 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. Listed or fully protected species that may be subject to project disturbance include desert tortoise, Nelson's bighorn sheep, and golden eagle. Desert kit fox, while not a fully protected species, is protected from take by regulations identified under Title 14.

Impacts to 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. Direct impacts to wildlife could include displacement and/or potential mortality of wildlife that are poor dispersers such as tortoise, lizards, and small mammals. Construction may also result in the temporary degradation of the value of adjacent native habitat areas due to disturbance, noise, increased human presence, and increased vehicle traffic during construction. Indirect impacts may include increased human presence and the loss of habitat through the colonization of non-native invasive plants. Mortality or loss of reproductive success may also occur during land clearing, excavation, grading, and construction of the HHSEGS project. Impacts to these special-status species are detailed below.

## Special-Status Reptiles

### *Desert Tortoise*

Implementation of the proposed project would result in direct, indirect, and operational impacts to desert tortoise and its habitat. In addition, development on the project site would require that all desert tortoises are identified and translocated 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. At this time the applicant has not identified target areas for translocation nor submitted a translocation plan for consideration. Translocation of desert tortoise must occur in areas where the species is not exposed to ongoing threats and the site must be able to provide for the long term conservation of the species.

Currently, the Energy Commission, CDFG, and USFWS are working cooperatively to resolve potential regulatory conflicts regarding potential translocation areas for this species. Because the proposed project is located directly adjacent to the Nevada border many of the desert tortoises that occur in the project footprint likely utilize home ranges that span portions of both California and Nevada. While translocation to sites in Nevada may allow some of the animals to maintain a portion of their home range; transporting desert tortoise, a state listed species, across the State border may pose legal and regulatory challenges for the State of California. Currently the CDFG is evaluating whether a legal mechanism exists to sanction such an action or whether a separate permit may be required. The CDFG and staff are also evaluating whether suitable candidate sites may occur within California. Conversely, USFWS is not bound by state requirements and considers translocation to suitable lands in Nevada to constitute a reasonable impact minimization measure at this time. Further discussion and coordination between the regulatory agencies regarding translocation will continue and be discussed further in the FSA. In addition, although the physical power plant site is located in California; facilities to support the power plant including a natural gas line, transmission line and other components would be constructed in Nevada. However, because the regulatory authority of the Energy Commission is limited to California, impacts to desert tortoises that occur in Nevada are not addressed in this document.

As the legal and practical ramifications of translocation remains unresolved at this time, the potential impacts to the species, and describes the types of impacts that may occur to desert tortoise on potential translocation sites. Analysis will be revised and conditions of certification will be finalized based on the resolution of these issues.

Desert tortoises are present on the proposed project site and within habitat located adjacent to the site. 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 majority of desert tortoise and their sign were detected on the central and western portions of the site and on lands located immediately east of the project in Nevada. Habitat on the project site consists of three primary vegetation community types. This includes Mojave Desert scrub, shadscale scrub, and disturbed areas that consist of graded areas or abandoned orchards. In addition, a network of graded roads forms a grid across most of the site, from the early site development phases of a now abandoned residential subdivision. Lower desert

tortoise densities in the southwestern portion of the project site may also be associated with the proximity to Tecopa Road and the residential communities that occur in this area. The proximity to rural residences increases use of the habitat by dogs. Dogs may range several miles into the desert and have been found digging up and killing desert tortoises (USFWS 2011).

Although only a limited number of desert tortoise were observed during the surveys in 2011; the actual number of desert tortoises that are potentially present on the project site cannot be determined from field survey data alone. The difficulties of sampling desert tortoises for population densities largely result from the fossorial (underground) lifestyle of the species (Freilich et al. 2004). Tortoises spend much of the year in underground burrows (Woodbury and Hardy 1948; Marlow 1979; Nagy and Medica 1986; Bulova 1994), and the patterns of tortoise activity vary annually, seasonally, and daily (Freilich et al. 2000, Anderson et al. 2001).

Based on the 2010 USFWS predictive model and the assumptions identified by Turner et al. 1987; the estimated number of adult, sub-adult, and juvenile desert tortoises that may occur in the project footprint range between 6 and 33 adult and sub-adult desert tortoises (i.e., USFWS lower and upper 95 percent confidence value) and between 3 to 34 juvenile tortoises (Turner et al 1987). The total population on site has the potential to range from a low of 9 animals to a high of 67 adults, sub-adults, and juveniles. The number of desert tortoise eggs estimated to occur on the project site in any given year range from approximately 46 to 158 eggs. These estimates are extrapolated from field survey data and may not represent the actual numbers of tortoises or eggs that occur on the site. The total estimated number of desert tortoise and the number of eggs that have the potential to occur on the project site are presented in **Biological Resources Table 10.**

**Biological Resources Table 10**
**Estimated Number of Desert Tortoise on the Project Site and Within the 150 meter Buffer**

| **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).

### *Direct Impacts to Desert Tortoise*

Construction of the proposed project would result in direct impacts to desert tortoise. These would occur during the initial stages of mobilization, during construction, and during operation of the facility. Direct impacts to desert tortoise would also occur along access roads and highways that support construction related traffic. 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 as a result of encounters with vehicles or heavy equipment. Other direct effects could include individual tortoises or eggs being entombed in their burrows, collection or vandalism, disruption of tortoise behavior during construction or operation of facilities, and disturbance by noise or vibrations from heavy equipment. Human disturbance either through construction or operation may disrupt 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.

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. Increased human activity and vehicle travel would occur from the construction and improvement of access roads and travel on Tecopa Road, which could disturb, injure, or kill individual tortoises. Desert tortoises are known to shelter under parked vehicles and be killed, injured, or harassed when the vehicle is moved.

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).

Absent mitigation, direct impacts to desert tortoise from the proposed project would be significant. The applicant has recommended impact avoidance and minimization measures to reduce direct impacts to desert tortoise. These include the installation of exclusion fencing to keep desert tortoises out of construction areas, conducting pre-constructing clearance sweeps and translocating the resident desert tortoises from the site. The applicant has also proposed implementing dust control measures; construction monitoring; inspecting beneath vehicles; restricting construction traffic to designated routes; reduced vehicle speed limits to minimize the incidence of vehicles strikes, and worker training programs. These recommendations were subsumed into conditions of certification **BIO-1** through **BIO-13**, which apply to protection of desert tortoise and other biological resources that occur in and near the project area. Proposed **BIO-8** (Impact Avoidance and Minimization Measures) recommends a variety of additional impact avoidance and minimization measures to supplement the measures provided by the applicant. These measures include minimization of construction, road, and traffic impacts through worker education, control of weeds and trash, and covering excavations that can entrap desert tortoise. Other measures that may reduce impacts of vehicles on the desert environment include limiting vehicle access to designated areas, controlling vehicle speeds, and monitoring of construction activities. Conditions specify performance requirements, clarify the level of monitoring expected on the project site, and include reporting standards. Conditions of certification proposed **BIO-7** (Biological Resources Mitigation Implementation and Monitoring Plan) requires written verification that all desert tortoise impact avoidance, minimization, and compensation measures have been implemented.

Because of the large scale land use conversion of the site coupled with the expected level of vehicle traffic and maintenance activities (i.e., mowing, mirror washing, etc.) required at the site, construction and operation of the proposed project will require the applicant to translocate all the tortoises that occur within the project footprint. The translocation of desert tortoise would occur prior to construction and would reduce the potential for construction and operation related mortality. Of concern is the fact that the applicant has not identified any proposed translocation sites nor submitted a translocation plan for desert tortoise. Other unresolved issues include location of recipient sites (i.e., California or Nevada locations) and legal monitoring authority. However, Energy Commission, CDFG, and USFWS are evaluating how to address this complex legal issue. This issue will be addressed and clarified in the FSA. Notwithstanding the resolution on the determination of potential translocation and control locations Energy Commission, CDFG, and USFWS agree that a translocation plan is required to ensure desert tortoise are afforded protection in compliance with CESA and ESA standards. In light of this, Condition of Certification **BIO-9** (Desert Tortoise Clearance Surveys and Exclusion Fencing) was developed. **BIO-9** would require installation of a desert tortoise exclusionary fencing around the entire project site and along access roads, 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 currently living on the project site to proposed translocation sites.

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 post development. Likewise, the ongoing translocation experience associated with the Ivanpah Solar Energy Project has illuminated the need to revise the translocation strategy to accommodate the fact that multiple clearance surveys are required to detect tortoises. While this 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 site, translocation site, and control area. 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 and the spread of disease. These impacts are described in more detail below.

### *Translocation*

Large scale land acquisition to support military training, ongoing development, and the construction of industrial level solar infrastructure projects has necessitated the use of translocation as a tool to minimize losses to desert tortoise and other sensitive species of wildlife. Construction of the proposed project would require the translocation of all 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, given the threat of future development and other inherent risks to desert tortoise associated with private land.

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 (985 feet). This requirement is intended to limit the potential exposure risk to healthy tortoises in adjacent habitat. 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, including one tortoise from the project site; one tortoise from the host population at the proposed recipient site; and one tortoise at the control site. 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 required 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 into any given 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 from the proposed site after the installation of exclusion fencing 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. Furthermore, handling, holding, and transport protocols may 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 expose animals 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.

For desert tortoises that occur near but not within the project site, the removal of habitat within a tortoise's home range or segregating individuals from their home range with a fence would likely result in displacement stress that could result in loss of health, exposure, increased risk of predation, increased intraspecific competition, and death. Tortoises moved outside of their home ranges may attempt to return to the area from which they were moved, therefore making it difficult to isolate them from the potential adverse effects associated with project construction.

Translocation may be a useful tool in 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).

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 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 Table 11** provides a summary of the data as taken from 2011 USGS study at Fort Irwin California.

**Biological Resource Table 11**
**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.

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.

To date the applicant has not prepared a Draft Desert Tortoise Translocation Plan. However, this 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.

The following text describes estimates of the numbers of tortoises that could be translocated from the project site; numbers of tortoises that would be handled at the translocation sites and control sites; and numbers of undetected juveniles and eggs that may suffer mortality on the project site. These estimates were derived through surveys and mathematical formulations. Therefore the total numbers of desert tortoises presented in the PSA are likely fall somewhere between the lowest and highest statistical 95 percent confidence level identified in the USFWS formula. Nonetheless, for the purposes of this analysis, staff must consider the potential for the largest probability of desert tortoise that has the potential to occur on the project site.

Approximately 6 to 33 adult tortoises (lower and upper USFWS 95 percent confidence level) and between 3 to 34 juvenile tortoises (based on 31.1 to 51.1 percent of the total population identified by Turner) are expected to occur on the proposed project site. In addition between 46 and 158 eggs may be present in the project footprint. The actual number of tortoises 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 and would be translocated off-site.

Given the likelihood that all of the eggs will be lost and assuming approximately 85 percent of the juveniles will be overlooked, between 3 and 29 juvenile desert tortoises (i.e., 85 percent of 3-34) and all of the eggs would be lost.

Therefore the total number of tortoises that may require translocation could range between a low of 6 desert tortoises (6 adults and subadults, and no juveniles) to a high of 38 desert tortoises (33 adults and subadults, and 5 juveniles). If all of these tortoise are translocated to areas greater than 500m from the project site, an estimated 18 (6 adults + no juveniles multiplied by 3) to 114 tortoises (33 adults + 5 juveniles multiplied by 3) would require handling, radio tagging, and long term monitoring. Some juveniles may be too small to radio-tag, and that the final number may be somewhat lower; however, this number is important for the purposes of identifying the number of tortoises that may be subject to translocation effects. **Biological Resources Table 12** (Desert Tortoise Density Estimates and Impact Summary) provides information on the number of tortoises that could be subject to project disturbance at the proposed project site and translocation areas.

**Biological Resources Table 12**
**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.

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 will occur in the translocated population, the host population, and in the control population. Although 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).

The translocation mortality rates utilized for this assessment is assumed to be 45 percent which should represent the high end of documented translocation mortality events for desert tortoise. Based on a review of recent translocation literature, the translocation mortality is expected to be lower than 45 percent. Using the estimated mortality figure of five percent for the control population (adult and juvenile tortoises multiplied by 0.05) and an estimate of 45 percent mortality for the translocated and host populations (adults and juveniles multiplied by 0.45) this would result in the potential loss of between 8 and 36 tortoises from translocation mortality. Adding the additional estimated loss of between 46 to 158 eggs and between zero to 29 juveniles not detected during the clearance surveys the proposed project could result in the mortality of between 16 to 187 tortoises and between 46 to 158 eggs.

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*

Implementation of the proposed project would result in the direct loss of approximately 3,277 acres of occupied desert tortoise habitat. These impacts are significant and require compensatory mitigation. This includes 1,611 acres of Mojave Desert scrub, 1,647 acres of shadscale scrub, and 19 acres of disturbed areas including the abandoned orchard (HHSEGS 2011a, Figure 5.2-3). The loss of this habitat would reduce access to foraging, denning, and dispersal areas. Compensatory mitigation is not requested for the 19 acres of disturbed habitat on the project site. These areas are highly disturbed or barren and are located immediately adjacent to Tecopa Road.

Prior to visiting the proposed project site, the US Geological Surveys (USGS) Desert Tortoise Habitat Model (Nussear et al. 2009) for the project site and surrounding area were reviewed. The model 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 1. Areas within the designated mapping unit of one squire 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 in the southeastern tip of the project site to 0.7; with the majority of the site ranked as 0.8 or 0.9.

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 is comprised 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 barren areas or abandoned orchards. In addition, a network of graded roads forms a rectilinear grid across most of the site.

The highest concentration of desert tortoises on the project site is associated with the Mojave Desert scrub communities that dominate the eastern portions of the site. Burrow density and sign was also concentrated in this area; however, burrows were present to some degree in most of the project area. The presence of tortoise in this area may be associated with a variety of factors including the more intact Mojave Desert 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 desert tortoise are found in shadscale communities portions of the project site supporting this vegetation type appear to have been subject to possible grading and animal grazing. These areas are also being colonized by populations of noxious and invasive weeds which degrade habitat for desert tortoise.

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 clearly degraded and likely provide a reduced forage base for desert tortoise. As with any model these scores reflect a hypothesized habitat potential given the range of environmental conditions where tortoise occurrence was documented (Nussear et al. 2009). As such, 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 (*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 rendered potential habitat into habitat with much lower potential in recent years. 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 2011). 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*

Construction of the proposed project would result in the direct and permanent loss of 3,258 acres of occupied desert tortoise habitat. Compensatory mitigation is required to offset this significant impact and to fully mitigate for impacts to desert tortoise. 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 has proposed a 1:1 ratio to mitigate for permanent impacts to desert tortoise habitat. In consultation with USFWS and CDFG, it has been determined that a mixed habitat compensation ratio of land acquisitions based on the final construction footprint would mitigate for desert tortoise habitat loss within the project disturbance area. The rationale for the mixed ratio is that tortoise habitat, use of the site, and long term habitat value for tortoise varies within the project footprint.

The highest tortoise densities and most suitable habitat were observed in the north and eastern portions of the project site. These areas support relatively intact Mojave Desert scrub and provide more complex topography and soil development. Mitigation for areas supporting Mojave Desert scrub (1,611 acres) is at a 3:1 ratio. This mitigation ratio is consistent with past Energy Commission mitigation requirements for projects with impacts to desert tortoise (for example, High Desert Power Plant Project, Calico Solar Energy Project, and the Victorville 2 Hybrid Power Project), and with Incidental Take Permits issued by CDFG for other non-Energy Commission jurisdiction projects in the region.

The applicant's recommendation of a 1:1 ratio for (1,647 acres) of the project site that supports shadscale scrub communities has been accepted and incorporated. These areas are more disturbed, are proximal to other disturbed areas, and have less evidence of use by desert tortoise. In addition, portions of this area have been subject to anthropogenic disturbance including grazing and land development.

### *Desert Tortoise Mitigation Requirements*

To satisfy CDFG's full mitigation standard and to comply with requirements of a State Incidental Take Permit for desert tortoise, the proposed mitigation must meet certain 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 requires a 3:1 ratio (1,611 acres) for areas supporting Mojave Desert scrub and a 1:1 (1,647 acres) ratio for areas of the project site that supports shadscale scrub communities. In total this would require the acquisition of 6,480 acres of compensatory mitigation for desert tortoise. As specified in Condition of Certification **BIO-12** (Desert Tortoise Compensatory Mitigation), 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 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. The potential for future fragmentation of remaining

desert tortoise habitat in the region is minimized through the 3:1 mitigation ratio for compensation.

Potential indirect 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), and **BIO-23** (Ground Water Dependent Vegetation Monitoring), and **BIO-24** (Remedial Action for Adverse Effects to Groundwater dependent Biological Resources) would minimize and potentially avoid impacts to locally important groundwater-dependent vegetation and seeps from project pumping. These locally important habitats include the mesquite bosque located east of the project site and Stump Spring. 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*

To satisfy section 2081 of the California Endangered Species Act, the applicant must 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. These financial assurances are generally provided in the form of an irrevocable letter of credit, 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 6,480 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 13**). 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** and **BIO-25** (In Lieu Fee Mitigation Option). 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 13**.

**Biological Resources Table 13**
**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 | 15% of land acquisition costs (#1) × 1.17 (17% of the 15% for overhead) |

| | | |
|---|---|---|
| | assessment; review of all title documents; drafting deed and deed restrictions; issue escrow instructions; mapping the parcels…. | |
| | **SUBTOTAL** - Acquisition & Initial Site Work | **$12,801,240.00** |
| | | |
| 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 | **$9,396,000.00** |
| | **SECURITY SUBTOTAL** - | **$22,197,240.00** |
| | **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 | **$22,717,237.20** |

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; mapping the parcels…..
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. No assumptions have been made whether CDFG would concur with 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 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, and in conjunction with Nevada BLM and the USFWS to define an appropriate geographic boundary for compensatory acquisitions. While mitigation lands should be as close to the project site as possible, ideally in the Pahrump Valley, a broader region, such as the Northern and Eastern Mojave Desert Management Plan (NEMO) planning area, or eastern Mojave Recovery Unit could also be beneficial to the species. The BLM will identify preferred preliminary mitigation for federal biological resources within the Draft EIS, scheduled to be published in June 2012.

### *Mitigation Compliance Monitoring*

These issues will be resolved using cooperative efforts with CDFG and the applicant to finalize a mitigation and enhancement plan that would offset the significant habitat loss and indirect impacts to desert tortoises associated with construction and operation of the proposed project.

### *Other Pertinent Legislation*

The REAT agencies signed a Memorandum of Agreement (MOA), issued November 18, 2008, to establish a REAT Account that may be used by project developers to deposit funding for specified mitigation for approved renewable energy projects in the Mojave and Colorado Desert region of southern California (the MOA is available at <www.energy.ca.gov/33by2020>). For each project using the REAT Account an individual subaccount would be established for project specific tracking, compliance and accounting purposes. The subaccount would identify a list of the specific mitigation actions, the cost, and a timeframe for carrying out the actions. NFWF would manage the subaccount on behalf of the REAT agencies, and at their direction would disburse mitigation funding to satisfy mitigation requirements for impacts to biological resources. NFWF is a charitable non-profit corporation established in 1984 by the federal government to accept and administer funds to further the conservation and management of fish, wildlife, plants and other natural resources (<www.nfwf.org>). Use of the REAT Account would not change any of the requirements a project proponent must fulfill in order to comply with applicable State and Federal environmental laws governing the permitting of the projects.

The REAT Account will also aid project proponents in carrying out contracting and construction activities. The SBX8 34 legislation that was signed into law by the Governor in March 2010, created a $10 million loan that provides for advanced

mitigation habitat purchases. This advanced mitigation option can be used by a project developer to receive credit for their compensatory mitigation requirement through the California Department of Fish and Game. Condition of Certification **BIO-25** provides an opportunity for the applicant to fulfill their mitigation obligations by depositing funds into the SBX8 34 Trust Fund.

Senate Bill 436 was signed into law Signed Oct. 8, 2011 and guides the use of endowments for long-term management of mitigation lands. The bill requires all endowments for long-term management of mitigation lands be maintained by the agency that required the endowment or by the non-profit or special district that takes ownership interest in the mitigation lands. An exemption is provided if the mitigation land is held by a for-profit entity or another entity that cannot hold endowments (Gov. Code § 65968(b) & (b)(3)). The bill also requires that endowments be managed, invested and dispersed solely for the specific property for which the endowment was collected (Gov. Code § 65965(b)(1)). In effect this bill seems to overturn recent CDFG policy directing all endowments from CESA permitting to NFWF, and will likely also affect future REAT use of NFWF to hold endowments for renewable energy projects. Under Senate Bill 436 NFWF is currently precluded from holding project related endowments. Should the applicant elect to utilize a REAT account as a mitigation option, the endowment may ultimately not be NFWF but another equivalent land trust organization to hold and manage the endowment for compensation lands.

### *Indirect and Operational Impacts to Desert Tortoise*

Indirect effects to desert tortoises from the development of the proposed project could include soil compaction, dust, the introduction of non-native and invasive plant species, and increased human presence along access roads. Indirect effects may also loss of dispersal areas and connectivity to other areas, contracted home ranges, and increased risk of predation by predators attracted to the area by increased human activity. Increased human presence due to new access and spur roads could lead to illegal collecting and spread of disease due to abandonment of captive tortoises infected with upper respiratory tract disease. Each of these impacts is discussed in more detail below.

### *Wildfire*

Desert tortoise that escape direct mortality from wildfires may still be indirectly impacted 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 2011). Wildfires can burn important forage and reduce cover required for thermal protection and refugia from predators. 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). Implementation of the worker environmental awareness training (Condition of Certification **BIO-6**) would reduce or eliminate the potential for wildfires to occur. Potential impacts from the spread of invasive plant species and

subsequent increase risk of wildlife would be reduced to less than significant levels through the implementation of conditions of certification **BIO-18** (Weed Management Plan). Conditions of certification **BIO-23** (Ground Water Dependent Vegetation Monitoring), and **BIO-24** (Remedial Action for Adverse Effects to Groundwater-dependent Biological Resources) 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.

### *Ravens, Coyotes, and Other Predators*

Human activities in the project area potentially provide food or other attractants in the form of trash, litter, or water, which attract and subsidize unnaturally high numbers of tortoise predators such as the common raven, kit fox, and coyote. 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). Dogs brought to the project site with visitors may harass, injure, or kill desert tortoises, particularly if allowed off leash to roam freely in occupied desert tortoise habitat. Implementation of the worker environmental awareness training (**BIO-6**) and restrictions on pets being brought to the site would reduce or eliminate the potential for these impacts.

Construction and operation of the project would 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.

Ravens may also use the perimeter fence as potential perch sites and new transmission line structures as nest and perch sites increasing the for loss of tortoises from raven predation. Several raven subsidies occur in the region including the city of Pahrump, Nevada, 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.

Construction and operation of the project could provide new sources of food, water, and nesting sites that might draw unnaturally high numbers of tortoise predators such as the common raven. In addition, 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. Roads provide a ready source of raven food in the carcasses of small mammals and reptiles that result from vehicle collisions, and increased nesting opportunities are provided by human structures. Road kills would mount with increased construction and operations traffic, further exacerbating the raven/predator attractions and increasing desert tortoise predation levels. 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.

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 roadkill 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 minimize and control trash and other human activities that tend to increase raven activity; and on-site raven activity management and control, and a per-acre contribution to support the USFWS Regional Raven Management Program (below).

### *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 project 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 2 percent fund management fee to the REAT Account held by NFWF for 3,258 acres of desert tortoise habitat disturbed by the project. This payment of $348,932 would support the regional raven management plan activities focused within the Mojave Desert Recovery Unit, which would be adversely affected by increases in raven subsidies attributable to the proposed project. The fees contributed by the applicant would fund staff that would implement the raven removal actions, education and outreach efforts, and surveying and monitoring 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; would reduce the impacts below a level of significance; and would satisfy the requirements of the CDFG for full mitigation pursuant to CESA.

The Raven Management Plan would involve identifying and preventing conditions that might attract or support ravens (for example, eliminating food sources such as garbage or roadkill and minimizing creation of structures that could provide ravens perches, nests, or roosts), monitoring the effectiveness of raven management and control measures, and then implementing additional adaptive management measures to make sure that the project does not result in an increase in raven numbers. Implementation of measures in Condition of Certification **BIO-13** would avoid or minimize the contributions of the project to increased desert tortoise predation from ravens to less-than-significant levels.

### *Increased Risk from Roads/Traffic*

Vehicle traffic would increase as a result of construction and improvement of access roads, increasing the risk of injuring or killing desert tortoise. 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 though 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). Additional unauthorized impacts that may occur from casual use of the access roads in the project area include unauthorized trail creation. 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 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 reduced speed limit on the dirt access roads within desert tortoise habitat. Condition of Certification **BIO-8** will also prohibit use of the existing desert trail network to access the site and require vehicles to access the project via Tecopa Road and Highway 160. The implementation of measures in **BIO-13** would further reduce subsidies for desert tortoise predators through the collection and management of road kill.

### *Conclusion – 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 between 6 to 33 adult tortoises and between3 to 34 juvenile tortoises. Between 46 and 158 eggs desert tortoise eggs are also expected on the site.

Staff concludes that the proposed project would result in direct mortality to all 46 to 158 eggs and between 3 to 29 juvenile desert tortoises (i.e., 85 percent of 3-34). Staff concludes that the applicant will be required to translocate between a low of 6 desert tortoises (6 adults and subadults, and no juveniles) to a high of 38 desert tortoises (33 adults and subadults, and 5 juveniles). If all of these tortoise are translocated to areas greater than 500m from the project site, an estimated 18 (6 adults + no juveniles multiplied by 3) to 114 tortoises (33 adults + 5 juveniles multiplied by 3) would require handling, radio tagging, and long term monitoring.

Using the estimated mortality figure of five percent for the control population and an estimate of 45 percent mortality for the translocated and host populations this would result in the potential loss of between 8 and 36 tortoises. Adding the additional estimated loss of between 46 to 158 eggs and between zero to 29 juveniles not detected during the clearance surveys the proposed project could result in the mortality of between 16 to 187 tortoises and between 46 to 158 eggs.

Should tortoise numbers be lower than assumed the associated impacts to adults, juveniles, eggs and tortoises at the proposed host and translocation sites would be correspondingly lower as well. Should the number of tortoise 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 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. The conditions would minimize habitat disturbance to only that necessary for project development; would prevent desert tortoises from entering the project site through installation of exclusion fencing; would require removal and translocation of tortoises now present on the project site and those detected during project development; and would compensate for habitat loss through off-site habitat acquisition. All of these measures would be monitored and verified.

### 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 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 and considered to have a low potential to occur. This species is often associated with rocky outcrops and 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

Badger burrows and desert kit fox burrow complexes were detected on the project site and the area supports suitable foraging and denning habitat for these species. Construction activities could also result in disturbance or harassment of individuals, including adjacent offsite animals.

#### *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 9 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. 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 entrap 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 and their sign were observed onsite during surveys conducted for the proposed project, and kit fox could be entrapped within the site by the exclusion fence, as described above for badgers.

### *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 other areas 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 the animals out of active territories can stress animals, 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. Although the relation of the disease outbreak to project construction is not known at this time, staff believes a conservative approach is necessary to ensure impacts to this species are mitigated accordingly. In addition, the intervener group Center for Biological Diversity (CBD) has most recently voiced concerns regarding kit fox at the April 27, 2012 public workshop. CBD's data requests (CBD 2012a) outlined these concerns, and requested clarification to staff's previous data request #78. CBD repeated staff's request to provide data on the number and distribution of kit fox sign including active and inactive dens, burrow complexes, and natal dens. The applicant's March 30, 2012 data request response referred to previous partial data responses that were published December 5, 2011.

### *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 reduce access to 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 passive relocation, or hazing, dens of these species are typically blocked, fitted with one-way doors, with the eventual collapse and backfill of the dens. Displaced animals then must navigate across the 3,277 acre project site and 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 if successful may lead to 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 been focused as a result of the ongoing deaths of kit fox on or adjacent to the Genesis Solar Energy Project construction site. Staff has become 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 remain onsite, digging new burrows overnight, or possibly moving briefly offsite, only to emigrate back. This results in ongoing stress to kit fox, in attempting to search out and/or create new dens onsite repeatedly, avoid humans and equipment, and find prey. Successful eviction is also important because kit fox may not be disturbed during pupping season (February 15 through May 31), and must be protected with construction buffers during this time.

Both badgers and kit foxes are categorized as “fur-bearing mammals” (CDFG Code Section 4000). California Code of Regulations, section 460, designates kit fox as “protected”, and they are further protected by CDFG Game Code (section 86) prohibition against take, defined as “hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill”. American badger is also considered a species of special concern, which affords this species special consideration and protection under CEQA.

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 ofmortality is expected even with staffs proposed conditions of certification. To reduce project impacts to American badgers and desert kit fox, Condition of Certification **BIO-8** (Impact Avoidance and Minimization Measures) and Condition of Certification **BIO-14** (American Badger and Kit Fox Management Plan) which 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. 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. Development of final condition language is pending CDFG review at this time. Final condition details will be provided in the FSA.

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), **BIO-23** (Groundwater-dependent Vegetation Monitoring), and **BIO-24** (Remedial Action for Adverse Effects to Groundwater-dependent Biological Resources), would further reduce direct and indirect impacts of the project to less than significant levels under CEQA.

### Nelson's Bighorn Sheep

Bighorn sheep are known from the local mountain ranges and the applicant detected the horn of a bighorn sheep on the project site. The CDFG confirmed that herds of this species are present in the Nopah Range to the west and the Kingston Range to the south (CNDDB 2012), and that they occupy, or have occupied in the past, the north of the Nopah Range. To evade predators, sheep have excellent vision, short legs, a low center of gravity, and a stocky build conducive to outmaneuvering predators in rugged terrain, yet are fast enough to outrun predators on flatter ground. Consequently, within the desert, habitat permanently occupied by bighorn sheep is primarily on or near rugged terrain above the desert floor. Such rugged habitat is not present on the project site, but is not requisite for intermountain areas to be important to bighorn sheep from both an evolutionary or ecological perspectives.

#### *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 potential 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.

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 desert 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 not 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 any rugged terrain to protect spring foraging habitat. Being over one mile from the base of either the Nopah or Spring mountains, the proposed project conforms with this guideline;

however, staff and CDFG both consider this information to be a planning tool, and while the project site provides marginal spring foraging habitat, with likely seasonal, infrequent use, CDFG has informed staff that 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.

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.

Access to water is of critical importance to bighorn sheep. Proximity to perennial water has been found to be the best predictor of bighorn sheep presence. In the desert region, few perennial water sources exist, and local sources become more important, particularly during summer. Bighorn sheep inhabiting desert ecosystems have been known to survive in the absence of ephemeral sources of surface water (Krausman et al. 1985), and males and females may have differing water uses, likely a function of physiological demands and social structure. Despite this information, there are no known large populations of bighorn sheep in the desert region that lack access to surface water. The Amargosa River, Stump Spring, as well as surface water in the Nopah and Kingston ranges, are expected to be locally important to sheep. Stump Spring, located 8 miles from the Kingston Range and approximately 2.5 miles east of the project site provides water from December to July. Use of this spring, even periodically, may place big horn sheep in close proximity to the project.

The Nopah Range population is somewhat isolated and, therefore, most threatened because of stochastic events (such as drought). Recolonization of the Nopah Range would be least likely, as this area is furthest removed from animals inhabiting the Spring Mountain Range, or Kingston or Clark ranges (Bleich pers. comm. 2012). Nevertheless, evidence that the Nopah Range is part of a metapopulation that includes the aforementioned ranges exists in the form of all white sheep that are known to occur in each of those mountain ranges. CDFG (Bleich pers. comm. 2012) believes this information supports the connection of the sheep populations on these mountain

ranges, and suggests that maintaining every opportunity for movement will enhance metapopulation processes and species persistence.

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 of the loss of any particular water source will depend on the number of water sources available to bighorn sheep (Wehausen 2005). Water sources can be lost to bighorn sheep due to various causes, including domestic and feral stock use, vandalism, or natural disasters.

The Nelson's bighorn sheep is a BLM sensitive species and is classified as fully protected by the State of California. Staff considers potential impacts to this species to be significant absent mitigation. Suitable forage for this species onsite is seasonal and episodic (infrequent). During periods of extreme rainfall bighorn sheep can forage farther from the safety of mountain ranges. However, as significant rainfall events and subsequent germination occur very infrequently, staff does not consider the loss of vegetation on the project site to constitute a significant loss of habitat for this species. Similarly, while bighorn sheep remains were found on the site, the project site does not act as a critical area for foraging. Based on the proximity to rural residences and fact that some portions of the project site are somewhat degraded staff considers impacts to bighorn sheep habitat to be adverse, but not significant.

Because of the limited distribution and status of bighorn sheep, impacts to this species would be considered significant should they occur in or near the project site during the construction of the project. Implementation of the following conditions would minimize potential impacts 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 PSA 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-6** (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), **WATER SUPPLY-6** (Groundwater Monitoring), and **BIO-24** (Remedial Action for Adverse Effects to Groundwater-dependent Biological Resources). With implementation of these measures, staff concludes that it is unlikely that there will be direct or indirect impacts to water sources that may be used by Nelson's bighorn sheep as a result of the project.

### 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. Based on the preliminary results of the acoustic surveys the applicant identified at least four special-status bat species including the pallid bat, Townsend's big-eared bat, long-legged myotis, and the Mexican free-tail bat as present on the project site. 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). Staff notes that continued surveys of the project site by the applicant, as well as the forthcoming second quarterly Anabat result report, will be incorporated into the FSA.

#### *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 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 is 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, 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). In a letter to the Energy Commission, dated March 12, 2012, the BLM expressed concern that pumping groundwater from the aquifer underlying Pahrump Valley, combined with potential pumping from other proposed projects in this groundwater basin, may cause impacts to the Amargosa Wild and Scenic River, mesquite woodlands in Pahrump Valley, and Stump Spring ACEC. The seasonal (December to July) spring pools at Stump Spring and their associated wetland-riparian vegetation, as well as other smaller seasonal springs, could also be affected by groundwater elevation declines.

### *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 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 is 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 sensitive 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. Condition of Certification **BIO-8** will include specific language regarding the avoidance of roosting

bats or maternity colonies. Implementation of this condition would reduce project impacts to less-than-significant levels under CEQA.

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 conditions of certification **BIO-23** (Groundwater-dependent Vegetation Monitoring), and **BIO-24** (Remedial Action for Adverse Effects to Groundwater-dependent Biological Resources). 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 abundance of insect prey on the project site and the effect to them from collision and thermal exposure is poorly understood. Studies by (Horvath et al. 2009) 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. 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. It has also been documented that some insects are attracted to photovoltaic solar panels and mistake these structures for the surface of water.

While these studies focused on photovoltaic structures the insect prey base may be affected in unknown ways by the solar field. Staff is also concerned with evaluating how solar energy concentrated by the mirrors impact insects flying over the heliostat field. Staff assumes impacts to insects to be the same as known impacts to organic substances, that is, that solar energy over 50 kilowatts per square meter (kw/m2) causes damage if sustained for over approximately 30 seconds (White and Dietenberger 2001). Currently this area of science is not well known and the applicant has offered no mitigation or minimization for these impacts. While staff is not currently able to quantify these impacts staff believes there may be potential for adverse impacts. Staff is currently waiting for responses to data requests regarding solar flux issued to the applicant for the Rio Mesa Solar Electric Generating Facility (11-AFC-04). Per applicant's letter dated March 28, 2012, applicant has requested staff utilize data responses provided for the Rio Mesa project, given the technology similarities. Staff accepts this approach. Ongoing coordination with CDFG will occur, including appropriate development of mitigation plans if required. Staff currently recommends the implementation of **BIO-15** (Avian, Bat, and Golden Eagle Protection Plan), to assist with monitoring operational impacts and formulate adaptive management strategies if needed. Condition of Certification **BIO-8** will include specific language regarding the avoidance of roosting bats or maternity colonies. Implementation of this condition would reduce project impacts to less-than-significant levels under CEQA.

## Impacts - Migratory/Special-status Bird Species

### Migratory/Special-status Bird Species

The vast plains, rugged mountains, and adjacent bajadas of the Pahrump Valley provide foraging, cover, and breeding habitat for a variety of resident and migratory birds. In the region various entities have worked to determine important migratory bird habitat. 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 has 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 riparian habitat and mesquite dune scrubs are utilized by a wide range of species. Localized water sources such as Stump Spring and other seasonal seeps and springs, and private residences south of the site also provide resources used by many species of birds. During surveys of the project site the applicant identified approximately 60 species of birds in the project area. Some of these include a number of special-status bird species. Some of the known or expected species that may be impacted by the project include golden eagle, burrowing owl, loggerhead shrike, Leconte's thrasher, northern harrier, loggerhead shrike, and prairie falcon.

#### *Direct Impacts to Special-status Birds*

Direct impacts to nesting birds or raptors would include the removal or disturbance of vegetation that supports nesting birds, increased noise levels from heavy equipment, increased human presence, and exposure to fugitive dust. 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 decibals to 74 decibals at 1500 feet from the noise source (piece of construction equipment) (HHSG 2011a, Table 5-7-7).

#### *Indirect Impacts to Special-status Birds*

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. Glareassociated with the heliostats, heat at the tower, and solar flux may also adversely affect birds' use of the site. In addition, noise and lighting effects have been demonstrated to adversely affect behavior, reproduction, and increase the risk of predation. A detailed discussion of solar flux, glare, noise, and lighting effects are described below for all birds.

Indirect impacts to nesting birds also include facility maintenance, human disturbance, the spread of noxious weeds, and disruption of breeding or foraging activity due to facility maintenance. Weed abatement through grazing or mechanized tools and

maintenance of the evaporation pond could also affect nesting. Another indirect risk to birds during project construction is entrapment. Birds may become entrapped within vertical pipes used to support the heliostats.

### *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. 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 Special-status Birds*

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. The applicant has proposed mitigation measures to avoid and minimize impacts to nesting birds that have been incorporated into Condition of Certification **BIO-16** (Pre-construction Nesting Bird Surveys). This measure includes conducting pre-construction nesting surveys, and the establishment of buffers, ranging from 250 feet 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. Bird species potentially affected include ground nesting species such as night hawks (*Chordeile* sp.) and horned lark. Construction during the breeding season could result in the displacement of breeding birds and the abandonment of active nests. 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 development 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. 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. Destruction of these nests would require permits from the USFWS and CDFG. 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.

Some species of birds may be more tolerant to disturbance than other species. In addition, some birds are capable of successfully nesting in close proximity to some forms of localized disturbance. Therefore, it is recommended that to minimize impacts to nesting birds, preconstruction surveys of the work area shall be conducted if work is to occur during the breeding season. If active nests are detected during the survey, a 500 foot no-disturbance buffer zone shall be implemented (Condition of Certification **BIO-15**, Avian Bat & Golden Eagle Protection Plan). In addition, staff recommends that the applicant develop a nesting bird management plan as a component of **BIO-16** that describes the methods used to deter nests, cap pipes, net equipment, implement buffers, and monitor nest sites. Implementation of Condition of Certification **BIO-8** (Impact Avoidance and Best Management Practices) and the pre-construction nest surveys required in **BIO-15** 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.

Based on a literature search and information obtained from Audubon and the Bureau of Land Management (BLM) it appears that birds may descend into pipes either in search of nest cavities or food and become entrapped within the pipes. Once inside the cavity, the birds become entrapped because they 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). Considering that over one million claim markers occur in the region it is not inconceivable that over one million birds have been lost. As a result of this, the State of Nevada has outlawed the use open top pipes for mining claims and it is now legal to remove these pipes if encountered in the field.

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 ). 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 that placement of many cylindrical pipes to support the structures. Staff considers these pipes to pose a significant risk to birds and bats and proposes the applicant maintain covers on all vertical pipes greater than four inches in

diameter as a component to condition of certification **BIO-8** (General Impact Avoidance & Minimization Measures).

Species that utilize the project site for foraging but not nesting, such as golden eagle and prairie falcon, 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 could result in significant impacts to bird habitat. Potential indirect impacts these areas would be reduced to less than significant levels with the implementation of conditions of certification, **BIO-23** (Groundwater-dependent Vegetation Monitoring), **WATER SUPPLY-6** (groundwater monitoring), and **BIO-24** (Remedial Action for Adverse Effects to Groundwater-dependent Biological Resources). With the implementation of these conditions impacts to migratory birds from the 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. These birds can have extremely large home 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 decibals to 74 decibals at 1500 feet from the noise source (piece of construction equipment) (HHSG 2011a, Table 5-7-7).

#### *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 birds' use of the site. In addition, noise and lighting effects have been demonstrated to adversely affect

behavior, reproduction, and increase the risk of predation. A detailed discussion of glare, noise, and lighting effects are described below for all birds.

### *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.

### *Conclusions and Discussion of Mitigation for Golden Eagles*

Golden eagles are extremely susceptible to disturbance during the breeding season. Given the nearest nest is over four miles to the west, and that all 19 nests located within 10 miles of the project site were unoccupied last year, it is unlikely that golden eagles are nesting close enough to the proposed project area to be disturbed by construction or operation activities. Significant impacts to golden eagle would occur if the indirect effects of a reduced prey base caused by development of the project result in loss of productivity or abandonment of nesting territories.

Up to 19 nests have been located in the vicinity of the project, and as many as five eagles have been observed on the site in a day. Golden eagles are routinely observed near the small community of Charleston View and may continue to occur in areas adjacent to the project post development to some degree. The development of the 3,277-acre project site would result in substantial loss of foraging habitat for this species. This loss of foraging habitat would be considered significant and require compensatory mitigation. 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 project site. If foraging did occur within the heliostat field, it could lead to collision, electrocution, or exposure to solar flux. Operational effects including a discussion of glare, solar flux, collision and electrocution are discussed further below.

### *Federal Guidelines*

The Bald and Golden Eagle Protection Act (BGEPA) prohibits the take of bald and golden eagles. Construction activities during the nesting season (February through September) could adversely affect golden eagle by indirectly affecting foraging habitat, which may ultimately result in nest failure or abandonment. The power plant operations could also take golden eagle by burning, singeing, or damaging eyesight by reflected solar flux, and/or by luminosity (*i.e.* the highly reflective nature of the heliostat field).

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. Staff is awaiting further guidance from USFWS to determine if a federal Eagle Act take permit may be warranted for the proposed project. An Environmental Assessment (EA) and Implementation Guidance for take permits were issued under the Bald Eagle and Golden Eagle Protection Act (USFWS 2010d). 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. The definition of disturb (72 FR 31132) includes 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 about the cumulative impacts to golden eagles resulting from loss of foraging habitat.

Given the nature of the potential impacts loss of forage and coupled with potential injury or mortality from reflected solar energy (discussed further below), the USFWS has recommended that the project applicant apply for a federal Eagle Act Permit. Staff is coordinating with USFWS regarding issuance of the permit. Staff has proposed Condition of Certification **BIO-15**, which requires the development of an Avian, Bat, and Golden Eagle Protection Plan which would require monitoring and reporting program that would document and report potential collision mortality from the proposed solar fields and provide mechanisms to reduce threats to eagles in the region. The USFWS has indicated that the plan would serve as the basis for an eagle permit application, and also that the applicant would be eligible to apply for a permit in December, 2012, after completing of a full year of surveys for golden eagle (CEC 2011l). Ultimately, the plan will have to meet the requirements of the USFWS and CDFG.

The USFWS has also raised concerns regarding potential collision threats associated with solar and renewable technologies. To address potential collision concerns (discussed below under operational effects) 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.

### *State Guidelines*

Under state law, golden eagles are fully protected. The term fully protected means that no take is allowed for this species, in contrast with federal law. Staff is currently working with the USFWS and CDFG to develop appropriate analysis and possibly supplemental mitigation to reduce impacts to this species. This will be based on ongoing coordination and pending review of applicant's next onsite avian spring survey data. Condition of Certification **BIO-12** (Desert Tortoise Compensatory Mitigation), **BIO-22** (Compensatory Mitigation for State Waters), **BIO-18** (Weed Management Plan), **BIO-23** (Groundwater-dependent Vegetation Monitoring), and **BIO-24** (Remedial Action for Adverse Effects to Groundwater-dependent Biological Resources), would reduce direct loss of golden eagle habitat and minimize indirect impacts of the project to less than significant levels under CEQA.

In summary, the inclusion of **BIO-15** and the implementation of conditions of certification **BIO-1** through **BIO-9**, and **BIO-12**, which include worker training, implementation of Best Management Practices, pre-construction surveys, biological monitoring, the avian protection plan, and land acquisition; long-term monitoring of groundwater and dependent biological resources in **BIO-23, BIO- 24, and WATER SUPPLY-6**; and compensation and avoidance and minimization measures for desert washes (**BIO-22**) would reduce potential impacts to golden eagles but may not reduce these impacts to less-than-significant levels under CEQA. Efforts to determine compliance with the California Department of Fish and Game's provision for no take of the State Fully

Protected Species under Section 3511 of California's Fish and Game Code are ongoing, in conjunction with CDFG. Supplemental analysis regarding this issue will be included in the FSA.

**Burrowing Owl**

Construction and operation of the project would result in impacts to burrowing owls and their habitat. The AFC indicated that eight burrows with burrowing owl sign (feathers, whitewash droppings, and/or pellets) were detected on the project site in 2011. Section 5.2.6.7.2 of the AFC also noted 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 meter survey boundary. The exact number of owls observed was not quantified, however AFC Table 5.2-7 confirms that burrowing owls were observed on the project site in 2010.

Phase III, or winter surveys, were conducted by the applicant January 30, 2012 and February 2, 2012. A previously reported burrow was found to be collapsed and no burrowing owl sign was observed at the burrow. Construction of the proposed project would affect foraging and breeding habitat for this species. The potential effects of the project to burrowing owls depend on many factors including the number of owls present in the project footprint and how the species utilizes the area (i.e., migratory stopover, year round, breeding, or wintering). Impacts from construction would be greater if the owls use the site year round or for breeding.

***Direct Impacts to Burrowing Owls***

Direct impacts to burrowing owls would include 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.

***Indirect Impacts to Burrowing Owls***

Indirect impacts 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. 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.

***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***

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.

Although the applicant suggests there is no indication that burrowing owls are breeding on the project site staff does not concur with this conclusion. Information provided by the surveys conducted to date would not be expected to accurately yield this level of data. Based on a review of the reports provided by the applicant there is no indication that multiple follow up surveys of active burrows were completed, which are often required to establish the breeding status of burrowing owls. Considering that both weather and temporal factors can affect the surveyor's ability to detect burrowing owls; staff must conclude the site has the potential to support breeding owls. Based on the detection of owls on the project their declining numbers throughout their range and the existing sign and habitat conditions on the project site, staff considers impacts of the proposed project to be significant. 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 recent guidance regarding how to mitigate impacts 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 the owls are using 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 and be considered to mitigate project impacts to the species, it is likely that owls would occupy areas close to known territories. Because of the extended construction schedule this could require multiple passive relocation events for the same owls. Each of these events stresses the bird and exposes the owls to predation, 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

passive relocation is used solely 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 moving owls from large sites like the project site, California Fish and Game Code 3503.3 prohibits the active relocation of burrowing owls; therefore, staff is recommending implementation of passive relocation techniques. Staff notes that it is not possible to determine what direction owls will move offsite, if they will make it to the edges of the site and beyond, or whether suitable habitat that has carrying capacity, or resources, for more owls is available.

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; therefore habitat compensation 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 have been discovered onsite. However, given the occasional migratory nature of burrowing owl, staff cannot predict how many owl, or burrowing owl 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.

Acquisition of the appropriate amount 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, 1 square mile per owl pair, and several owls can overlap in that 1 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 are present on site.

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 by this species and that some territories likely overlap. However, a determination ofan appropriate mitigation ratio for this species. Staff is also evaluating whether the acquisition of mitigation lands for burrowing owls may be nested within the lands acquired for desert tortoise. Staff is concerned that evicting owls from the project site onto adjacent lands without providing suitable alternate burrows may pose a mortality risk to the birds. Staff inquired at the April 27, 2012 workshop whether private land to the south and west of the project site was under consideration for mitigation. The applicant indicated that these lands were not currently being considered as potential mitigation parcels.

With 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.

## 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 to biological resources include disturbance to common and sensitive wildlife 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; night time lighting and maintenance activities (i.e., washing and maintenance would occur at night); noise; and collisions with structures. These impacts are discussed below.

### Roads

The proposed project would not require construction of a new road; however, access by facility staff and maintenance personnel and equipment would increase existing traffic levels along Tecopa Road, and create fugitive dust from onsite ground-disturbance, as well as during operations phase onsite traffic along ring roads.

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 impacts that remain within the project perimeter. Also, there would be substantial use of access roads outside of the fenced project site

given the phased implementation of the project. Desert tortoise exclusion fencing would need to be installed along both sides of these access roads.

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 access roads to the project site.

### Noise

Operational noise from the HHSEGS is predicted throughout the plant 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 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. 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 at the project site 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 occur 7 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.

### Weed Management Activities

The applicant has indicated that weed management would be an ongoing activity on the project site. This may consist of both mechanical and chemical applicant of herbicide. The use of herbicides to control weeds can be effective; however the herbicides with residual toxicity could adversely impact native plants and wildlife.

Herbicides are any chemical agents, taken from a broader spectrum of pesticides, which target the specific control or removal of plants. Many weed control programs rely heavily or solely on the use of herbicides, which are generally considered the most cost-effective method of eradication. However, herbicides may harm or kill desirable native vegetation that is near or even adjacent to the targeted weeds. Many weed species require specific timing or methods of herbicidal application (i.e., disturbing a protective waxy cuticle to allow uptake or applying herbicide after the plant has bolted, but before seed set, etc.). If such methods are not followed, native vegetation could be harmed by herbicidal contamination, while the target weed species are left unaffected. Additionally, herbicides may be detrimental to wildlife species such as amphibians or small mammals or negatively impact water quality.

Herbicides can help protect native vegetation from invasive weeds, but they can also have detrimental environmental impacts (CNPS 2008). Because of this, it is best to select an herbicide that has low toxicity, will not move from its target or leach into groundwater (low water solubility), and will not remain in the environment for a long period of time (low persistence). The application method should be site-specific. Not all herbicides or application methods are equally appropriate, effective, or safe, given different site conditions and weed species.

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 14** identifies the general effects of herbicides on wildlife.

**Biological Resources Table 14**
**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<br>Inhibits an enzyme that is essential for plant growth | Causes weight loss and decreased body weight gain in experimental mammals<br>Appears to have low toxicity in mammals, birds, fish, and invertebrates |
| *Clopyralid* | Highly selective toxicity to terrestrial plants (primarily broadleaf species)<br>Relatively non-toxic to aquatic plants and grasses<br>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<br>May adversely affect liver and kidney weights and gastric epithelial tissue<br>Appears to show no effect on viability of bird eggs and chick immune systems |
| *Dicamba** | Mimics plant hormone indole 3 acetic acid<br>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<br>Relatively non-toxic to mammals, fish, and amphibians<br>Acute toxicity to birds appears to be generally low<br>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<br>Inhibits photosynthesis, respiration, and nucleic acid synthesis | May reduce food conversion efficiency leading to loss of body weight in mammals and birds<br>Certain surfactants used with glyphosate are much more toxic to fish that others<br>May cause histological changes in gills, kidneys, and liver of some fish |
| *Imazapyr* | Inhibits an enzyme that is essential for plant growth<br>Practically non-toxic to conifers | Appears to be relatively non-toxic to terrestrial and aquatic animals |
| *Picloram* | More toxic to broadleaf plants than grasses<br>Mimics naturally occurring auxins leading to uncontrollable and abnormal growth | Appears relatively non-toxic to terrestrial animals<br>Moderately toxic to aquatic animals, particularly some fish<br>May affect fry survival and growth in some fish |
| *Triclopyr* | Mimics indole auxin plant growth hormones causing uncontrollable growth<br>At sufficiently high levels of exposure, abnormal growth is so severe that vital | May cause developmental effects at levels that cause maternal toxicity in mammals<br>May have adverse effect on mammalian |

| | | |
|---|---|---|
| | functions cannot be maintained and plants die | kidney functions<br>Higher concentrations may cause mortality or immobility in frog tadpoles<br>Larger doses may cause a decrease in body length and smaller doses may lead to lethargic behavior in some fish<br>Relatively non-toxic to birds |

Staff considers the habitat and functions and values on the entire 3,277-acre project area to be lost for most species of wildlife post development. However, for some disturbance tolerant species and for the many small species trapped within the perimeter, including birds, small mammals, and reptiles, these species may be harmed by ongoing weed management activities, such as herbicide use. Special-status species 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 itemized above in as summarized in **Biological Resources Table 14**. 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. Staff considers impacts from herbicide use to be significant, absent mitigation. To avoid potentially significant impacts to special-status species located adjacent to the project, the applicant should implement Condition of Certification **BIO-18** (Weed Management Plan) which would restrict herbicide use on windy days, require the focused application of herbicides, prohibit the use of pre-emergents and other herbicides with residual soil toxicity, prohibit spraying or mechanical weed management near special-status species, and limit 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 storm water retention area to manage stormwater runoff and protect downstream private lands from erosion and sedimentation. The Overall Grading and Drainage Plan[3] from the AFC indicate the retention area will occur on the western side of the project and would be used 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 39 hours, based on a 5-year flood event.[4] At a staff workshop held April 27, 2012, the applicant shared maps with staff that indicated how large the retention area would be and the expected depth of water after various storm events.

[3] AFC Appendix 5.15A: Preliminary Construction SWPPP-DESCP, Attachment I (Grading and Drainage), Drawing No. C-2000, Revision No. D

[4] AFC Appendix 5.15ER: Post construction Hydrology Report, page 9.

Given the scarcity of water in the desert, many species of wildlife can be attracted to areas supporting pooling or 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, even if they are fenced off from wildlife, retention basins 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 ponded water despite perimeter fencing. 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. Staff considers large areas of standing water, even for relatively short durations in arid environments, to pose a potential risk to desert tortoise and other wildlife because of the potential subsidy these pools provide to ravens.

In order to reduce potential water subsidies to ravens and other species staff is recommending the implementation of **BIO-8** (Impact Avoidance and Minimization Measures). 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 three primary factors which could cause injuries or even mortality of 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, and effects of disturbance and lighting. These are discussed below.

### Lighting and Collisions

The project would include two 750-foot power towers, heliostat field (each approximately 12 foot high), and ancillary equipment including boilers and ancillary facilities. Onsite facilities range from a height of 750 feet (power towers), to 120 feet for boilers and the air-cooled condenser unit. 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. 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).

It is difficult to predict the magnitude of collision-caused bird mortality as a result of the HHSEGS project. Based on the known distribution of the species in the project area and observations made during reconnaissance surveys, it is generally expected that collision mortality would occur to some degree. As collisions are known to occur from a variety of manmade and natural objects the construction of project would result in a net increase above baseline conditions.

Lighting 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). 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). Radar data from the Mojave Desert indicate that less than 15 percent of nocturnal migrants fly below 984 feet (Felix et al. 2008). The power towers would be 750 feet high.

Diurnal birds 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 large stormwater retention pond that would hold water for limited time 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 minimize this risk of collision and disturbance to wildlife from lights, staff recommends implementation of proposed Condition of Certification **BIO-8**, which 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 collision events 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.

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.

### Glare and Collisions

Large scale solar facilities present a new and relatively un-researched risk for bird collisions. As described above birds are likely to collide with various structures associated with the heliostat field and power towers. Although not physically imposing structures the proposed heliostat fields may also pose some collision risk to birds. Depending on the time of day, use of the site by various species, and glare or polarized light it is possible that birds will collide with the arrays. Operation of the solar panels could also cause an increase in Polarized Light Pollution (PLP) which occurs from light reflecting off of dark colored anthropogenic structures. 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 (2009). 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 lead to the effect on their navigation ability and ultimately effects on dispersal and reproduction (Horvath et al. 2009).

Bird fatality studies conducted at the Solar 1 facility near Daggett, California indicated that much of the bird mortality consisted predominantly of collisions with mirrors; however some were affected by solar flux associated with the two standby positions. These collisions were partially attributed with increased numbers of birds attracted to the adjacent evaporation ponds and agricultural fields (McCrary 1986). 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 from solar panel technology is not well understood. Given the lack of information on these impacts for such a large facility as the proposed project, it is likely that some birds will likely collide with the mirrors and perish. The severity of this impact would vary depending on the species involved, and the number of birds involved.

Staff 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. No other feasible means of minimizing or avoiding this impact are known, and therefore staff acknowledges it may not be possible to fully mitigate this impact even with the application of additional measures.

### Luminosity

When the project is operating, the heliostats will reflect the sun's rays onto the solar boilers at the top of the solar towers, which will occupy the top 130 feet of each solar power tower. During these times, the boilers will absorb approximately 95 percent of the light that reaches them. During the solar plant's operational hours, the five percent of the 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 is expressed as the number of kilowatts per square meter (kW/m2). The *maximum permissible exposure* (MPE) is the highest power or energy density of a light source that is considered safe, (i.e. that has a negligible probability for creating damage). As expressed in the **Traffic and Transportation** section, the MPE for momentary exposure (for a period of 0.25 second or less) is 2kW/m2, and MPE for continuous exposure (for a period greater than 0.25 second) is 1 kw/m2. The avian eye is known to see different spectrums than humans. Because avian thresholds to solar flux have not been well studied, staff will use human thresholds for discussion purposes.

The heliostat field will create zones with different levels of irradiance. Staff has no further data as to zones of irradiance within the solar field, the impacts these various zones might have, or if feasible mitigation exists. Staff will incorporate additional data as/if it becomes available via the Rio Mesa project proceeding. The Rio Mesa project uses the same type of solar generators as the HHSEGS project and staff will use this data to support the preparation of the FSA, if available. For the purposes of evaluating significance thresholds, staff believes irradiance has the potential to cause injury or lethality to birds that fly within an un-quantified area of the solar field. Injury or death

from exposure to irradiance would be in conflict with the MBTE, the Eagle Act, and the Bald and Golden Eagle Protection Act.

Staff recommends implementation of **BIO-15 (**Avian, Bat, and Golden Eagle Protection Plan). This condition would require the project owner to monitor, record, and report bird deaths and injuries from heat and bright light from concentrating sunlight. Monitoring project 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 understanding operational impacts to birds including documenting bird behavior, responses to stress, and identifying and implementing measures to avoid, minimize, or mitigate these impacts. Staff notes that while data collection is important, and could potentially inform new mitigation or adaptive management strategies, feasible mitigation for impacts to avian species from irradiance may not exist. Staff expects residual, unavoidable effects after implementation of mitigation.

### Solar Flux

Solar energy, or flux, will reflect from the tower to the heliostat field. The panels are designed with a slight internal tension, such that focusing of the reflected energy ensures more energy reaches the tower. Based on the applicant's filings for the Rio Mesa project by the time the solar energy is focused onto the tower the overall capture of energy is 500 $kW/m^2$ at the focal point. For reference, ambient incident radiation onto heliostats is $1kW/m^2$. This technology results in zones of increasing levels of solar flux, which will range from 1 to 500 $kW/m^2$ across the solar field which could impact birds and lead to mortalities.

Solar flux is also created when the heliostats are in standby mode. When in standby mode, heliostats are defocused into a ring, similar to a doughnut shape, with the collector tower in the center of the "doughnut", or solar flux ring. This area of defocused energy operates in the reverse manner as tower collection. Solar energy reflected from heliostats in the standby position defocus the energy in a direction slightly oriented toward the collection towers, yet still into the sky. The energy defocused in this manner will dissipate, creating decreasing zones of solar flux. Significant heat flux could be experienced at heights of 750-1,000 feet. Staff has requested the applicant model these zones for the Rio Mesa project, and if possible, will incorporate subsequent data responses within the Hidden Hills FSA.

Standby mode can be used at the same time as the plant is operating, therefore, the entire solar field can be thought of as a three-dimensional box. Within this box, at any particular place, is a solar flux field of an unknown intensity. Staff is concerned that birds flying through this solar flux field may be subject to injury or death. Staff presents available data of on solar flux within the solar field, the impacts these various zones might have, or if feasible mitigation exists. Data requests filed in the Rio Mesa proceeding request a three-dimensional models of a solar tower under full-load, partial-load, and full standby status. Staff requested that the models show the elevated temperature of the receiver tower and heliostat surfaces on surrounding air. Models of flux were requested to identify 1.) ambient solar energy; 2.) energy reflected and/or radiated from the heliostats to the receiver tower, the standby locations, and surrounding air; and 3.) energy reflected and/or radiated from the receiver tower.

Engineering staff also requested comprehensive models of various operational modes and seasons. Staff has asked that 2.5 kW/$m^2$, 10 kW/$m^2$, 25 kW/$m^2$, 50 kW/$m^2$, and 150 kW/$m^2$ density contours be depicted. The applicant was also asked to provide the modeled radiant heat flux data for vertical space, from the ground surface to the highest altitude where cumulative energy flux is 2.5 kW/$m^2$ or greater, and including the entire heliostat field. Staff will evaluate responses to these data requests, and coordinate with CDFG and USFWS to determine level of impacts and appropriate mitigation.

Exposure to solar flux has the potential to harm birds by damaging or blinding the bird's eyes; burning or singeing of feathers and skin; and in some circumstances can result in the death of the bird. The potential for injury depends on a variety of factors including the length of exposure and the level of flux to which a bird is exposed. The potential impacts to birds or other living organisms from exposure to solar energy flux or convective energy is not well understood. Human tolerance threshold information has come from a number of sources, however much of the current data has been obtained from accidents such as fire, studies on nuclear tests/warfare, and food safety data. Based on information gleaned from these sources the general consensus is the higher the flux, the shorter the duration of safe exposure.

Published data vary widely in the responses to solar flux, especially at low levels. Data indicates exposure for several seconds to a solar flux level of 7 kW/m2 causes no burns to human skin, (Phani 2008), yet a different study, "*Toxicity assessment of combustion products*" (accessed April 30, available at: http://go.totalsafety.nl/uploads/heat/fire-dynamics-exposure-to-heat.pdf)", reports flux of 2.5kW/m2 to be a safe human threshold. The same author reported various human responses from exposure to solar energy ranging from pain, to varying degrees of burn. At flux of 15kW/$m^2$, a full human skin burn (3$^{rd}$ degree burn) was reached in four seconds. For comparison, at 5 kW/$m^2$, it took over 15 seconds for a full burn to develop.

Data on organic material is further developed, and have used studies using wood to guide development of impact assessment. Unpiloted ignition, which is ignition in the absence of a spark or fire source, will occur at 50 kW/m2. This means that a piece of wood, subjected to solar flux of 50kW/m2 will catch fire, without a spark or light, nearly instantaneously. Staff observes that flux at that level or above would likely also kill a bird within seconds. Significant areas of the 3,277-acre project site would have flux at or exceeding 50kW/m2. Based on applicant's data, staff is able to preliminarily identify that solar flux will reach or exceed 100kw/$m^2$ for a minimum of 200 meters from each tower. Staff points out that in addition to flux around the tower, a zone of unknown size will be associated with flux from heliostats while in the standby mode.

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). Damage to feathers – burning or singeing – likely occur first, and depending on the depth of plumage absorbance, burns to the skin. It is unknown what protection plumage will afford the different species of birds that may move into solar fields and experience elevated flux levels. However, plumage damage may result in death that occurs later in time and space from when the damage occurred. Impairment of flight, impairment of ability to thermoregulate, and decreased ability to evade predators either with escape flight and/or movement would

potentially be lethal. Birds replace lost feathers slowly and even minimal damage to flight feathers can significantly affect flight performance. In a desert environment, plumage is particularly important for thermoregulation and camouflage from predators. Staff also observes that a large powerful bird, such as golden eagle, may experience damage to plumage, skin, or eyes from solar flux, yet still fly away from the site. Offsite incidences of mortality would not be feasible to document, nor are accurate predictions of what percentage of birds would be subject to this effect.

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 typically within 20 to 50 miles per hour (mph) (USGS 1998), but can vary dramatically on the upper end of the range. Using a conservative analysis, staff calculates a bird flying 20 mph (approximately 9 meters per second), would take approximately 22 seconds to fly through a 200 meter zone where flux would minimally be over 100 $kW/m^2$. While it is unknown what the behavioral response of the bird will be from exposure to this energy field, passage through an area of this energy intensity could result in injury to the birds. Heat from the field will be reflected on the ventral (underside) of the bird if the bird's flight is parallel to the earth. Although staff considers that most birds would attempt to move away from the source of heat; given the size of the potential special area of exposure, staff believes that even a large raptor, such as an eagle, could be subject to injury. However, flux is not visible unless fine particulates are present in the air column. It is possible that an animal in a zone of solar flux would not be able to see the flux zone, and therefore would also not be able to determine the shortest path to safety out of the solar flux zone. Staff considers the impacts from exposure to flux to be significant to all avian species in the project vicinity, including golden eagle and migrants and will present refined analysis in the FSA.

While additional information clarifying the extent of potential impact to birds from exposure to solar flux and glare will be provided in the FSA, staff has developed **BIO-15** (Avian, Bat, and Golden Eagle Protection Plan) as partial mitigation for impacts to special status birds and raptors. Conditions of certification recommended **TRANS-9** (Heliostat Operations Positioning and Monitoring Plan) would collect operational information, including instances of heliostat positioning anomalies, and potentially may reveal operational factors that could ameliorate or minimize these impacts. No other feasible mitigation is known or has been identified at this time.

### *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 alignment review by the applicant. 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. As such, proposed Condition of Certification **BIO-8** requires above-ground transmission lines and all electrical components to be designed, installed, and maintained in accordance with these guidelines to reduce the likelihood of large bird electrocutions and collisions. With the proposed mitigation addressed in proposed Condition of Certification **BIO-8**, the proposed transmission lines would not pose a significant electrocution threat to birds.

## 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), colonization or expansion 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.

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 3,277 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 areas used by big horn sheep. Bighorn sheep are known from the area 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, and desert kit fox the project will also pose a barrier but will not completely prevent passage.

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 to be adverse but not significant. The presence of large areas of open habitat and adjacent natural lands will not preclude movement in the area. While the project will impede the movement of desert tortoise it is not likely to pose a significant barrier for tortoise in the region. The proposed project's construction impacts to wildlife movement would be less than significant.

## Impacts to Special-status Plants

### Pahrump Valley Buckwheat, Nye Milk-Vetch and Other Special-Status Plants

Construction of the project would directly impact 10 special-status plant species. Eight of the 10 species have a highly restricted range in California. All 10 species have distribution outside California but two species are also rare outside California. In most cases, the population in the project vicinity represents the western limit of those species' ranges. The following special-status plant species occur within the project footprint and would be directly affected by the project:

- desert wing-fruit (*Selinocarpus nevadensis*)
- Goodding's phacelia (*Phacelia pulchella* var. *gooddingii*)
- gravel milk-vetch (*Astragalus sabulonum*)
- Nye milk-vetch (*Astragalus nyensis*)
- Pahrump Valley buckwheat (*Eriogonum bifurcatum*)
- pink funnel-lily (*Androstephium breviflorum*)
- Preuss' milk-vetch (*Astragalus preussii* var. *preusii*)
- purple-nerve springparsley (*Cymopterus multinervatus*)
- Wheeler's skeletonweed (*Chaetadelpha wheeleri*)

None of the affected species are state or federally listed Threatened, Endangered (or state-listed Rare) or candidate species. All 10 species are considered at-risk or vulnerable to regional (statewide) extinction by NatureServe; a consortium of natural heritage programs and conservation data centers throughout North America, and the International Union for the Conservation of Nature (IUCN).

Two species – Pahrump Valley buckwheat and Nye's milk-vetch – are also rare outside California and are ranked List 1B in the California Native Plant Society (CNPS) *Inventory of Rare and Endangered Plants of California*, meaning CNPS has determined they are "rare, threatened, or endangered in California and elsewhere". Pahrump Valley buckwheat is also a BLM Sensitive species (i.e., it is rare throughout its global range).

The remaining eight species found onsite are CNPS List 2 species, meaning CNPS has determined they are "rare, threatened, or endangered in California, but more common elsewhere" (CNPS 2001a). These are species that otherwise would have appeared on the CNPS List 1B except for being more common outside the boundaries of California. These eight species are: pink funnel-lily, gravel milk-vetch, Preuss' milk-vetch, Tidestrom's milk-vetch, Wheeler's skeletonweed, purple-nerve springparsley, Goodding's phacelia, and desert wing-fruit.

The status, range, local distribution, general and microhabitat preferences of the 10 directly affected species are discussed in the "Setting" subsection of this analysis and in the applicant's botanical survey reports (HHSEGS 2011a, Appendix 5-2G; CH2 2011h; CH2 2012c).

### *Direct Impacts to Special-status Plants*

Partial site grading and construction, trenching, road construction, and ongoing vehicle and equipment traffic, 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 subsection "Cumulative Impacts". Potential direct impacts to special-status plants on the proposed transmission line in Nevada are not included in this analysis.

Construction of the project would eliminate a substantial portion of the total documented occurrences in California of five special-status species: desert wing-fruit; gravel milk-vetch; Pahrump Valley buckwheat; Preuss' milk-vetch; and Wheeler's skeletonweed. **Biological Resources Table 15**, below, summarizes this impact based on occurrence data available at the time of this preliminary assessment. The applicant has already begun a second round of offsite surveys to determine whether the range or distribution in California of the species found onsite is greater than currently known; some species have only recently been added to the CNPS Inventory, and the area is generally under-surveyed. Offsite surveys conducted in spring 2011 yielded many new occurrences for most – but not all – of the 10 affected species in Pahrump Valley, Stewart Valley, Chicago Valley, and California Valley. The applicant also documented new occurrences east of the California-Nevada border that bisects Pahrump Valley, and in the Ash Meadows area.

More occurrences will likely be found for some of the affected species during the spring-summer 2012 offsite surveys; the results of the surveys are expected mid-June 2012. This preliminary analysis, however, is based on current information regarding the species' range and distribution in California. The results of the new surveys will be fully analyzed in FSA. New information gained from the spring 2012 surveys may affect preliminary significance determinations, including those currently determined significant and immitigable, and could result in changes to proposed conditions of certification. Compensatory mitigation, as described in conditions of certification **BIO-20**, would only be required for species would be significantly impacted (following evaluation of new survey data).

### *Proportion of State Distribution Affected*

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)

Occurrences derived from different sources were compared spatially in GIS to prevent duplications. In all cases, occurrences or collections that were greater than 20 years (referred to as "historic" occurrences in the CNPS Inventory) were not included because the data is unreliable for a variety of reasons (e.g., ambiguous location descriptions, occurrences subsequently eliminated by development, etc.).

All of the project survey data, to date, has been incorporated into the CNDDB. The number of occurrences described in this analysis and shown in the CNDDB reflects the CNDDB processing of the applicant's GPS data. This ensures that the applicant's survey results are compared to other California 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; population size data is incomplete for most species, and the populations of desert annuals fluctuate wildly in response to a variable and unpredictable climate.

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 (CDFG 2012).

Although the project survey data has been incorporated into the CNDDB, the CNDDB rank (also known as the NatureServe global and state rank) has not yet been updated to reflect the new found occurrences. The NatureServe rank is an index of extinction risk. The "S" rank describes the extinction risk of a species within California. The "G" rank reflects it entire global distribution. The numeric rank has several advantages including the use of several "Rarity Factors" as well as "Trend and Threat Factors", which are scored and weighted. The rank is based on the following factors: 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).

Plants with a NatureServe state rank of 1 ("S1") are "Critically imperiled in the state/province 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." (Master et al. 2009) NatureServe state rank 2 plants ("S2") are "Imperiled in the state/province 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".

**Biological Resources Table 15**, below, provides the current NatureServe global and state rank, and the CNPS List. Upon completion of the project special-status plant surveys, the NatureServe rank will be updated to reflect all new occurrences found during project surveys as well as new threats. **Biological Resources Table 15**, below, summarizes the direct impacts of the project on the California distribution of the 10 special-status plant species, based on occurrence data available at the time of this preliminary assessment. An eleventh species – Torrey's Mormon tea – is included in the table because it was detected in the one-mile radius study area surrounding the project during previous surveys. The applicant is re-surveying portions of the project site in spring 2012 to determine if this species may have been overlooked or misidentified.

## Biological Resources Table 15
## Special-status Plant Species in the Project Area and Offsite

| **Common name** (*Scientific name*) | **Status Codes[3] CNDDB Rank (Global/State)** **CNPS List** | **Total Known Occurrences in California (including project onsite & offsite occurrences[1])** (historic >20 ys not included)[2] | **Total Number of Occurrences on Project Site** | **Percent of Total Known Occurrences in California in project Footprint[1]** (historic >20 ys not included)[2] |
|---|---|---|---|---|
| **desert wing fruit** (*Selinocarpus nevadensis*) | G5 / **S1.3** CNPS List 2.3 | **7** (1) | **1** | **14.3%** |
| **Goodding's phacelia** (*Phacelia pulchella* var. *gooddingii*) | G4T2T3 /**S1.3?** CNPS List 2.3 | **16** (3) | **1** | **6.3%** |
| **gravel milk-vetch** (*Astragalus sabulonum*) | G5 /**S2** CNPS List 2.2 | **8** (11) | **4** | **50.0%** |
| **Nye milk-vetch** (*Astragalus nyensis*) | G3 /**S1** CNPS List 1B.1 | **19** (0) | **1** | **5.3%** |
| **Pahrump Valley buckwheat** (*Eriogoum bifurcatum*) | G2 / **S2** CNPS 1B.2 BLM CNPS List 1B.2 | **24** (2) | **3** | **12.5%** |
| **pink-flowered androstephium** (*Androstephium breviflorum*) | G5 /**S2S3** CNPS List 2.2 | **93+** (8) | **1** | **1.1%** |
| **Preuss' milk-vetch** (*Astragalus preussii*) | G4T4 /**S1.2** CNPS List 2.3 | **6** (2) | **2** | **33.3%** |
| **purple-nerve spring parsley** (*Cymopterus multinervatus*) | G5? /**S2** CNPS List 2.2 | **22** (9) | **1** | **4.5%** |
| **Tidestrom's milk-vetch** (*Astragalus tidestromii*) | G4G5 /**S1.2** CNPS List 2.2 | **43** (7) | **2** | **4.7%** |
| **Torrey's Mormon-tea** (*Ephedra torreyana*) | G5? / **S1** CNPS List 2.1 | **1 (?)** (0) | **0** | **0.0%** |
| **Wheeler's skeletonweed** (*Chaetadelpha wheeleri*) | G4 /**S1S2** CNPS List 2.2 | **20** (7) | **5** | **25.0%** |

[1] The total number of occurrences offsite are expected to increase following completion of the additional surveys planned for spring 2012. Consequently, the percentage of the total known occurrences located on the project site is expected to decrease for some species. The results of the 2012 surveys are expected in early June 2012 and will be reflected in the Final Staff Assessment.
[2] Herbarium collections >20 ys old and CNDDB occurrences not seen >20 ys not included in this analysis as they are unreliable; location descriptions are often ambiguous, misidentified, or the site incurred impacts that subsequently eliminated the occurrence.
[3] **Status Codes**

**CNDDB (NatureServe) Global Rank/State Rank**

**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.

**State Threat Rank Extension**

.1 = very threatened
.2 = threatened
.3 = no current threats known

**California Native Plant Society**

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.

## *CEQA Significance and CNPS Status*

CEQA Guidelines section 15065 lists certain conditions which are considered to be *mandatory* findings of significance. One such condition is if the project has the potential to substantially degrade the quality of the environment, and substantially reduce the number or restrict the range of an endangered, rare, or threatened species. The ten 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. Plants on the CNPS List 1A, 1B and 2 meet the definitions of Sections 2062 and 2067 (CESA) of the California Fish and Game Code for state listing (CNPS 2001; CDFG 2011). Furthermore, even if a species is not a California or federally listed species it still may be considered endangered, rare or threatened, if the species can be shown to meet the criteria in Section 15380 of the CEQA Guidelines. "CEQA Section 15380 provides that a plant or animal species may be treated as 'rare or endangered' even if not on one of the official lists if, for example, it is likely to become endangered in the foreseeable future." Plants appearing on CNPS List 1B or 2 are considered to meet CEQA's Section 15380 criteria, and effects to these species are generally considered "significant." As such, the Energy Commission and other state agencies such as the California Department of Fish and Game (CDFG), the California Department of Water Resources, and others have a history of requiring mitigation for impacts to CNPS List 2 and List 1B special-status plants.

Similarly, the Nevada Department of Conservation and Resources also recognizes species that are rare in Nevada but more common outside of Nevada in its *Animal and Plant At-Risk Tracking List* (NNHP 2010a). Like California, the Nevada Natural Heritage Program consults the NatureServe global and state ranks, and Northern Nevada Native

Plant Society. “Taxa considered at-risk and actively inventoried by NNHP typically include those with federal or other Nevada agency status, and those with Global and/or State ranks 1-3, indicating some level of imperilment.” Arizona follows a similar policy (ARPC 2001).

All of the CNPS List 1B and 2 plants in the project area are included in the CDFG Special Plants List (CDFG 2011) and are tracked by the CDFG’s Natural Diversity Database (CNDDB). The *CNPS Inventory* has been a broadly recognized and accepted source of science-based information on the rarity, endangerment, and distribution of California special-status plants since its first edition in 1974. The Energy Commission’s regulations reference CNPS Lists in the definition of “species of special concern” (California Code of Regulations, Title 20, section 1702 (q) and (v)). BLM also recognizes CNPS expertise through its policy of designating all CNPS List 1B plants as BLM Sensitive unless specifically excluded by the BLM State Director (BLM 2009b).

### *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 CNPS List 2 plants occurrences 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).

### *Pahrump Valley Local Population*

The Pahrump Valley-Stewart Valley area is a conservation priority area in Nevada (NNPH 2012b), recognized for a large suite of rare plants that includes Pahrump Valley buckwheat, which is also found on the project site.

Many of the special-status plant species onsite also have occurrences offsite elsewhere in Pahrump Valley, including the Nevada side of the valley, and in Stewart Valley, which is indistinct from Pahrump Valley in terms of habitat and topography. However, the Pahrump Valley and Stewart Valley “local population” is separated from other nearby populations in California and Nevada by topographic features, watershed boundaries, and habitat discontinuities. Thus the project site occurrences are a continuation of the rest of the Pahrump Valley population for those species distributed on both sides of the valley but the local populations of some species are somewhat isolated from other populations and from the core population (or metapopulation) by these topographic and/or habitat discontinuities. Fragmentation and other impacts to the portion of the

local population on the Nevada side of the valley could potentially have an influence on the viability of a species' distribution and range in California.

### *Indirect Impacts to Special-status Plants*

Potential indirect impacts to special-status plants located near 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. The project would fragment the local population of Pahrump Valley buckwheat, which is also a BLM and Nevada Sensitive species, and the local populations of all other special-status plant species that would be eliminated by construction and operation. 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.

The spread of invasive plants is a major threat to biological resources in the California desert because non-native plants can displace native plants, particularly rare species and less robust species, increase the threat of wildfire, and supplant wildlife foods that are important to herbivorous species.

Changes to drainage patterns downstream of the project area could indirectly impact special-status plant species located downstream through sedimentation or the introduction of invasive plants; washes are common vectors for some invasive species, facilitating their spread into adjacent habitats. 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. Even activities as seemingly harmless as dumping or spreading clippings from mowing could result in the inadvertent introduction and spread of invasive plants into rare plant populations.

Exotics out-compete native species 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). Without animal consumption, the weedy material dries and accumulates to form a continuous, flammable canopy thousands of acres large, particularly along roads (*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. Fires caused by converter equipped vehicles have occurred instantaneously once the vehicle has come to a stop on dry grass. The weeds that

typically recolonize disturbed soils along roads and transmission corridors also tend to increase the flammability of the roadside vegetation. Mowing, welding, and grinding, and the use of firearms are also potential sources for ignition of accidental fires. Bird collisions and electrocutions are a primary cause of transmission line-associated fires outside of forested areas (where downed trees are the primary cause of ignition).

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; and others). The proliferation of many non-native plants 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 ecosystem and most perennials are poorly adapted to even low-intensity fires. Nor are the special-status plants (and animals) that co-evolved likely to respond favorably to fire. Fires that were once infrequent and burned only small patches due to lack of fuel are now frequent and catastrophic (Pavlik 2008). 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.*).

### *Conclusions and Discussion of Special-status Plant Mitigation*

Pending the results of the spring 2012 surveys, expected mid-June 2012, the direct impacts to desert wing-fruit; gravel milk-vetch; Pahrump Valley buckwheat; Preuss' milk-vetch; and Wheeler's skeletonweed to be significant and potentially immitigable because the project would eliminate a substantial portion of their range in California, and there may not be sufficient opportunities for offsite mitigation. Following completion of the applicant's 2012 offsite surveys, special status plant impacts and mitigation will be re-evaluated. Staff requested the applicant provide information gained from the offsite surveys in the survey report that would facilitate staff's analysis of the significance of impacts and opportunities for compensatory mitigation. This may include:

- Number of additional offsite occurrences detected;
- Ecological health 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, reproduction biology and dispersal mechanisms;
- Site quality and vigor of the offsite occurrences;
- Any indicators that an occurrence may have characteristics that would assign it local or regional significance;
- Ownership and management threats and opportunities; and
- The average size of an occurrence in the project vicinity, in acres, by species (for the purposes of establishing acquisition costs and security).

Therefore, preliminary determinations are based solely on the following factors:

- Proportion of occurrences that would be directly affected by the project relative to the documented range and distribution of these species in California (based on current information);
- 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; and
- Potential cumulative threats to remaining occurrences.

Staff considered the following mitigation for significant direct, indirect, and cumulative impacts to special-status plants:

- Avoiding the impact altogether;
- Minimizing the impact through partial avoidance;
- Compensating the loss by preserving at-risk populations offsite, and
- Compensating or minimizing impacts by restoring degraded habitats.

The spring 2012 special-status plant surveys may detect offsite occurrences that would minimize the significance of the project's impacts to special-status plants by reducing their extinction risk in California; this risk is based largely on the proportion of the total statewide occurrences affected and threats to remaining occurrences (Master's et al. 2009; CNPS 2012; CNDDB 2012). If the new surveys fail to detect enough occurrences to adequately minimize the extinction risk for a species' range in California, staff will explore the potential for modifications of the project design or construction methods as well as opportunities for offsite mitigation. Mitigation would only be required for species that staff determines, after analysis of the new survey data, would be significantly impacted.

Staff considered the possibility that because of the position of the project on the California-Nevada border and the presence of a different habitat type just off the eastern boundary, avoidance along a strip on the eastern side of the project (where most occurrences are located) 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) and the direction of the prevailing winds from California into Nevada

(northwest to southeast), any avoided occurrences along the eastern edge may have limited connectivity, and dispersal pathways into California may be affected over the long term. Staff considered the possibility that mitigation that protects occurrences better situated in California may be preferable to avoiding a strip along the eastern boundary with Nevada that may or may not be sustainable.

Preservation of offsite occurrences, conversely, could minimize the impact to less-than-significant, providing: there are adequate opportunities for offsite mitigation; a mitigation ratio is established to adequately offset the net loss; and the acquired lands are enhanced and restored as needed to ensure the long-term viability of the occurrence. Compensatory mitigation through acquisition would require the project owner to pay stewardship fees for 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, decommissioning ORV trails, protection from herbivores, managing public access, enforcement); and monitoring the implementation, effectiveness and compliance with the conservation goals and objectives of the mitigation.

Condition of Certification **BIO-20** (Special-status Plant Compensatory Mitigation) provides preliminary guidelines and performance standards for offsite mitigation if staff determines, pending the results of the 2012 surveys, it is a viable option for protecting and/or enhancing the California range of the affected species.

In Condition of Certification **BIO-20**, the compensation ratios for significant impacts are based on a species rarity and extinction risk in California, as expressed in the NatureServe state rank. The Nature Serve ranks will be updated, following submission of the new survey data, to reflect the new occurrences found by the applicant during two years of surveys. The mitigation ratio of 3:1 for S1-ranked plants is required to offset the net loss of plants and habitat of species' that are very rare in California and the project would eliminate a substantial portion of their range in California. Two species are also globally rare. The 3:1 ratio would also minimize future fragmentation of remaining populations by placing them under a permanent conservation easement. A 2:1 mitigation ratio is required for S2-ranked plants. Impacts may not be required for some S3-ranked plants, based on the factors described above for assessing impacts and other factors, such as cumulative threats. Compensation would only be required for impacts that are determined to be significant in the FSA.

The most common metric for assessing a species extinction risk or vulnerability is the proportion or number of the total documented occurrences impacted, rather than the area affected or size of the population; the latter of which is highly variable in the desert due to a variable and unpredictable climate. Thus, the amount of the security deposit, which is required prior to initiating ground-disturbing project activities as a financial assurance that an adequate level of funding is available to implement the required mitigation, will be established by converting numbers of occurrences affected to an acreage figure. The conversion would be based on the average size of an occurrence for each species in the project vicinity, informed by the applicant's abundance of data on special-status plants in the project vicinity; the result of over two years of onsite and offsite botanical surveys by the applicant. Condition of Certification **BIO-20** (Special-status Plant Compensatory Mitigation) would be revised in the FSA to specify the dollar

amount of the required security, but would include a provision for adjusting that security amount when parcel-specific information is available.

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. Similarly, desert tortoise or desert wash mitigation lands, or other mitigation lands, could be used to fulfill the requirements for special-status plant mitigation but only if they meet all of the selection criteria, standards and guidelines contained in Condition of Certification **BIO-20** (Special-status Plant Compensatory Mitigation).

If onsite avoidance is infeasible or would fail to protect the species' range in California, and if there are few to no opportunities for offsite mitigation, staff may ultimately conclude the impacts are significant and immitigable for the species at highest risk. However, this will be addressed further in the FSA.

This analysis also acknowledges the potential for accidental impacts during construction and various indirect impacts to special-status plant occurrences in close proximity to project during operation. These include: 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; and sedimentation of washes offsite from erosion of channels onsite and upstream, and other impacts discussed earlier. Although the project's indirect 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). Condition of Certification **BIO-19** (Special-status Plant Avoidance & Minimization Measures) includes measures for preventing or minimizing the project's contribution to these cumulatively considerable indirect effects. Measures in **BIO-19** are only required to protect occurrences that are offsite and in close proximity to project construction, operation, and closure activities; no monitoring or management of offsite occurrences is proposed because adjacent lands are not owned or accessible to project employees and contractors. A new condition of certification, **BIO-21** (Designated Botanist) would ensure the full and timely implementation of all measures for protecting special-status plants.

Measures for avoiding and minimizing indirect impacts to offsite occurrences from the spread of invasive weeds are contained in **BIO-18** (Weed Management Plan). Condition of Certification **BIO-19** (Special-status Plant Avoidance & Minimization Measures) contains measures for preventing accidental impacts to special-status plants adjacent to the project during construction, operation, and closure. The project owner is not responsible for managing or monitoring special-status plant occurrences offsite (on other private lands or BLM lands). Occurrences of special-status plants onsite shall be mitigated by the offsite compensatory mitigation measures described in **BIO-20**; the avoidance or minimization measures described in **BIO-19** are not required for onsite occurrences.

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). **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; washes not only facilitate the dispersal of special-status plants but they can also be vectors for the spread of invasive weeds.

Conditions of certification **BIO-8**, **BIO-6** (Worker Environmental Awareness Program), and **BIO-18** (Weed Management Plan) contain fire prevention measures. Mitigation compliance will be ensured through conditions of certification **BIO-21** (Designated Botanist), **BIO-7** (Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP); and **BIO-6**.

## 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 Table 5** and **Figure 23**). 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 4 miles of the project wells (CH2 2011g, Figure DR48-1).

**Water Resources** staff's analysis of the applicant's recent pump test data concludes that where groundwater-dependent ecosystems (GDEs) occur in close proximity to the project wells, along the eastern boundary, groundwater elevations, under a worst-case scenario, may drop as much as 20 to 30 feet below current levels within 30 years at the project boundary (see section "**Water Supply**" of this PSA). At Stump Spring, water levels could drop as much as 2 to 7 feet below current levels within 30 years. These estimates of drawdown do not include the combined or cumulative effect of the project and other foreseeable future projects in the vicinity, including another BrightSource Energy project (Sandy Valley) that would pump 170 acre feet per year.

Staff is concerned about the close proximity of the project wells to active seasonal springs and sensitive groundwater-dependent ecosystems that may be supported all or in part by the same basin-fill aquifer, or shallow aquifer, from which the project will pump to meet its water needs, projected at 200 acre feet per year during construction and 140 acre feet per year during operation.

Many comments were received expressing similar concerns about the impacts of groundwater pumping on dependent habitats and wildlife. These include comments from: the California State Director and Nevada State Director of BLM (BLM 2012a; CEC 2011v); Amargosa Conservancy (ARM 2011a); Inyo County (INYO 2012a); The Nature Conservancy (CEC 2012g); Center for Biological Diversity (in public workshops); and the Nevada Department of Wildlife (NDW 2011a) identified a number of species that might be affected by the groundwater drawdown. The record of conversation with The Nature Conservancy (CEC 2012g) contains links to presentations made by BLM California Desert District and USGS that also 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). Comments from BLM (BLM 2012a) and Inyo County (INYO 2012a) contain detailed recommendations for mitigation in the form of long-term monitoring and remedial action if impacts are detected.

Differences between the applicant's and staff's assessments center on: 1) the ability of the groundwater-dependent mesquite habitats to withstand a sustained, project-related decline in the water table; 2) the reliability of limited well data and aquifer properties to accurately predict the lateral or vertical extent of the project's effects; 3) the applicant's assertion that the fault zone represents a complete barrier to groundwater flow (versus a partial barrier), or that its highly unlikely that project pumping would affect resources on the other side of the fault, and 4) whether information currently available is adequate to conclude there is no communication between the shallow and deeper confined aquifer and 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 PSA.

### *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) 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.

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 (Comarin 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. Stump Spring supports three seasonal pools that provide valuable open water habitat over a period that recently extended from approximately December to July (Poff pers. comm. 2012). BLM recently discivered that three additional unnamed springs 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. While staff cannot be certain they are supported by the same aquifer from which the project will pump groundwater, the fact that the decline of the basin's springs during the last century corresponded with the increase in pumping is concerning.

### *Significance of the Resources At-risk*

Mesquite woodlands 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 mandated in the MSCHP.

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, which includes the groundwater-dependent resources adjacent to 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 are also a proposed conservation priority in the Southern Nye County MSHCP (USFWS undated).

In a landscape dominated by desert scrub, these patches of woodland 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. Desert woodlands comprise a small percentage of the total vegetation, but 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 PSA, and summarized in **Biological Resources Table 5**; Crampton et al. 2006, and 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.

### *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." They also note 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." Staff concurs; the compound or cumulative effect of the project pumping and periodic drought, if or when it occurs during operation and closure, is likely to be significant. This is particularly worrisome given the overdraft condition of the valley basin and adverse effects already apparent on 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. 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 a recent site visit.

The applicant also cites a case study from literature of a mesquite that rooted to a depth of 190 feet, implying that the mesquite roots would chase the decline of the water table. There are many environmental factors affecting root growth: 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; in general, it becomes increasingly difficult for mesquite to survive once the water table falls below 15 meters (Crampton et al. 2006; Stromberg et al. 1992; and others). 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 50m (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).

The maximum tolerable water table decline is difficult to predict and variable depending on many environmental factors; however, neither staff nor applicant need conjecture because the warning signs of impending changes in ecosystem processes are already apparent in the stands most affected by the basin overdraft (i.e., stands closest to Pahrump). 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 have already declined to levels low enough to cause die-back, it is clear that the stands are at or near the limits of their tolerance.

One documented response of mesquite to drought is to become more sprawling and shorter until, in the most extreme cases, they become very low shrubs (Keeler-Wolf, pers. comm. 2010, Martinez & Lopez-Portillo 2003), a condition seen in the applicant's photos, observed by staff during site visits, and documented in the BLM Conservation Management Strategy for mesquite-acacia woodlands (Crampton et al 2006). Based on the overall low stature of many stands, the remains of dead cottonwoods and willows, (*ibid.*), and well records, the evidence is strong that additional declines have the potential for significant adverse effects.

Similar effects are seen throughout the species range in California and Nevada. Keeler-Wolf (pers. comm. 2010) 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." Groundwater pumping is a serious threat in many locations and has led to the decline of numerous stands (Sawyer et al. 2009).

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 [Stateline 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 the fault in the basement rock, in the project area, juxtaposes carbonate 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. 2012).

### *Ecological Consequences*

When groundwater is maintained within the root zone, management decisions can be made to either increase or decrease vegetation cover through modification of groundwater depth. 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). Long-term study in the Owens Valley suggests that a change in water table elevation of as little as 0.3 ft. could affect a major change in plant life form and species

composition, if, in fact, the plants survive (Manning 2009). Stromberg et al (1996) noted species changes, including species die-off, at this range of change in water table. Other organisms dependent on 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, and dependent wildlife. Impacts observed in the northernmost stands already affected by background groundwater decline include a reduction in mesquite cover combined with an increase in cover by weedy annual grasses, and a loss of cover, food sources, and other habitat values for mesquite-dependent wildlife. Loss of the mesquite associated with the coppice dunes would leave dunes vulnerable to deflation. 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. For example, ladderback woodpeckers, Lucy's warblers and ash-throated flycatchers can only nest in tree trunks sufficiently large to hold nest cavities, and many other breeding bird species prefer woodlands with older, taller trees (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 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 cumulative effects, is another serious concern. 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 basins 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).

A detailed discussion of cumulative impacts is provided later in this section of the PSA.

### *Discussion of Impacts and Mitigation*

Project-related groundwater pumping may impact sensitive and biologically significant groundwater-dependent ecosystems within the cone of depression identified by staff in their analysis of recent pump test data (see **Water Supply Table 5** and **Figure 23**), including mesquite woodlands, mesquite dune scrubs, and nearby seasonal springs. The exceptional ecological values of Stump Spring, and the habitat values of other nearby desert springs and mesquite habitats, are discussed under the subsection "Setting: Groundwater-Dependent Ecosystems" of this analysis.

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.

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 the Stateline 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 (30yr), 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 if pumping caused a decline in the flow of springs or a significant decline in the health or habitat values of the mesquite woodlands and dune scrub, the impacts would be significant and immitigable.

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 elevation monitoring plan proposed by **Water Resources** staff in **WATER SUPPLY-6.** Water table monitoring combined with monitoring for indicators of plant vigor and recruitment to provide early warning signs of impending changes and ensure that remedial action is

taken well before effects result in plant mortality or significant impairment of the habitat function and values.

Staff consulted 11 recognized experts in: vegetation ecology, environmental statistics and the development of long-term vegetation monitoring plans, impacts of groundwater pumping on dependent ecosystems, and hydrogeologists in the development of a similar condition for another solar power project that was licensed in 2010. Staff revised and improved the condition and consulted a peer review by several additional agency biologists and hydrologists; a complete list is provided under "Personal Communitications" following the list of references at the end of this PSA section.

To ensure that the selection of adaptive measures was not deferred until a later time, Condition of Certification **BIO-24** outlines the remedial action that would be taken once a project-related adverse effect is detected. If thresholds are exceeded, the project owner would be required to: 1) stop pumping, modify or significantly reduce pumping to a level necessary to restore the groundwater elevation to pre-threshold levels. In the event that groundwater levels continue to decline for a period, before they begin to recover, **BIO-24** also requires compensatory mitigation for the temporal loss of habitat function and value, by acquiring and retiring adjudicated water rights in the Pahrump basin (Nevada side), as required by proposed Condition of Certification **WATER SUPPLY-2.**

### *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 woodlands 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 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. 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;

6. 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 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**

The Amargosa River is wholly supported by groundwater, and a federally-designated Wild and Scenic River and the Amargosa River ACEC were designated to protect their “outstanding resource values”. A total of 35 state and/or federal listed or candidate groundwater-dependent plants and animals are sustained by the deeper, more laterally extensive regional groundwater system. Some aquatic species may be highly sensitive to even minor changes in the groundwater (Deacon 2007). The importance of

maintaining current groundwater levels is identified in the management plans of these special management areas and the Mesquite-Acacia Conservation management Strategy of the Clark County Multiple Species Habitat Conservation Plan (Crampton et al. 2006).

The potential for project pumping to affect the Amargosa Wild and Scenic River is unclear and could take 100 years or longer to propagate such distances (see the "**Water Supply**" section of this PSA). **Water Resources** staff's groundwater assessment includes an analysis of potential impacts to the Amargosa River. **Water Resources** staff conclude the project is not expected to have a measurable impact to the Amargosa River or its tributaries. However, Condition of Certification **WATER SUPPLY-2** requires the project owner provide a water use offset within the Pahrump Valley groundwater basin that is equal to project pumping by acquiring and retiring of water rights. Assuming that the Amargosa River eventually receives water that was once beneath the Pahrump Valley, **Water Resources** staff concludes this mitigation would address out-of-basin concerns.

### 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 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; impacts to the coppice dunes and other groundwater-dependent ecosystems are described in the previous subsection of this PSA section.

## Construction Impacts to Desert Washes

### Ephemeral Streams

A total of 28.33 acres of jurisdictional Waters of the State, including single-thread and braided ephemeral streams, were delineated on the proposed project site. Of these

28.33 acres, 0.4 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.

### *Impacts to Ephemeral Streams*

The applicant proposes that impacts to project waters are less than significant. Staff considers this to be an underestimate of the project impacts that are likely to occur to drainages during construction and operation, and the value of the washes to area wildlife. Staff commends the applicant for maintaining some degree of the surface drainage patterns, rather than diverting all streams around the project site. However, the combination of partial site grading, road construction and maintenance, perimeter exclusion fencing, dust and weed control, vegetation mowing, mirror-washing, erosion/sedimentation following storm events, glare and lighting, and the increase in human disturbance will eliminate nearly all of the habitat functions and values of the ephemeral streams within the project boundaries.

These drainages support native plant communities that are relatively undisturbed in the upper reaches, and in some areas is distinct from the adjacent upland habitat (CH2 2012k). The drainages also provide wildlife movement corridors for some species. 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). Desert washes are also important dispersal pathways for many special-status plants in the California desert (O'Leary, pers. comm. 2012).

Impacts to the washes onsite may also impact rare desert wash communities, if present. Staff has requested clarification from the applicant on desert wash vegetation in the project area to determine if the rare plant community – creosote bush-galleta grass association – occurs on the project site, as inferred from two recent data responses.

### *Conclusions and Discussion of Mitigation*

Potential impacts to the project area drainages are significant because the project would eliminate the beneficial functions and values that these state waters provide to wildlife. The applicant proposes to minimize obstructions of the natural surface drainage patterns but the biological functions and values of the streams would be lost due to

perimeter exclusion fencing, partial grading, road construction and maintenance, vegetation maintenance, spraying, noise, glare, and human disturbance.

Pending field verification of the state waters delineation by CDFG, Condition of Certification **BIO-22** requires the project owner acquire, preserve, and enhance property that compensates at a 2:1 mitigation ratio for the 28.33 acres of state waters that would be directly and indirectly impacted onsite (56.66 acres total). The 2:1 ratio is necessary to compensate for the net loss of desert washes; the importance of the washes as a dispersal agent for special-status plants; the loss of habitat along the washes that is distinct from the adjacent uplands in cover density and, in some cases, in species composition; and the proximity of the washes to rare and sensitive mesquite dune scrub and area springs, which increases their value to area wildlife. A 0.5:1 mitigation ratio is proposed for indirect impacts to the 4.51 acres of streams that extend upstream of the project and in close proximity to the project boundary. Construction of the pipeline along the eastern boundary would require trenching through many of these washes. Significant indirect impacts to adjacent streams during operation are expected from human disturbance, glare, lighting, and potential head-cutting or erosion above the gas pipeline trench that cuts through the washes at the eastern boundary. These indirect effects, although individually minor, are cumulatively considerable. 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 for state waters compensation described in **BIO-22**. With implementation of this proposed condition of certification, direct impacts to the project's state waters would be reduced to less-than-significant levels, and the project's contribution to significant cumulative effects would be rendered less than cumulatively considerable. **BIO-22** may need to be updated based upon the results of CDFG's verification of the applicant's waters delineation.

Based on the applicant's April 23, 2012 Data Response 2D-3 (CH2 2012k) it is unclear whether there is wash vegetation that may also be considered a rare natural community. If the rare creosote-galleta grass wash habitat is present, the impact will be quantified, assessed, and added to the mitigation currently proposed in **BIO-22** at a mitigation ratio of 2:1. This mitigation ratio is necessary to offset the net loss of a rare natural community, and minimize the project's contribution to a cumulative considerable impact from fragmention of the desert wash habitat adjacent to another rare plant community (mesquite coppice dunes and seasonal springs). Creosote bush-galleta grass associations have a NatureServe rank of G3S3, meaning they are vulnerable in California, and elsewhere, due to a restricted range, relatively few populations, recent and widespread declines, or other factors making it vulnerable to extinction in California. This same community has also been affected by renewable energy development in the eastern Riverside County area. Galleta grass is a culturally significant plant (UMICH 2012).

## Introduction and Spread of Noxious Weeds and Other Invasive Plants

### Noxious Weeds and Other Invasive Plants in the Project Area

Eleven species of invasive weeds were documented in the project area. 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.

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*

Invasive species rank second only to habitat destruction in causing species endangerment across the United States. 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.

The spread of invasive plants is a major threat to biological resources in the Mojave Desert. Many invasive species form monocultures (dense stands of one species) that push out native species and reduce food and shelter needed by native wildlife, including endangered species. Presence of invasive species contributes to habitat quality and ecosystem health decline. They increase fire frequency and intensity, and decrease water availability for both plants and wildlife. They 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).

Mediterranean annual grasses and other annual weeds dominate large areas of the desert but contribute little or nothing to the food web (Pavlik 2008). 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.

The proliferation of non-native annual grasses 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. The potential spread or proliferation of non-native annual grasses, combined with the proximity to ignition sources could increase the risk of fire, and the effects to these poor-adapted desert communities and special-status wildlife, including desert tortoise would be severe.

Wildfires (caused by construction or downed transmission lines) are rare but the increase in daily vehicle use in the area from new jobs during operation and construction could significantly increase the risk of ignition along road edges, and the fires carried by the cover of dried annual grasses introduced or spread by project activities. Sparks generated by mowers and other equipment are also common ignition sources.

### *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 is a significant impacts and requires mitigation.

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). To minimize the indirect effects of weeds on sensitive biological resources adjacent to the project, Condition of Certification **BIO-18** requires the project owner to manage weeds onsite for the life of the project to prevent their spread into adjacent offsite habitat. **BIO-18** also includes measures for minimizing the accidental introduction or spread of weeds from contaminated vehicles and equipment entering and exiting 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.

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 traffic.

Additional measures were added to existing condition of certification, and new conditions required that would render the project's contribution to significant cumulative effects to a level less than cumulatively considerable, as discussed under "Cumulative

Impacts", below. These include a requirement to pay an annual fee to the local agricultural commissioner for increased monitoring and abatement costs, as described in the Commissioner's scoping comments, and in an amount determined by the Commissioner (Inyo County 2012b).

## 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 2011). 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 2011).

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 2011).

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 projects 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 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 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.

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 6,480 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 above projects 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-24** requires remedial action if monitoring detects impending ecosystem changes. **BIO-12** directs the acquisition of 6,480 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

6,480 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 washe 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: **BIO-23** (Groundwater-dependent Vegetation Monitoring), **WATER SUPPLY-6** (groundwater elevation monitoring), **BIO-24** (Remedial Action for Adverse Effects to Groundwater-dependent Biological Resources), which ensure 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 this preliminary analysis of cumulative effects to special-status plants encompasses Pahrump Valley and adjacent valleys within the Amargosa Desert region in California. The qualitative assessment was based on a review of the project's offsite survey data, databases, literature, and consultation with regional experts. Because the Pahrump Valley "local population" extends into the state of Nevada, staff also considered the potential for cumulative impacts from the Nevada side of the valley. Impacts to the Nevada portion of the 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 (Roosa et al. 2010, Lennartsson 2002), and reproduction depends on proximity to neighboring populations, the dispersal distance of pollen, and the breeding system.

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. Nearly all of the past and present development has occurred on the Nevada side of the local population in northern Pahrump Valley and environs.

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, 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 macro-habitats (e.g., Mojave Desert scrub), BLM lands outside ACECs have a multiple use management designation the agency cannot protect, in perpetuity, from renewable energy development or other authorized mixed uses.

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 or to minimize the cumulative loss of habitat; plants are sessile organisms with very specific microhabitat requirements that are not well understood and the failure to find special-status plants in abundance throughout the Mojave Desert scrub after two years of 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. Rare plants can also sometimes be locally abundant, but highly restricted in their range. Pahrump Valley buckwheat is an example of a species that can be locally abundant but has a highly restricted range.

Staff considered the mitigated effect of the project after implementation of **BIO-18** (Weed Management Plan), **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. Avoidance and minimization measures included in conditions of certification **BIO-18** and **BIO-19** will minimize the project's effects but without monitoring and adaptive management of indirect impacts to offsite occurrences, the residual effects individually minor but cumulatively considerable, when viewed in connection with the similar effects of past, present, and foreseeable future projects in the Pahrump Valley environs. The most significant of these cumulative effects 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.

These residual effects would be addressed with the addition of the following fire prevention measures:

- **BIO-6** (Worker Environmental Awareness Program), measure #4;

- **BIO-**18 (Weed Management Plan), measure #5,which prohibits the use of mowers and other mechanical methods of weed control during periods of high fire risk, requires mowing during the early morning (low risk) hours, prohibits disking, which increases weeds (and flammability of vegetation), and requires basic fire prevention measures during mowing (contact information for fire personnel, a live water supply, shovels and extinguishers);

- **BIO-8** (Avoidance and Minimization Measures), measure #3 for prohibiting off-road traffic, measure #5 for reducing the risk of bird collisions and electrocutions, which

are a cause of transmission line-associated fires, measure #15 for prohibiting firearms, and measure #18 for controlling unauthorized use of the project access roads.

Because the project cannot monitor or manage offsite weed occurrences along roads used by project employees and contractors, or offsite weed occurrences spread or introduced by the project, **BIO-18** requires compensation to the Inyo and Mono counties Agricultural Commissioner for increased weed monitoring and abatement costs in the project vicinity. The amount of the annual contribution shall be established by that agency and incorporated into the condition of certification in the FSA.

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 maintaining existing surface drainage patterns downstream.

The mitigation ratios in **BIO-20** (special-status plant compensatory mitigation) are designed to offset the net loss of plants or habitat, and prevent the future fragmentation of remaining occurrences by acquiring them at a 3:1 or 2:1 ratio (depending on the plant status or rank) and protecting them in perpetuity under a permanent conservation easement.

Conditions of certification **BIO-7** (BRMIMP) and a new condition, **BIO-21** (Designated Botanist), will ensure the full and timely implementation of the measures described above.

## Cumulative Impacts – Introduction and Spread of Invasive weeds

In scoping comments on the project from the Inyo County-Mono County Agricultural Commissioner (Inyo County 2012b), the Commissioner registered the agency's concern about the potential for the spread of highly invasive weeds from the Las Vegas area into the project area. The comment letter cited the applicant's documents indicating most equipment and employee vehicular traffic will commute from southern Nevada and the Las Vegas region. Vehicles and equipment commuting between Pahrump and the project site are also likely to introduce new invasive agricultural and wildland pests from Pahrump into the project area, or spread existing weed species along area roads and utility corridors. The Commissioner noted that any movement of equipment, vehicles, and construction material can introduce invasive weed species via plant matter or seed attached to these items, e.g., on tires or the undercarriage of vehicles). The Commissioner also underscored the vulnerability of construction-disturbed soils to weed invasion.

Nearly all of the past and present urban and agricultural development has occurred in northern Pahrump Valley; however, past grazing has occurred throughout the region. 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. Weeds are also spread on contaminated feed, straw, seed mixes, and on contaminated vehicle and equipment tires.

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 19$^{th}$ and early 20$^{th}$ century fostered invasions for many weedy species, such as cheat grass and Russian thistle (Brooks & Pyke 2002);
- Residential development in Pahrump and Charleston View promote higher levels of off-road vehicle use, which introduces weeds in otherwise remote areas and increases the frequency of fire, which promotes further weed invasion and increases flammability, and general increase in vehicle traffic, which facilitates the spread of weeds;
- Construction and maintenance of 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, 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 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 associated with urban expansion and other renewable energy development; transmission and other corridors are major vectors.

The past, present, and foreseeable future projects would combine with the project's contribution to the spread of weeds—not just within the project boundaries but regionally through the increase in vehicle traffic between infested and uninfested areas during construction and operation—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), **BIO-19** (Special-status Plant Impact Avoidance & Minimization Measures), and **BIO-20** (Special-status Plant Compensatory Mitigation). Because monitoring or management of adjacent offsite special-status plant occurrences cannot be required beyond the project boundary, the project cannot control the introduction of invasive weeds from contaminated vehicles commuting from Pahrump or Las Vegas to the project vicinity, beyond implementation of a washing station to prevent introductions onsite. Staff shares the Agricultural Commissioner's concerns about the potential for introduction of new weeds into the area from communities in southern Nevada, and the inevitable increase in monitoring and control from projects of this size and threat. Avoidance and minimization measures included in conditions of certification **BIO-19** and **BIO-19** will minimize the project's direct effects but without monitoring and adaptive management of offsite occurrences of special-status plant and weeds, staff considers the residual effects individually minor but cumulatively considerable.

These residual 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**, additional measures in **BIO-22** for minimizing the effects of erosion and sedimentation downstream or offsite, mitigation ratios in **BIO-20** (special-status plant compensatory mitigation), and a requirement in **BIO-18** for funding the increased weed monitoring and abatement costs through the Inyo and Mono counties Agricultural Commissioner's office, which is responsible for weed monitoring and management county-wide. The amount of the annual contribution shall be established by that agency and incorporated into the condition of certification in the FSA.

Conditions of certification **BIO-7** (BRMIMP) and a new condition, **BIO-21** (Designated Botanist), will ensure the full and timely implementation of the measures described above.

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 Pahrump Valley metapatch, as defined in the Mesquite-Acacia Conservation Management Strategy (CMS) (Crampton et al. 2006) of the Clark County Multiple Species Habitat Conservation Plan (MSHCP), is approximately 9,047 acres; the portion of the total metapatch potentially affected by the project totals approximately 4,040 acres, based on the applicant's mapping of mesquite near the project site. 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". Mesquite coppice dunes also occur at Sandy Valley but Sandy Valley is also threatened by potential future renewable energy projects, including a 170 acre feet per year (afy) project proposed by BrightSource Energy.

This analysis evaluates the impacts of the project combined with the current baseline of past effects, present (existing) projects, and reasonably foreseeable or probable future projects in the Pahrump Valley groundwater basin. **Cumulative Scenario Figure 1** and **Cumulative Scenario Table 1** and **Table 2**, contained in the section "Cumulative Scenario" of this PSA, provide a summary and graphic representation of the present projects and probable future renewable energy projects throughout a region that extends beyond Pahrump Valley. Past effects are discussed briefly below and in the regional overview, above.

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

The determination considered the following facts and concerns:

- Mesquite habitats occupy less than 1 percent of the land area in Clark County, 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);
- The Pahrump Valley mesquite metapatch represents a significant portion of the total distribution of mesquite in southern Nevada. The combined effects of the project and nearby groundwater users would be substantial;
- The Pahrump Valley Metapatch is a conservation priority in the Clark County MSHCP Mesquite-Acacia Conservation Management Strategy (CMS) (Crampton et al. 2006), a proposed conservation priority in the southern Nye County MSHCP (USFWS 2011) (in development), and a rare natural community in California (Sawyer et al. 2009);
- Mesquite woodlands are recognized for their exceptional value to wildlife (Crampton et al. 2006, and others); threats to mesquite woodlands in the region "...may all lead to the listing of species under the Endangered Species Act (ESA) as present or threatened destruction, modification or curtailment of species' habitat or range is one of five listing factors. Also, habitat fragmentation and degradation may lead indirectly to increases in predation or disease, another reason for listing species." (*ibid.*);
- 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 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;
- The expressed concerns of BLM and many others about the potential for significant cumulative impacts to groundwater-dependent species, and conflicts with the conservation priorities and management plans for groundwater-dependent resources;
- The total dependence of Pahrump and environs on groundwater (approximately 10,000wells presently) and the unlikelihood that the city will receive piped water from other areas in the near future (Peterson pers. comm. 2012); and
- The potential for climate change to exacerbate already declining water levels and increase the demand for groundwater.

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.

Cumulative impact assessments cannot conclude that contributions to cumulative impacts are not significant because the project's contribution represents a small percentage of the overall problem. Doing so could improperly omit facts relevant to an analysis of the collective effect that the proposed project and other related projects would have upon these important 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 are cumulatively considerable.

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 three peer-reviewed conditions of certification that would ensure the project's effects are rendered less than cumulatively considerable: **BIO-23** (Groundwater-dependent Vegetation Monitoring), **WATER SUPPLY-6** (groundwater elevation monitoring), and **BIO-24** (Remedial Action), and **WATER SUPPLY-2** (compensation for the project's contribution to the basin overdraft).

Under **BIO-24**, if thresholds are exceeded, the project owner would be required to: 1) stop pumping, modify or significantly reduce pumping to a level necessary to restore the groundwater elevation to pre-threshold levels. In the event that groundwater levels continue to decline for a period, before they begin to recover, **BIO-24** also requires compensatory mitigation for the temporal loss of habitat function and value, by acquiring and retiring adjudicated water rights in the Pahrump basin (Nevada side), as required by proposed Condition of Certification **WATER SUPPLY-2.**

A full range of mitigation options was considered; these are discussed in detail under "Impacts to Groundwater-dependent Ecosystems" subsection of this PSA 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 complete loss of the habitat functions and value of the streams, including their function in seed dispersal for rare and common native plants.

In addition to the project's contribution to the loss of surface waters by diversion and/or channelization, the project also contributes to individually minor but cumulatively significant impacts of groundwater pumping on the base flow of streams, the spread of invasive plants in stream corridors, diversion of surface runoff to channels downstream of road crossings, altered surface drainage patterns and groundwater recharge, and encroaching human disturbance and loss of adjacent desert wash habitat value for disturbance-sensitive species. Nearly all of the past and present urban development has occurred on the Nevada side of the Pahrump Valley; however, roads and transmission corridors have altered surface hydrology throughout the basin.

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 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 6,480 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. However, at this time, staff is unable to make determinations of cumulative effects stemming from the loss of golden eagle and migratory birds that may occur due to operation of the project. 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.

However, pending the results of the 2012 special-status plant offsite surveys, if there are few to no opportunities for offsite mitigation and onsite avoidance is infeasible or would fail to protect the species' ranges in California; staff may conclude the project's direct impacts to special-status plants are significant and immitigable for the species at highest risk. The results of the spring 2012 surveys and potential direct, indirect, and cumulative impacts will be fully assessed in the FSA.

## 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") 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 6,480 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 28.33 acres of jurisdictional state waters, and indirect impacts to 4.51 acres, according to the applicant's delineation, which has not been field verified by CDFG staff as of the publication of this PSA. The final jurisdictional acreage may be adjusted in the FSA. Condition of Certification **BIO-22** specifies compensatory mitigation for the loss of state waters at a ratio of 2:1. Staff is also awaiting clarification on the presence/absence of a desert wash community. If present, staff would require mitigation for this habitat at a ratio of 3:1. The compensatory mitigation requirements and avoidance and minimization measures in **BIO-22** would minimize and offset direct and indirect impacts to state waters, which includes any riparian (desert wash) vegetation, if present, 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.

**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 considered fully protected species that occur in the project area. Condition of Certification **BIO-15** requires the completion of an Avian, Bat, and Golden Eagle Protection Plan, 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. LORS compliance determinations for golden eagle will be available in the FSA. 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.

**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 conditions of certification recommended by **Water Resources** staff to ensure compliance with the Porter-Cologne Water Quality Control Act. These WDRs have yet to be issued (see the **Water Quality** section of this document). The Lahontan RWQCB will separately issue a Clean Water Act Section 401 Water Quality certification for the project. Condition of Certification **BIO-7** (Biological Resources

Mitigation Implementation & Monitoring Plan) requires the project owner provide a copy of all state and federal permits.

## 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 minimize the risk of significant impacts to the ACEC, Condition of Certification **BIO-23** requires long-term groundwater-dependent vegetation monitoring) at Stump Springs ACEC and similar habitat on Nevada BLM multiple use-designated lands that would complement the well monitoring required in **WATER SUPPLY-2** and ensure the project would not result in significant indirect impacts to resources in the ACEC. **BIO-24** requires remedial action if impending adverse effects are detected that would require the project to stop, modify, or reduce the project pumping to restore groundwater levels to pre threshold levels. Together, these measures would ensure the project would not exceed the ACEC management thresholds for maintaining groundwater levels.

**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 an Avian, Bat, and Golden Eagle Protection Plan 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 may inform new minimization measures in the future (e.g. after several years of data collection) but does not reduce impacts to golden eagle. The FSA will present final LORS determination for gold eagle as determined in conjunction with USFWS and CDFG.

**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 28.33 acres 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. 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.

## CONCLUSIONS

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, there are a number of unresolved issues that require resolution or further clarification so that staff can complete its analysis in the FSA. These include:

**Potential Regulatory Conflicts**. Staff is working with CDFG and USFWS to determine if a legal mechanism exists to allow desert tortoises to be translocated from the project area to the State of Nevada. Transporting desert tortoise, a state listed species, across the state border may pose legal and regulatory challenges for the State of California. Preliminary discussions with the CDFG have indicated that movement of desert tortoises into Nevada may occur under a Memorandum of Understanding and through the issuance of a 2081a take permit. However, use of this permit is applied for actions

that include scientific study and species management. The permit does not appear to be applicable when used as part of a mitigation program. Staff recommends the applicant identify potential translocation and control sites within the State of California to accommodate the movement of tortoises from the project area. These actions should commence prior to the FSA so potential impacts to these areas can be analyzed in the FSA.

**Analysis of Avian Impacts from Solar Flux and Reflectance.** Staff has requested additional information regarding potential operational impacts to avian species and exposure to solar flux. At this time, staff has insufficient data to make a determination of the project's potential impacts and conformance with state and federal LORS.

**Additions to Desert Kit Fox, American Badger, and Burrowing Owl Conditions.** These species will require an adaptive management approach emphasizing flexibility in passive relocation methods, ground-disturbance schedule, and treatment of possible disease outbreak for desert kit fox. Development of final condition language is pending ongoing coordination with the CDFG. Final condition details will be presented in the FSA.

**Ongoing Surveys for Special-status Plants.** Additional information regarding special status plant occurrences in off-site areas, which could reduce project impacts to populations of rare plants that occur on the project site, was requested from the applicant. Staff anticipates substantial changes to the significance determinations in the FSA depending on the outcome of these surveys. Field survey results may also require changes to proposed conditions of certification in the FSA.

**Field Verification of State Waters Delineation and Desert Wash Plant Communities.** The total acres of state waters is undetermined at this time; the applicant proposes there are 28.33 acres of state waters in the project boundaries but CDFG has not yet field-verified the delineation. Clarification of a recent data response from the applicant was requested to determine if the rare natural community creosote bush-galleta grass association occurs on the project. Impacts to this rare desert wash community type, if present, would be fully analyzed in the FSA and appropriate mitigation imposed to reduce impacts to less than significant levels.

It is anticipated that all outstanding issues will be resolved and compliance with applicable LORS will be described in the Final Staff Assessment.

## STAFF'S PROPOSED FINDINGS OF FACT

1. Construction and operation of HHSEGS will disturb approximately 3,277 acres of desert habitat, of which approximately 19 acres has previously been developed or significantly disturbed, and some degree of degradation is present across portions of the site.

2. A total of 28.33 acres of jurisdictional Waters of the State, a CDFG sensitive habitat, occur on the project site.

3. One state and federally listed threatened species, the desert tortoise, occurs on the HHSEGS site.

4. One state fully protected species, the golden eagle, forages on the HHSEGS site, and nests within ten miles of HHSEGS project site.

5. The diverse plant communities and landscape features in and around the HHSEGS site provide suitable foraging breeding, and/or facilitate wildlife movement throughout the greater region.

6. The HHSEGS site provides forage and shelter for the following special status species: American badger, kit fox, and burrowing owl. These species would be displaced by HHSEGS project construction.

7. The HHSEGS site provides occasional forage and dispersal movement for the fully protected Nelson's bighorn sheep.

8. The HHSEGS project area provides forage, cover, roosting, and nesting habitat for a variety of common and special status wildlife species and birds.

9. Twenty-one occurrences of 10 special-status plant species occur on the HHSEGS site, representing a substantial proportion of the total statewide distribution for five of the ten species.

10. The HHSEGS project will lower groundwater levels within the project area and potentially also in adjacent groundwater-dependent ecosystems and springs, including the Stump Spring Area of Critical Environmental Concern, a protected area under management by BLM. These resources have exceptional value to wildlife and are conservation priorities in Nevada and California.

11. Implementation of conditions of certification **BIO-1** through **BIO-10**, **BIO-12**, and **BIO-13** will reduce impacts to the desert tortoise.

12. Implementation of conditions of certification **BIO-14**, **BIO-1** through **BIO-9**, **BIO-14**, and **BIO-18** through **BIO-24** will reduce impacts to American badger and kit fox, Staff recognizes there are ongoing concerns with displacing these species from a large development parcel. Staff is coordinating with the applicant and CDFG regarding methods to passively relocate this species.

13. Implementation of conditions of certification **BIO-1** though **BIO-8**, **BIO-12, BIO-17** will reduce impacts to burrowing owl. Staff recognizes there are ongoing concerns with displacing owls from a large development parcel. Staff is coordinating with the applicant and CDFG regarding methods to passively relocate this species.

14. 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.

15. Implementation of Conditions of certification **BIO-1** through **BIO-8**, **BIO-14, BIO-18 and BIO-12, BIO-15**, and **BIO-25** will reduce impacts to nesting birds and special status bat species to less than significant. Operational impacts of the HHSEGS project are not determined for golden eagle, special status birds and bat species.

Staff is developing analysis and mitigation in coordination with CDFG and USFWS. The FSA will present staff's suggested mitigation, significance determination, and updated conditions of certification.

16. Implementation of conditions of certification **BIO-23**, **BIO-24**, **WATER SUPPLY-2**, **and** WATER **SUPPLY-6** will avoid or minimize indirect impacts from project pumping to less than significant levels.

17. Implementation of conditions of certification **BIO-8, BIO-18, BIO-19, BIO-20, BIO-21**, and **BIO-22** will reduce impacts to special-status plant species to less than significant levels. However, pending the results of the 2012 special-status plant offsite surveys, if there are few to no opportunities for offsite mitigation and onsite avoidance is infeasible or would fail to protect the species' range in California, staff may conclude the project's direct impacts to special-status plants are significant and immitigable for the species at highest risk.

18. The project's direct and indirect impacts to desert washes will be mitigated by the implementation of conditions of certification **BIO-22**, **BIO-18**, and **SOIL-1**.

19. 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**.

## PROPOSED CONDITIONS OF CERTIFICATION

Staff proposes the following conditions of certification:

## DESIGNATED BIOLOGIST SELECTION AND QUALIFICATIONS[5]

**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;

[5] 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.

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 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 Plan, USFWS Golden Eagle Incidental Take 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 there 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, CDFG and/or input, 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 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, nesting bird, 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 nest and provide information as described above;

5. Provide overview [for operational staff] of potential impacts to avian species from energy 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) 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 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 Plan, 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;

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. Spoils shall be stockpiled in disturbed areas lacking native vegetation and which do not provide habitat for special-status species. Parking areas, staging and disposal site locations shall also be located in areas without native vegetation or special-status species habitat. 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.

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 roadkill, 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 to prevent the spread and propagation of noxious weeds:

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;

c. Use only weed-free straw, hay bales, and seed for erosion control and sediment barrier installations, and

d. Avoid using invasive non-native species in landscaping plans and erosion control.

19. Stockpile Topsoil. To increase chances for revegetation success, topsoil shall be stockpiled from the project site and along project linear features for use in revegetation. The top six (6) to eight (8) inches of native topsoil from the least disturbed locations and only areas that are relatively free of noxious weeds shall be used as a source of topsoil. All other elements of topsoil use shall be as described in *Rehabilitation of Disturbed Lands in California* (Newton and Claassen 2003, pp. 39-40).

20. 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.

21. 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.

22. 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 perimeter security fence and temporarily installed along the underground utility corridors in California. 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.

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. 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.

d. 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. If tortoise were moved out of harm's way during fence construction, permanent and temporary fencing shall be inspected at least two times a day for the first 7 days to ensure a recently moved tortoise has not been trapped within the fence. 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, where drainages intersect the fencing, 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/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 seven required siting criteria. 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 (1,611 acres) for and areas that support shadscale scrub communities at a ratio of 1:1 (1,647 acres). The total compensatory land acquisition required to mitigate impacts to desert tortoise shall be 6,480 acres or the ratio of lands actually impacted by the project footprint. The requirements for acquisition of the 6,480 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 might make habitat recovery and restoration infeasible;

    f. not be characterized by high densities of invasive species, either on or immediately adjacent to the parcels under consideration, that might jeopardize habitat recovery and restoration; and

    g. 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 $22,197,240.00. 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 = $6,480,000;

   b. costs of initial habitat improvements to compensation lands, calculated at $250/acre = $1,620,000;

   c. costs of establishing an endowment for long-term management of compensation lands, calculated at $1,450/acre = $9,396,000;

   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 $4,701,240.00 (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.

**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 inactive, potentially active, or definitely 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 definitely active dens shall not be disturbed during the whelping/pupping season (February 1 – September 30).

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. If tracks are observed, the den shall be progressively blocked with natural materials (rocks, dirt, sticks, and vegetation piled in front of the entrance) for the next three to five nights to discourage the badger or kit fox from continued use. After verification that the den is unoccupied it shall then be excavated and backfilled by hand to ensure that 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. 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.

Placement of escape dens along perimeter fencing to reduce predation risk.

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, results, mitigation measures implemented, and the results of the mitigation.

## AVIAN, BAT, AND GOLDEN EAGLE PROTECTION PLAN

**BIO-15** The project owner shall prepare and implement an Avian, Bat, and Golden Eagle Protection Plan to monitor the death and injury of birds from collisions with facility features such as reflective mirror-like surfaces and from heat, and bright light from concentrating sunlight. The study design shall be approved by the CPM in consultation with CDFG and USFWS, and shall be incorporated into the project's BRMIMP and implemented. The plan shall include plans to conduct visual biweekly surveys for special birds, raptors, and bat mortalities throughout the project site for a period of five years unless otherwise requested by the CPM or CDFG. In addition to the photo documentation of bird mortalities, mortalities and injuries to bats and other wildlife shall be photo documented. Additionally, data would document any overt signs of injury resulting in death (e.g., scorched feathers). This information would be compiled and provided to the CDFG and CPM on quarterly intervals for the first two years of project operation, then annually thereafter, unless otherwise requested by the CPM or CDFG. Adaptive management thresholds will be set and clearly defined, including potential response to significantly large avian or bat kills, raptor kills, or if a golden eagle is injured or killed as a result of the project. The plan will require the immediate implementation of remedial actions should one golden eagle be killed on the project site by project activities or facilities. The study shall also include seasonal trials to assess bias from carcass removal by scavengers as well as searcher bias.

**Verification:** Prior to the start of power plant operation, the project owner shall submit to the CPM for approval and the USFWS and CDFG for review and comment, a final Avian, Bat, and Golden Eagle Protection Plan and agree to implement the plan. Modifications to the plan shall be made only after approval from the CPM.

For one year following the beginning of power plant operation, the Designated Biologist shall submit quarterly reports to CPM, CDFG, and USFWS describing the dates,

durations, and results of monitoring. The quarterly reports shall provide a detailed description of any project-related bird or wildlife deaths or injuries detected during the monitoring study or at any other time.

Following the completion of the fourth quarter of monitoring for the first year, the Designated Biologist shall prepare an Annual Report that summarizes the year's data, identifies any project-related bird fatalities or injuries detected, and provides recommendations for future monitoring and any adaptive management actions needed. The Annual Report shall be provided to the CPM, CDFG, and USFWS. Quarterly reporting shall continue until the CPM, in consultation with CDFG and USFWS, determines whether more years of monitoring are needed, and whether mitigation and adaptive management measures are necessary.

The Designated Biologist shall provide to the CPM, CDFG, and USFWS an annual report summarizing all available data (species of carcass, date and location collected, and cause of death) describing bird and other carcasses collected within the project site each year.

## 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. Staff is working with the CDFG to assess the acquisition requirements for compensatory mitigation lands in consideration of recent guidance provided in the 2012 Staff Report on Burrowing Owls. For the purposes of the PSA 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 indirect effects of weeds on sensitive 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 objective of the Weed Management Plan shall be to: 1) manage weeds onsite 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, operation, and closure. The project owner shall also be responsible for protecting offsite biological resources from collateral or non-target harm from weed management activities through the measures contained below.

Responsibility for weed management on special-status plant mitigation lands may be transferred to the land trust or other approved deed or easement holder; however, the cost of monitoring and management shall be included in the stewardship fees for the mitigation lands and paid by the project owner.

"Target" weed species for long-term management 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.

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[6] or Nature Conservancy criteria[7]; e) measures that would be used to manage target weeds; 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.

[6] 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: www.caleppc.org and www.swvma.org.

[7]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

2. Avoidance and Treatment of Dense Weed Populations. The draft plan shall include a requirement to flag and avoid or treat dense populations of the most invasive non-native weeds If grading and construction cannot avoid these worst infestations (which promotes their spread), they shall be pre-treated by one of the following methods: a) treating the infested areas in the season prior to construction and spraying the new crop of plants that emerge in early spring, or b) 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 c) 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 the establishment of a washing station for cleaning and 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 areas. Cleaning shall be conducted on all track and bucket/blade components to 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 eradication of invasive non-native weeds onsite that occur within 100 feet of any offsite special-status plant occurrences. The draft plan shall include measures for preventing accidental harm to offsite occurrences, and wildlife, 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 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 special-status plants 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 shall be provided with contact information for reporting infestations.

6. Compensate Local Agencies for Increased Weed Monitoring and Abatement. The project owner 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.

7. Safe Use of Herbicides. The draft plan shall include detailed specifications for avoiding herbicide and soil stabilizer drift, and 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 where the herbicides will be used, and what techniques will be used to avoid chemical drift or residual toxicity to special-status species and their pollinators, and consistent with the Nature Conservancy guidelines and the criteria under #2, below. 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"[8], Cal-IPC Invasive Plant Profiles[9],and the California Department of Food & Agriculture Encycloweedia[10].

8. Weed Control Methods. The methods for weed control described in the draft plan shall meet the following criteria:

    a. Manual: Well-timed removal of plants or seed heads with hand tools; seed heads and plants 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. Only the following application methods may be used: wick (wiping onto leaves); inner bark injection; cut stump; frill or hack and squirt (into cuts in the trunk); basal bark girdling; foliar spot spraying with backpack sprayers or pump sprayers at low pressure or with a shield attachment to control drift, or with a squeeze bottle for small infestations (see Nature Conservancy guidelines described above). Spraying (if employed) shall only be conducted on windless days;

    c. Biological: Biological methods may be used subject to review and approval by California Department of Fish and Game (CDFG), Nevada Department of Wildlife (NDOW), and Bureau of Land Management (BLM), and are either locally native species or have no documented incidences of, or potential for naturalizing, hybridizing with native species, or preying on special-status species;

[8] http://wiki.bugwood.org/Invasipedia

[9] http://www.cal-ipc.org/ip/management/plant_profiles/index.php

[10] http://www.cdfa.ca.gov/plant/ipc/encycloweedia/encycloweedia_hp.htm

d. Mechanical: Disking, tilling, and mechanical mowers or other heavy equipment shall not be employed in natural areas but hand weed trimmers (electric or gas-powered) may be used. Mechanical trimmers shall not be used during periods of high fire risk and 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 30 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.

As part of the Annual Compliance Report, each year following construction the Designated Botanist 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) evidence that sensitive biological resources in close proximity were not harmed by weed management activities; 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. This includes all activities during project construction, operation, and closure that could directly or indirectly harm occurrences offsite in close proximity to the project. "Project" includes areas temporarily and permanently disturbed by the project, including the solar fields, linear facilities (within California), and areas disturbed by temporary access roads, fence installation, construction work lay-down and staging areas, parking, storage, or any other activities in close proximity to offsite special-status plants. The project owner is not responsible for managing or

monitoring special-status plant occurrences offsite but shall prevent indirect impacts to nearby occurrences by employing the avoidance and minimization measures contained below for project construction and operation. The project owner shall implement the following measures:

1. Designated Botanist. For work within 100 feet of any offsite special-status plant occurrences, a Designated Botanist shall be retained to oversee the activities to ensure there are no accidental or indirect impacts. The Designated Botanist shall meet the qualifications listed in **BIO-21**. The Designated Botanist shall oversee and train any other Biological Monitors tasked with conducting botanical survey and monitoring work.

2. Special-Status Plant Impact Avoidance and Minimization Measures. 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. Site Design Modifications: Incorporate modifications to site design or construction techniques to minimize direct and indirect impacts to special-status plants around the project perimeter and access roads including: 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. These modifications, and the locations of offsite special-status plant occurrences within 100 feet of the project boundary shall be clearly depicted on the grading and construction plans, and on report-sized maps in the BRMIMP.

    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 boundary and within 100 feet of the temporary Environmentally Sensitive Areas (ESAs) to protect the offsite occurrences from accidental impacts during construction and operation. The adjacent offsite occurrences shall be clearly delineated in the field with temporary construction fencing and signs prohibiting movement of the fencing and any sediment controls at the project boundary under penalty of work stoppages and additional compensatory mitigation. The occurrences shall also be clearly identified with signage to ensure that avoided plants are not inadvertently harmed during construction, operation, or closure. The offsite occurrences shall also be clearly depicted on construction drawings as ESAs, which shall also include all avoidance and minimization measures on the margins of the construction plans. Equipment and vehicle maintenance areas, spoil piles, and wash areas shall be located at least 100 feet from any adjacent offsite occurrences.

    c. Special-Status Plant Worker Environmental Awareness Program (WEAP). The WEAP **(BIO-6)** shall include training components specific

to protection of special-status plants as outlined in this condition. Training shall be conducted by the Designated Botanist (**BIO-21**).

d. Herbicide and Soil Stabilizer Drift Control Measures. Special-status plant occurrences shall be protected from herbicide and soil stabilizer drift. The Weed Management Plan (**BIO-18**) shall include measures to avoid herbicide drift or residual toxicity to special-status plants consistent with guidelines such as those provided by the Nature Conservancy's *The Global Invasive Species Team*[11] , the U.S. Environmental Protection Agency, and the Pesticide Action Network Database[12].

e. Avoid Weed Contaminated Erosion and Sediment Control Materials. Any seed mixes used for erosion control shall not include invasive or non-native plants. Erosion-control seed mixes, straw, and other mulches, if used, shall be certified weed-free. Equipment shall be cleaned before entering and exiting the site pursuant to the Weed Management Plan (**BIO-18**).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. These specifications shall be incorporated in the Drainage, Erosion, and Sedimentation Control Plan required under **SOIL-1**.

g. Monitoring and Reporting Requirements. The Designated Botanist shall conduct weekly monitoring of the ESAs that protect adjacent ofsite special-status plant occurrences during construction, operation, and decommissioning activities in close proximity to the occurrences.

**Verification:** The Special-Status Plant Impact Avoidance and Minimization Measures shall be incorporated into the BRMIMP as required under Condition of Certification **BIO-7** and implement the measures during project construction and operation.

Implementation of the special-status plant impact avoidance and minimization measures shall be reported in the Monthly Compliance Reports prepared 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 and any remedial action that was required.

[11] Hillmer, J. & D. Liedtke. 2003. Safe herbicide handling: a guide for land stewards and volunteer stewards. Ohio Chapter, The Nature Conservancy, Dublin, OH. 20 pp. Online: <http://www.invasive.org/gist/products.html.

[12] Pesticide Action Network of North America. Kegley, S.E., Hill, B.R., Orme S., Choi A.H., PAN Pesticide Database, Pesticide Action Network, North America. San Francisco, CA, 2010 <http://www.pesticideinfo.org>

The project owner shall submit a monitoring report every year for the life of the project to monitor effectiveness of protection measures for all avoided special-status plants to the CPM. 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 measures implemented, including dates, photos, and monitor/worker names; d) description of the status, health, and threats to special-status plant occurrences; 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.

**Note:** Staff expects the results of the applicant's 2012 spring surveys will affect staff's final determinations and details in Condition of Certification **BIO-20** (Special-Status Plant Compensatory Mitigation Plan). Staff has requested additional information from the applicant on opportunities for offsite mitigation (CH2 2012m). Staff expects that this condition in the Final Staff Assessment would contain species-specific determinations and mitigation recommendations; however, the general guidelines and performance standards for the mitigation described below are not expected to change. If the spring 2012 surveys fail to detect new offsite occurrences for some species and 1) the project would eliminate a substantial portion (greater than 20 percent) of the total documented occurrences in California, and 2) there are no opportunities for offsite compensatory mitigation, staff may recommend onsite avoidance, as described below, or conclude the impacts are significant and immitigable. Performance standards for compensatory mitigation by acquiring and preserving offsite occurrences, and for onsite avoidance, if required, are provided below.

## 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 acquire mitigation lands containing that meet the criteria, performance standards described below, and by protecting the occurrences in perpetuity under a conservation easement. The project owner shall provide funding for the acquisition and long-term maintenance and management of the acquired lands as described below, and based on the fee schedule shown in **Biological Resources Table 9.** The responsibility for acquisition of lands may be delegated by written agreement from the Energy Commission staff to a third party, such as a non-governmental organization supportive of habitat conservation, as described. Such delegation shall be subject to approval by the CPM, in consultation with CDFG, prior to land acquisition, enhancement, or management activities.

1) Compensatory Mitigation Ratio. Significant impacts that are mitigated by land acquisition shall be mitigated at a ratio of 3:1, based on the number of occurrences affected, for NatureServe state rank 1 plants (S1), and a 2:1 ratio for state rank 2 plants (S2). For example, three California Natural Diversity Database (CNDDB) occurrences must be acquired and preserved for every single occurrence of a state rank 1 species eliminated. Range ranks (e.g., "S2S3") 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 amount of the security deposit shall be calculated by converting the required number of occurrences to an acreage figure based on the average size of an occurrence for the affected species in the project vicinity, and informed by the applicant's data on special-status plant occurrences in the project vicinity. The compensation lands selected for acquisition must meet one of the following selection criteria:

a) Occupied Habitat. The compensation lands selected for acquisition shall be occupied by the target plant population and shall be characterized by site integrity and habitat quality required to support the target species, and 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.

b) Unoccupied but Adjacent. Compensation may also be achieved by acquiring habitat for which occupancy by the target species has not been documented, if the proposed acquisition lands are immediately adjacent to occupied habitat, contain suitable habitat for the affected species AND can be demonstrated, subject to approval of the CPM, to be essential for the defensibility and long-term sustainability of the occupied habitat by providing a protective buffer and enhancing connectivity with suitable habitat of a good to high quality.

Review and Approval of Compensation Lands Prior to Acquisition. A Draft Mitigation Plan shall be 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.

Management Plan. The project owner or approved third party 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.

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.

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. 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 costs per acre and other calculations are itemized in **Biological Resources Table 9**. The actual costs will vary depending on the measures that are required for the compensation lands. 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 total number of acres used to determine the security deposit shall be calculated by converting the required number of occurrences (based on the mitigation ratios described in #1, above) to an acreage figure based on the average size of an occurrence for the affected species in the project vicinity, as indicated by the applicant's data on special-status plant occurrences in the project vicinity. 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.

i. NFWF REAT Account. The project owner may elect to comply with the requirements in this condition for acquisition of compensation lands, initial protection and habitat improvement on the compensation lands, or long-term maintenance and management of the compensation lands by funding, or any combination of these three requirements, by providing funds to implement those measures into the NFWF REAT Account. To use this option, the project owner must make an initial deposit to the REAT Account in an amount equal to the estimated costs (as set forth in the Security section of this condition) of implementing the requirement. However under Senate Bill 436 NFWF is currently precluded from holding project related endowments. Should the applicant elect to utilize a REAT account as a mitigation option the endowment may not be held by NFWF but another equivalent land trust organization that actually holds and manages the endowment for compensation lands. If the actual cost of the acquisition, initial protection and habitat improvements, or long-term funding is more than the estimated amount initially paid by the project owner, the project owner shall make an additional deposit into the REAT Account sufficient to cover the actual acquisition costs, the actual costs of initial protection and habitat improvement on the compensation lands, and the long-term funding requirements as established in an approved PAR or PAR-like analysis. If those actual costs or PAR projections are less than the amount initially transferred by the Applicant, the remaining balance shall be returned to the project owner.

The responsibility for acquisition of compensation lands may be delegated to a third party other than NFWF, such as a non-governmental organization supportive of desert habitat conservation, by written agreement of the Energy Commission staff. Such delegation shall be subject to approval by the CPM prior to land acquisition, enhancement or management activities. Agreements to delegate land acquisition to an approved third party, or to manage compensation lands, shall be executed and implemented within 18 months of the start of ground disturbance.

2. Partial onsite avoidance through site design modifications. Staff may recommend partial onsite avoidance for any of the significantly impacted species if there are insufficient opportunities for offsite mitigation. Avoidance, if recommended, would be limited to the outer rows of heliostats and the temporary construction area where avoided occurrences would have connectivity to adjacent undisturbed habitat. Heliostats and access roads and other components shall be excluded from the avoidance area to achieve a buffer of 500 feet or more from the uphill side of a special-status plant occurrence and 300 feet from the downhill side. The temporary or permanent road or utility construction, parking, storage, vegetation maintenance, spraying, or any other project activity shall not be allowed within the boundaries of the onsite preserve. Any avoided occurrences onsite shall be protected during construction,

operation, and closure by the avoidance and minimization measures described in Condition of Certification **BIO-19**.

**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 avoidance) that meets the criteria and performance standards described above, and according to the mitigation ratios described above.

If the project owner elects to fulfill all or a portion of the mitigation obligations through onsite avoidance that meets the standards described above, a detailed proposal, including maps and avoidance & minimization measures to be employed shall be submitted to the CPM for review and approval no fewer than 30 days prior to the start of any project ground-disturbing activities.

If the project owner elects to mitigate through off-site compensation, 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. The financial security will be used to purchase compensatory habitat and must be accomplished no later than 18 months from the start of any project-related construction activities.

## DESIGNATED BOTANIST QUALIFICATIONS AND DUTIES

**BIO-21** The project owner shall hire and assign a Designated Botanist to oversee the implementation of mitigation measures described in **BIO-18** (Weed Management Plan), **BIO-19** (Special-status Plant Avoidance and Minimization Measures) during construction, operation, and closure, including equipment mobilization. The project owner shall submit the resume of the proposed Designated Botanist, with at least three references and contact information, to the CPM for approval in consultation with CDFG.

The Designated Botanist 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 plant collecting; and

5) At least five years experience analyzing the impacts of development on native plant species and natural communities.

The Designated Botanist duties shall include the following:

1) Advise the project owner's construction and operation managers, and the Designated Biologist on the implementation of the biological resources conditions of certification;

2) Consult on the preparation of the Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) to be submitted by the project owner;

3) Be available to supervise, conduct and coordinate mitigation, monitoring, and other biological resources compliance efforts in areas within 250 feet of special-status plant occurrences;

4) Clearly 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;

5) Inspect active construction areas within 250 feet of special-status plant occurrences at the start and close of each construction day;

6) Oversee operation activities within 250 feet of special-status plant occurrences or that may impact occurrences indirectly (e.g., chemical spraying);

7) Notify the project owner and the CPM of any non-compliance with any condition of certification relating to, or affecting Inspect active construction areas within 250 feet of special-status plant occurrences;

8) Respond directly to inquiries of the CPM regarding special-status plant occurrences;

9) 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;

10) Train the Biological Monitors as appropriate, and ensure their familiarity with **BIO-19** (Special-status Plant Avoidance and Minimization Measures), BRMIMP, Worker Environmental Awareness Program (WEAP) training, and **BIO-18** (Weed Management Plan);

11) Maintain availability for regular, direct communication with representatives of CDFG, including reporting special-status species observations or changes to existing occurrences to the California Natural Diversity Database (CNDDB); and

12) Conduct the monitoring and oversee the implementation of **BIO-23** (Groundwater-dependent Vegetation Monitoring)..

13) Conduct the monitoring and oversee the implementation of **BIO-18** (Weed Management Plan), training workers, as appropriate, and ensure compliance.

**Verification:** At least 60 days prior to construction-related ground disturbance, the project owner shall submit the resume for the Designated Botanist to the CPM, in consultation with CDFG, for review and final approval. Once the Designated Botanist is approved, the project owner will provide written verification to the CPM that the Designed Botanist is available to be onsite to implement the required mitigation measures.

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 Designated Botanist is available to be onsite.

If a Designated Botanist needs to be replaced, the qualifications of the proposed replacement must be submitted to the CPM at least 10 working days prior to the termination or release of the preceding Designated Botanist. In an emergency, the project owner shall immediately notify the CPM to discuss the qualifications and approval of a short-term replacement while a permanent Designated Botanist is proposed to the CPM for consideration.

The Designated Botanist shall provide copies of all written reports and summaries that document botanical resources compliance activities in the Monthly Compliance Reports submitted to the CPM. If actions may affect botanical resources during operation a Designated Botanist shall be available for monitoring and reporting. During project operation, the Designated Botanist shall submit record summaries in the Annual Compliance Report unless his or her duties cease, as approved by the CPM.

**Note:** Quantities shown below in Condition of Certification **BIO-22** (State Waters Compensatory Mitigation and Impact Avoidance & Minimization Measures) for total acres impacted and total acres mitigated through compensation may be adjusted in the Final Staff Assessment following field verification of the State Waters delineation by California Department of Fish and Game (CDFG) staff.

## 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. Compensatory Mitigation. The project owner shall acquire and preserve under a permanent conservation easement a parcel or parcels of land that includes at least 56.66 acres of state jurisdictional waters, or the area of state waters contained within the project footprint delineated as vegetated waters but lacking a distinct wash community, calculated at a mitigation ratio of 2:1. Indirect effects to washes upstream of the project and adjacent to the mesquite dunes shall be mitigated at a ratio of 0.5:1, or a total of 2.25 acres. Washes with a distinct wash community, or rare natural community, if determined through the field verification to occur within the project footprint, shall be mitigated at 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. 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.

        ii. Contain waters in a general physiographic setting similar to the affected waters (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 CDFG approval before sites are acquired;

        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 ORV may be considered the project owner can demonstrate that the unauthorized ORV can be excluded and controlled with road decommissioning and signage, accompanied by a restoration proposal;

        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 easily 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. If all or any portion of the acquired Desert Tortoise or other required compensation lands meets the criteria above for state waters, the portion of the other habitat compensation lands that meet the criteria 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 and CDFG 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 and CDFG 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 Security shall be approved by the CPM, in consultation with CDFG, to ensure funding. 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 replace the resource functions and values unavoidably lost or adversely affected by the project, by acquisition or restoration. Restored 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 **12** (Desert Tortoise Compensatory Mitigation).

2. 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 within 250 feet of the downhill side of the project boundary and within 100 feet of the uphill side. 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 waters in the Annual Compliance Reports.

a) Guidelines for Stream Crossings. The project owner shall preserve pre-development surface drainage patterns and sediment transport in streams crossed by permanent roads. Arizona crossings shall be

employed 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 single-thread or compound channel stream types, 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 into existing natural streams downslope of the project. For all or portions of diverted distributary streams, the diverted flow may be released as sheet flow within the topographic boundary that defines the outer limits of the distributary stream network.

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 Applicant's project supervisors. 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 Applicant 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

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. 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 outside the permitted work area 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 under supervision of the Biological Monitor. Fencing may be limited to the boundaries of the streams where they occur within 50 feet of work activity. 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 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 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 on site 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. 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.

Streams can be vectors for the spread of noxious weeds. Tires, tracks, and undercarriage of vehicles and equipment that will enter the site shall be inspected for weed, seed, seed heads, weed-infested mud, and other plant parts before transporting to the project area. Equipment that has been used in heavily weed-infested areas shall be cleaned onsite before it is moved to uninfested areas offsite.

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 depicting how these structures restore pre-development drainage patterns (location and volume of flows) to streams 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.

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.

## GROUNDWATER-DEPENDENT VEGETATION MONITORING PLAN

**BIO-23** The project owner shall implement a Groundwater-dependent Vegetation Monitoring Plan (Vegetation Monitoring Plan) in conjunction with the Groundwater Level Monitoring, Mitigation, and Reporting Plan (**WATER SUPPLY-6**) for monitoring the project effects of groundwater pumping on mesquite and other groundwater-dependent vegetation. Monitoring shall be conducted for the life of the project, including pre-construction, construction, and Project operation.

The project owner shall prepare a peer-reviewed Vegetation Monitoring Plan that meets the performance standards and guidelines contained below. The vegetation monitoring shall be conducted within groundwater-dependent vegetation communities, or "GDEs", located: a) east of the project as depicted in HHSEGS Data Response Set 1A, Figure D48-1 (CH2 2011c); b) BLM Stump Spring ACEC; and c) offsite reference plots established in comparable GDEs away from pumping impacts for distinguishing project effects from background effects or a regional drought.

The vegetation data collected as part of the Vegetation Monitoring Plan shall be used in conjunction with data from the Groundwater Well Monitoring Plan (**WATER SUPPLY-6**) to determine if remedial action is required, as described in **BIO-24.**

The Vegetation Monitoring Plan shall meet the performance standards described below and include the following components:

1. Monitoring Objectives and Performance Standards. The objectives of the Plan shall be to monitor the project effects of groundwater pumping on GDEs at a level of detail necessary for: a) detecting statistically and biologically significant adverse effects on GDEs; b) distinguishing project effects from background effects, or the effects of nearby wells; c) distinguishing project effects from the effects of a regional drought; and d) in conjunction with the remedial action described in **BIO-24** ensure that the project groundwater pumping has a less-than-significant effect on GDEs.

2. 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.

3. Threshold for Remedial Action. The three-parameter threshold for remedial action requires that all of the three conditions below are met: 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 (controls); AND b) a statistically significant drawdown in the water table that exceeds the background decline by 0.5 feet as described in **WATER SUPPLY-6**; AND c) cannot be correlated solely to regional drought conditions.

4. Distinguishing Project Effects from Background or Other Project Effects. Reference plots, as described in #9 below, shall be established to determine whether declines in plant vigor and aquifers are project-related or reflect regional drought conditions. Distinguishing project-pumping effects from non-project pumping shall be accomplished by installing monitoring wells between the project and other nearby pumping wells and between the project wells and GDEs as described in **WATER SUPPLY-6**.

5. Timing. Vegetation monitoring shall be conducted twice annually during the same one to two week time period during peak growing period (mid- to late April) and during the hottest and driest time of year in Pahrump Valley. Well monitoring shall be conducted as described in **WATER SUPPLY-6**.

6. Parties Responsible for Monitoring. Vegetation monitoring shall be conducted by the Designated Botanist (**BIO-21**). Monitoring data shall be quality-checked 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. Monitoring data, as well as monitoring wells and plots shall be available to the CPM at all times and, where located on federal lands, to the BLM Nevada and California state leads for Soil, Water, Air and Riparian Programs, and the BLM Southern Nevada District Hydrologist and Botanist.

7. Location of Vegetation Monitoring Plots. Vegetation monitoring plots shall be established at: a) Stump Spring ACEC; b) points north, central, and south within the GDEs closest to the project boundary and north of Tecopa Highway/Old Spanish Trail; and c) comparable GDEs at offsite

reference plots within the Death Valley Regional Flow System (DVRFS), as described in #9 below. Vegetation monitoring shall only be conducted within GDEs and not in upland plant communities that are not groundwater-dependent.

8. Monitoring Controls. The "controls shall consist of the data collected at the same plot during the baseline (pre-pumping) monitoring for a pre-disturbance vs. post-disturbance comparison. Because of the potential variability in GDE characteristics and depth to groundwater among the different GDE plots and well locations, the study design shall treat the monitoring plot and corresponding control plot (i.e., baseline data) as a pair (versus 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].

9. Offsite Reference Plots. To distinguish project effects from the effects of a regional drought, vegetation monitoring plots shall also be placed in comparable GDEs in a similar physiographic setting in areas not subject to the influence of adjacent pumping. Data collected from reference plots shall be used in conjunction with climate data to determine if declines in vegetation health are related to drought conditions. The offsite reference plots shall be located within the DVRFS and approximate the project area GDEs in species assemblages, depth to groundwater, and lithology to the extent possible. Differences between the project area GDEs and the reference sites shall be determined and adjusted for by examining the differences prior to the start of pumping. Impacts from pests and diseases, if present, must also be considered and excluded or adjusted for as part of the analysis.

10. Sample Size and Design. The sample size and design shall be sufficient to achieve adequate (90 percent) statistical power, with a Type I error rate (false-change error rate) of 10 percent. The minimum detectable change, or biologically significant change, shall be 20 percent above baseline. Following collection of the 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 indicates that the sampling design is insufficient to achieve adequate statistical power, the design shall be modified (for example, by adding additional monitoring sites) 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 "target populations" from which the sampled GDEs will be compared shall be the baseline attributes in the same plots. The null and alternative

[13] Manly 2008 – Manly, B., *Statistics for Environmental Science and Management* (2nd ed), CRC Press/Chapman and Hall, 292 pp.

[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.

hypotheses shall be framed in terms of a bioequivalence test as described in *Statistics for Environmental Science and Management* (Manly 2008)[16] for a "pre-disturbance vs. post-disturbance" comparison. To distinguish project effects from regional drought, a mean of the attributes of the near-project GDE plots would be compared to a mean of the reference plots. Differences or variability between the reference plots and the near-project plots shall be adjusted for by examining the difference prior to project pumping (the mean of reference plots compared to the mean of pre-pumping, or baseline).

11. Groundwater Level Monitoring. The project owner shall conduct the groundwater level monitoring as described in **WATER SUPPLY-6.**

12. Soil Core Sampling. One soil core sample per community type shall be collected as part of the baseline data to establish the approximate average rooting depth of each phreatophytic species, and thereafter shall be repeated every five years. The coring method must provide a continuous core that will provide visual examination of roots and root nodules, soil profile, and soil moisture.

13. Baseline and Long-term Data Collection. 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, if groundwater pumping ceases or is replaced by other water sources, vegetation monitoring shall continue until groundwater levels have returned to baseline levels.

14. Fine-Scale Vegetation Mapping. Groundwater-dependent vegetation and all springs within the 1-foot drawdown contour in **Water Supply Figure 23** shall be mapped to the association level consistent with classification protocol in the *Manual of California, 2nd edition* (Sawyer et al. 2009). The minimum polygon size for GDEs shall be 500 sq ft. Mapping of the adjacent upland communities is not required. GDEs include communities dominated or co-dominated by one or more of the following phreatophytes observed in the project vicinity: mesquite (*Prosopis* spp.); four-wing saltbush (*Atriplex canescens*); allscale (*A. polycarpa*); bush seep-weed (*Suaeda moquinii*); desert baccharis (*Baccharis sergiloides*); alkali goldenbush (*Isocoma acradenia*); and any other phreatopytic species listed in *Wetland Plants of Specialized Habitats in the Arid West* (Lichvar &

[16] Manly 2008 – Manly, B., Statistics for Environmental Science and Management (2nd ed), CRC Press/Chapman and Hall, 292 pp.

Dixon 2007)[17].The mapping shall be accompanied by a GIS-based calculation of total acres of each mapping unit within the drawdown zone. Boundaries of the permanent plots and any off-site reference sites shall be recorded using GPS technology and depicted on the geo-referenced aerials. GIS shape files and metadata shall be provided with the draft monitoring plan.

15. Guidelines for the Monitoring Plan. Vegetation Monitoring Plan shall provide a detailed description of each of the following components:

    a. Sampling Design. The sampling design shall discuss: samples, controls and reference plots; plot size and shape; precision; sampling errors; type I and II errors; minimum detectable change; statistical power; how to use these principles to increase sampling efficiency; and how the sampling design will be refined after analysis of the baseline data to attain the desired level of precision. Interpretation of soil core data shall also be discussed. The Monitoring Plan shall also discuss a key species (phreatophytes); methods for permanently marking plots in the field; monitoring schedule and frequency; vegetation attributes; demographic assessments and other attributes sampled; and monitoring and sampling objectives (target/threshold, change/trend-based)..

    b. Field techniques for measuring vegetation. Describe the vegetation attributes, demographics, and field techniques that will be used to collect data on selected attributes. The techniques selected shall be based on a demonstrated knowledge of the biology of the species and their morphological responses to stress. Examples of appropriate field techniques for measuring drought response include but are not limited to: percent dieback; live crown density; percent cover of live (versus dead or residual) vegetation, age/size classes: percent cover/density of associated species; percent composition of native versus non-native species; and percent cover based on wetland indicator status or status as phreatophytes (Lichvar & Dixon 2007). 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.

    c. Data Management. Describe how the data will be recorded in the field, processed and stored, including: the design of data dictionaries for collecting monitoring data in the field electronically to eliminate errors in data entry.

d. Training of personnel. Describe minimum standards for training and monitoring personnel. All data collection shall be done under the training and supervision of the Designated Botanist (**BIO-21**).

[17] Lichvar & Dixon 2007 – Lichvar, R. and L. Dixon, *Wetland Plants of Specialized Habitats in the Arid West*, U.S. Army Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory, Hanover, NH. (ERDC/CRREL TR-07-8), June 2007, < http://www.crrel.usace.army.mil/library/technicalreports/ERDC-TR-07-8.pdf>

e. Statistical analysis. Describe statistical tests that would be used to analyze the monitoring data and establish statistical power, sampling errors, precision, etc., and how groundwater elevation monitoring data collected pursuant to **WATER SUPPLY-6** would be used to interpret the vegetation data. Comparisons shall be made between the sample plots and the baseline (as a control) and between the sample plots and reference sites as described above.

16. Peer Review. The draft Monitoring Plan shall undergo a peer review by one or more recognized experts in the preparation of monitoring plans for plant populations; responses of desert phreatophytes to drought stress or groundwater depletion; and biostatistics. The peer reviewers shall be selected 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.

17. Semi-Annual Monitoring Report. Monitoring Reports shall be submitted to the CPM, BLM Nevada and California state leads for Soil, Water, Air and Riparian Programs, and the BLM Southern Nevada District Hydrologist and Botanist 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 (or any deviation from the Plan); results of the vegetation and groundwater level monitoring; comparison of predicted versus actual water table declines; analyses based on the statistical tests and methods described in the Vegetation Monitoring Plan; photos; and conclusions and recommendations.

18. The first Annual Monitoring Report shall include an appropriate statistical analysis of baseline monitoring data to assess whether the sampling design was adequate to attain quality data and precision as described above, and, where needed, recommendations for revisions of the methods.

**Verification:** No less than 90 days prior to start of any project-related groundwater pumping, the project owner shall provide the peer-reviewed Groundwater-dependent Vegetation Monitoring Plan to the CPM, and implement the monitoring plan.

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 State Lead for Soil, Water, Air and Riparian Programs, and the BLM Southern Nevada District Hydrologist and Botanist no more than 60 days following the collection of spring and fall monitoring data and every spring and fall thereafter for the life of the project.

## REMEDIAL ACTION FOR SIGNIFICANT IMPACTS TO GROUNDWATER-DEPENDENT BIOLOGICAL RESOURCES

**BIO-24** Thresholds for remedial action, 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. 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.

If monitoring, as described in **WATER SUPPLY-6,** indicates that project-related groundwater elevations continue to decline before they begin to rise back to pre-threshold levels, even after pumping has stopped, the project owner shall compensate for the temporal decline in ecosystem health by a Water Use Offset Plan, and according to the guidelines and performance standards for offsets described in **WATER SUPPLY-2**. The acquisition of water rights is required in addition to –not as an alternative to—stopping, reducing or modifying pumping. This compensation shall be required only if monitoring indicates that project-related groundwater elevations continue to decline before they begin to rise back to pre-threshold levels, even after pumping has stopped.

**Verification:** 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, that modifying or reducing pumping will restore the groundwater elevation to pre-threshold levels.

No more than 90 days following detection, if water levels do not return to baseline after stopping pumping and the decline continues the project-related trend, as demonstrated by the monitoring plan described in **WATER SUPPLY-6**, the project owner shall submit to the CPM for review and approval, in consultation with the BLM Nevada State Lead for

Soil, Water, Air and Riparian Programs, and the BLM Southern Nevada District Hydrologist and Botanist, a Water Use Offset Plan as described in **WATER SUPPLY-2**.

No later than 18 months following approval of the final Remedial Action Plan, the project owner shall provide to the CPM written documentation of the completed offset, as described in **WATER SUPPLY-2**.

## 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, and the Advanced Mitigation option available through the California Department of Fish and Game's Advanced Mitigation Program established by Senate Bill X8 34.

**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 by CDFG. 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.

## 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 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.

## REFERENCES

The tn: 00000 in the references below indicates the transaction number under which the item is catalogued in the Energy Commission's Docket Unit. The transaction number allows for quicker search and retrieval of individual items docketed for a case or used for ease of reference and retrieval of exhibits cited in briefs and used at Evidentiary Hearings.

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Allen et al. 2010 – Allen, Edith B., L. E. Rao, R.J. Steers, G.S. Tonnesen, and Robert F. Johnson, *Impacts of Anthropogenic Nitrogen Deposition on Invasive Species and Fire Risk in California Deserts*. 35th Annual Meeting and Symposium of the Desert Tortoise Council. Ontario, California.

American Bird Conservancy 2010 – *Bendire's Thrasher: Hiding in Plain Sight*. In: Bird Conservation, Fall 2010 Edition.

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# Cultural Resources

# To be filed

# June 15, 2012

# GROWTH INDUCING IMPACTS

JAMES ADAMS

The CEQA Guidelines (Section 15126.2(d)) consider a project to be growth-inducing if it fosters economic or population growth or the construction of additional housing, either directly or indirectly, in the surrounding environment. Projects which would remove obstacles to population growth could also be considered growth-inducing, such as a major expansion of a waste water treatment plant that allows more construction in a public service area. It must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment.

The **SOCIOECONOMICS** section of this Hidden Hills Solar Electric Genering System (HHSEGS) Preliminary Staff Assessment analyzes whether the construction and operations workforces would induce population growth, necessitate the construction of additional housing, or adversely impact acceptable levels of services for police protection, schools, etc. This analysis will focus on the potential for growth-inducing impacts related to the project's electric transmission line and natural gas pipeline as well as existing limitations to development in the project area. Potential impacts include loss of biological resources, open space, groundwater resources and other significant effects on the environment such as increased industrialization of an existing rural landscape.

## Overview of Development in the Area

Historically, the Charleston View area has been targeted by the Inyo County General Plan for new growth (Inyo County 2001). 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. Theresa 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). The Charleston View area, including the HHSEGS site, was previously subdivided into small- and medium-size parcels with a dirt road grid system that would have been used as the proposed residential subdivision developed. 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.

A February 16, 2012 letter from Inyo County Administrative Officer Kevin Carunchio notes that the construction of the HHSEGS would forgo the possibility of alternative uses of the 3,277 acres and adjoining lands. According to the letter, the proposed project's physical characteristics would hinder any future alternative use of the site itself, including the 9,500 acres of land around the site. The letter also notes that two major impediments to significant growth in the Charleston View area are the lack of electricity and the availability of sufficient water to support major commercial, recreational or

residential developments. Electricity will be coming to the area no later than next year (unrelated to HHSEGS) but the uncertainty related to water supply remains a concern (INYO 2012b).

Inyo County planning staff envisions a city-scale major mixed-use development on approximately 13,000 acres in the Charleston View area which includes the HHSEGS site if it were not developed for solar. Inyo County's position is that new development is unlikely to occur in the current decade and would probably await the full recovery from the present region-wide economic slowdown in eastern Inyo County and the adjoining Nevada counties (INYO 2012b).

## PROJECT INFRASTRUCTURE/SERVICE CAPACITY INCREASE

Significant growth impacts could occur if a project provides infrastructure or service capacity to accommodate growth levels beyond those permitted by local or regional plans and policies. Included in this are projects such as a new electric transmission line or gas pipeline which could remove obstacles to growth activities. 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). Staff has analyzed the potential for the HHSEGS transmission line and natural gas pipeline to induce growth.

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 June, 2012 (USBLM 2012).

### Electric Transmission Line

As noted in the HHSEGS Application for Certification (AFC), there are two transmission line options for the HHSEGS. The first option would interconnect via a 230-kV transmission line to a new Valley Electric Association (VEA) Tap Substation (Gamebird) at the intersection of Tecopa Road and Nevada State Route (SR) 160 (Tecopa/SR-160 Option). This option would require an approximately 10-mile-long generation tie-line from the HHSEGS to the Gamebird Substation. As noted in the AFC, the transmission line would originate at HHSEGS's onsite switchyard cross the state line and parallel it along Tecopa Road to the Gamebird Substation in Nevada. However, the BLM has raised concerns about impacting the nearby mesquite thickets during construction of the gas pipeline and transmission line. The applicant has proposed moving the switchyard

and metering station to a location immediately across the state border on BLM land in Nye County, Nevada (CH2 2012p). More recently, the applicant indicated at a May 9, 2012 Issues Resolution Workshop that it has decided to build the switchyard and metering station at the original location identified in the project description of the AFC (Common Area). As discussed in the **TRANSMISSION SYSTEM ENGINEERING** section of this **PSA**, the Tecopa/SR-160 transmission line option also includes a 230-kV transmission line from the Tap Substation into the town of Pahrump, Nevada with approximately 28.1 miles of transmission line and a two-acre switchyard on private land, with a one-mile-long connection to the Eldorado Substation.

The other identified transmission option involves a 500-kV transmission line that would interconnect to the electric grid at Southern California Edison's Eldorado Substation in Boulder City, Nevada (Eldorado Option). This option would follow the same 10-mile-long route to the Gamebird Substation at the juncture of Tecopa Road and SR-160, but would continue southeast for approximately 53.7 miles to the Eldorado Substation in Boulder City, for direct connection to the California ISO-controlled grid. The proposed gen-tie line would likely be a multi-generator transmission line that could be available to serve other projects in the region (HHSG 2011a, pg. 3-2). Both transmission line options would provide power to substations that would be utilized by other development projects in Nevada and California.

## Natural Gas Pipeline

The project would require a 12- to 16-inch-diameter natural gas pipeline. The pipeline would exit the HHSEGS site at the California-Nevada border and travel on the Nevada side southeast along the state line, then northeast along Tecopa Road until it crosses SR-160 about nine miles northeast of the project site. This section of the gas pipeline would carry gas solely for the project. Staff understands that no excess gas would be available for additional development near the project area in this part of Inyo County, California (CH2M Hill 2012). Any other development in the project area would need to secure additional gas supplies separate from what is proposed to be supplied to the HHSEGS. For these reasons, staff concludes the project's gas pipeline from the connection at SR-160 to the HHSEGS would not stimulate or induce any additional growth in the project area.

After reaching SR-160, the gas line could be increased to a 36-inch line that would turn southeast and continue approximately 26 miles, following the proposed Eldorado 500-kV transmission line corridor, to intersect with the Kern River Gas Transmission Company (KRGTC) line (HHSG 2011a, pg.1-3), about 25 miles south of Las Vegas, Nevada. A KRGTC representative has told staff that only preliminary discussions with the applicant have taken place regarding the gas pipeline and that KRGTC would not be involved in determining the diameter of the HHSEGS gas line, its construction and operation, or provide gas for the new line (KRGTC 2011). The decision to increase the gas line to 36 inches in diameter where the line would intersect SR-160 in Nevada has not been made. BrightSource representatives have indicated that gas for the project could be provided by the VEA (CH2M Hill 2012). Given the fact that the 36-inch gas line would be only nine miles from the California border, it is possible that the pipeline could

provide gas for future development in California or Nevada. In addition, BrightSource Energy Partners are the owners of the Sandy Valley Solar project east of Tecopa Road near the intersection with SR-160 (CEC 2012b). If this and other projects require comparable amounts of natural gas and are built in addition to the HHSEGS, a 36-inch-diameter gas pipeline may be needed to provide enough gas for these projects. Staff has reviewed **Cumulative Effects Figure 1** which identifies 13 potential projects (primarily renewable energy including Sandy Valley Solar) within 60 miles of the HHSSEGS (mostly in western Nevada). The projects are in various stages of document-generation and agency review/approval and it is unclear how many will actually be constructed.

The transmission infrastructure that receives HHSEGS electricity is being built to serve exogenous electricity demand in other regions, and has no identifiable growth inducing impact in the vicinity of the project. However, the addition of new electrical and natural gas resources could be used for additional renewable energy development, infrastructure development in the Pahrump Valley/Charleston View area, or other development in more distant parts of Nevada and California. Potential impacts from such additional energy development, should it occur, includes loss of biological resources, open space, groundwater resources and other significant effects on the environment such as increased industrialization of an existing rural landscape.

### Limitations to Development

The Pahrump Valley groundwater basin, which includes the Charleston View area, is currently in severe overdraft. Absent project effects, basin water levels directly beneath the proposed site could fall approximately 20 feet over the next 30 years from existing agricultural and domestic uses. Superimposed project pumping could result in a potential water level drop of up to 50 feet of total drawdown at the project site over the next 30 years. Preliminary review of the AFC and supporting documentation indicates the additional proposed project pumping could also result in significant impacts to other users in the basin. The impacts would occur in the form of local drawdown effects on adjacent well owners and an ongoing reduction in basin storage. As noted in the **Water Supply** section of this document, the scarcity of local water resources is a serious constraint on any significant economic development. New commercial/residential development is also constrained in the local area by the Open Space Recreation and Resort/Recreation land use designations on approximately 8,330 acres.

## 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 and/or a 500-kV electric transmission line.

2. HHSEGS would require a 12- to 16-inch-diameter and a 36-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 June 2012.

4. The electric transmission lines and gas pipelines that serve HHSEGS would provide new infrastructure that could be utilized by other development projects in Nevada and California.

5. The Pahrump Valley groundwater basin, which includes the Charleston View area, is currently in severe overdraft and 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.

## CONCLUSIONS

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.

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 Hidden Hills Transmission Project, and would be discussed more fully in the forthcoming BLM DEIS. Staff believes the new electric transmission line for the HHSEGS and the 36-inch diameter gas pipeline discussed in the AFC could have growth-inducing impacts in Nevada and California by providing new resources that would be utilized by other development projects.

The addition of new electrical and natural gas resources could be used for additional renewable energy development, infrastructure development in the Pahrump Valley/Charleston View area, or other development in more distant parts of Nevada and California. Potential impacts include loss of biological resources, open space, groundwater resources and other significant effects on the environment such as increased industrialization of an existing rural landscape. Depending on the size, location, and number of projects, the induced growth related to the HHSEGS could directly or indirectly affect the ability of a local agency to provide needed public services (electricity, water, etc.) beyond the levels assumed in existing environmental documents.

## REFERENCES


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CH2 2012p – CH2MHill/J. Carrier (tn: 64558) Supplemental Data Response, Set 2, Boiler Optimization Plan and Design Change. 4/2/2012

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Inyo County 2001 - Land Use Element of the 2001 Inyo County General Plan, pg. 4-11, adopted December 2010

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KRGTC 2011 – Report of Conversation between Doug Gibbons, Manager – Land and Environment for Kern River Gas Transmission Company, and James Adams on 11/20/11.

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# HAZARDOUS MATERIALS MANAGEMENT

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 Preliminary Staff Assessment (PSA) 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 |
|---|---|
| **Federa**l | |
| 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. |

| | |
|---|---|
| §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, section 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, Section 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 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 Tables 5.5-2, 5.5-3, and 5.5.4 of the Application for Certification (AFC) (HHSEG 2011a), 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

administration, warehouse, and 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)

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** sections (5.1) of the Application for Certification (AFC) (HHSG 2011a) and the staff assessment.

## 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. This area is primarily served by State Route (SR) 160 and local streets (HHSG 2011a, Section 5.12.3). The immediate terrain is level, without substantial hills.

## 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. The St. Therese Mission, a commercial facility, is under construction approximately 0.5 mile southeast of the HHSEGS site. 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 nearest residence to the HHSEGS property boundary is approximately 300 feet west of the fenceline (see Figure 5.9-1). 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

## DIRECT / INDIRECT IMPACTS AND MITIGATION

## Proposed Project

### 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%), sulfuric acid (96%) 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 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

1 Boiler Optimization Plan, Hazardous Material Handling, CH2 2012p, pp 5-6:

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.

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).

While natural gas would be used in significant quantities, it would not be stored on site. It would be delivered via a new gas pipeline to the HHSEGS project site. 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 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.

A 12- to 16-inch-diameter natural gas pipeline will be required for the project. It will exit the HHSEGS site at the California-Nevada border and travel on the Nevada side southeast along the state line, then northeast along Tecopa Road until it crosses under SR 160. From this location a 36-inch line will turn southeast and continue approximately 26 miles, following the proposed Eldorado Option transmission line corridor, to intersect with the Kern River Gas Transmission (KRGT) pipeline. A tap station will be constructed at that point to connect it to the KRGT line. The total length of the natural gas pipeline will be approximately 35.3 miles (HHSG 2011a, Sect 5.12.1).

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), 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. 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, metering equipment, and possible pigging facilities. 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 analysis for 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). Staff proposes **Condition of Certification HAZ-2** which ensures that the HMBP, which includes the Inventory and Site Map, Emergency Response Plan and Owner/Operator Identification, and Employee Training 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 50-minute response time to the project site. SIFPD indicated in communications in March and July of 2011that local firefighters are equipped to handle simple HazMat incidents, but that Pahrump Valley Fire Rescue Services and Nye County Emergency Services would need to be called in for assistance with more complex situations given their mutual aid agreements with Inyo County (CEC 2011j). The Pahrump Valley Fire Rescue Services' 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. The

[2] www.pahrumpfire.biz

[3] www.nyecounty.net

station 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.

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.

[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

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 **PSA**.

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 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 **BIOLOGY**, the **AIR QUALITY**, the **SOIL RESOURCES, WATER RESOURCES**, and the **WASTE MANAGEMENT** sections of this PSA.

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).

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 Hazardous Materials Division of the Southern Inyo Fire Protection District and the CPM for review. After receiving comments from the Inyo County Environmental Health Services Department (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.

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.

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 and 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

[5] North American Electric Reliability Council, www.nerc.com/files/V1-Communications.pdf

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:

   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 applicant.

**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 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 5.5-3R1 Supplemental Data Response, Set 2,

Boiler Optimization Plan and Design Change. 4/2/2012

**TABLE 5.5-3R1**
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:<br>Lead (45-60% of battery)<br>Sulfuric Acid (10-30% of battery) | <br>7439-92-1<br>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 | 42 gal[f] | 42 gal[f] | e | e | Yes |

**TABLE 5.5-3R1**
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 |
|---|---|---|---|---|---|---|---|---|
| | | | (does not include oil contained within individual equipment and reservoirs) | | | | | |
| 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 | 1,300 lb | [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<br>75 ppm<br>100 ppm | 60 minutes<br>30 minutes<br>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.

## REFERENCES FOR HAZARDOUS MATERIALS APPENDIX B, TABLE 1


AIHA. 1989. American Industrial Hygienists Association, Emergency Response Planning Guideline, Ammonia, (and Preface) AIHA, Akron, OH.

EPA. 1987. U.S. Environmental Protection Agency, Technical Guidance for Hazards Analysis, EPA, Washington, D.C.

NRC. 1985. National Research Council, Criteria and Methods for Preparing Emergency Exposure Guidance Levels (EEGL), Short-Term Public Emergency Guidance Level (SPEGL), and Continuous Exposure Guidance Level (CEGL) documents, NRC, Washington, D.C.

NRC. 1972. Guideline for Short-Term Exposure of the Public to Air Pollutants. IV. Guide for Ammonia, NRC, Washington, D.C.

NIOSH. 1994. National Institute of Occupational Safety and Health, Pocket Guide to Chemical Hazards, U.S. Department of Health and Human Services, Washington D.C., Publication numbers 94-116.

WHO. 1986. World Health Organization, Environmental Health Criteria 54, Ammonia, WHO, Geneva, Switzerland.


## 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 HealthP

**NRC**: National Research Council

**STEL**: Short Term Exposure Limit

**STPEL**: Short Term Public Emergency Limit

**TLV**: Threshold Limit Value

**WHO**: World Health Organization

# LAND USE

Christina Snow

## SUMMARY OF CONCLUSIONS

This section of the Preliminary Staff Assessment (PSA) 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** indicates that the environmental justice population is greater than fifty percent in one census block within a six-mile radius of the proposed HHSEGS project. Energy Commission staff has not identified any significant adverse direct or cumulative land use impacts resulting from the construction or operation of the proposed project, including impacts to the environment justice population. Therefore,there are no land use environmental justice issues related to this project and no minority or low-income populations would be significantly or adversely impacted.

## 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 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).

[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 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 site and provides maps showing the zoning classification boundaries. |
| County of Inyo Title 21 Renewable Energy Development | 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 26 miles[2] 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 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.

[2] 26 miles is the driving distance from the proposed project to Pahrump. 8 miles is the direct distance from southern Pahrump to the proposed project's Solar Field 1.

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 172 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, and landscaping. 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. Immediately south of the proposed project lies a sparsely populated residential area, Charleston View. Approved in the 1960s, 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 Tecopa Road to the project entrance road on the east side of the project. Secondary access would be from Tecopa Road along the west side of the site, then along a paved road between the two solar plants.

## Transmission Lines

An outgoing 230kV generation tie line would be constructed using either the applicant-proposed Transmission Line Tecopa Road/SR 160 Option or the Eldorado Option. Under the Tecopa Road/SR 160 Option, the project would interconnect via a 230kV transmission line to a new Valley Electric Association (VEA) owned substation at the intersection of Tecopa Road[3] and Nevada State Route (SR) 60. The Eldorado Option would interconnect via a 500kV transmission line that interconnects to the electric grid at the Eldorado Substation, in Boulder City, Nevada.

Both of these options extend from the eastern boundary of the project site and are located in Nevada, primarily on federal land that is managed by the BLM, except for

[3] The road is also called Tecopa Highway and Old Spanish Trail Highway.

small segments located in the vicinity of the Eldorado Substation, which is located within the city limits of Boulder City, Nevada. The BLM will prepare a separate environmental analysis of the transmission line options.

## Natural Gas Pipeline

A 12- to 16-inch-diameter natural gas pipeline would be required for the project. The pipeline would exit the HHSEGS site at the California-Nevada border and travel on the Nevada side southeast along the state line, then northeast along Tecopa Road until it crosses under SR 160. From this location a proposed 36-inch line would turn southeast and continue approximately 26 miles, following the proposed Eldorado Option transmission line corridor, to intersect with the Kern River Gas Transmission (KRGT) pipeline. A tap station would be constructed at the point to connect it to the KRGT line. The total length of the natural gas pipeline would be approximately 35.3 miles.

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.

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[4] indicates there are 68 residents living within 6 miles of the project site in California. 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] area.

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. A 550-acre firearms training institute (Front

[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.

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.

- 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 is comprised 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 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.

## SURROUNDING AREA

Lands adjacent to the project site in California and Nevada include 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 subdivision 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.[6]
    - 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[7] or conversion of forest land to non-forest use.
- Physical disruption or division of an established community.

[6] 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.

[7] 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.

- 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.[8]

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 the environmental justice populations 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, 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

[8] 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)

**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 3,277-acre site. The nearest residence is about 300 feet east of the Solar Plant 2 solar field boundary and the next closest is approximately 3,500 feet south of the Solar Plant 2 power block (AFC, Figure 5.9-1). 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 justified 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. Inyo County has also referenced the applicability of Title 21, Renewable Energy Development Code for the project.

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 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, 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<br>Goal Gov – 10: Energy Resources<br>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. | No | Although the project is a renewable energy project that is encouraged by this goal, the project is incompatible with Title 21, the GP and zoning code. Information that would make this project consistent with Title 21, GP and zoning code has not been provided from the applicant. |
| Chapter 4 Land Use Element<br>Commercial<br>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)<br>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 residential units is encouraged, with density of developed are allowd up to 24 du/net acre. | 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. |
| Chapter 4 Land Use Element<br>Commercial<br>Goal LU-5: Provide adequate public facilities and services for the existing and/or future needs of communities | Policy LU-5.1: Open Space and Recreation Designation<br>This designation provides for existing and planned public parks, ball fields, horse stables, | 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 |

| Applicable LORS | Description | Consistency Determination | Basis for Consistency |
|---|---|---|---|
| and their surrounding environs, and to conserve natural and managed resources. | greenbelts, and similar compatible uses. The FAR shall not exceed 0.20. The minimum parcel size is generally 40 acres. | | 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. |

## 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 is comprised of 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).

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 HHSEGS project site 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 and 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 large 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.

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). The applicant has not provided further information to staff for incorporation into this analysis and Inyo County has not received the general plan amendment application as of completion of the preliminary staff analysis.

## 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. Inyo County has requested that the applicant submit applications for a zoning reclassification, or other entitlements as identified in the Renewable Energy Ordinance (Title 21), so that the proposed project would be consistent with zoning and that appropriate development standards can be

implemented. As of this writing, the applicant has not submitted the requested applications.

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.

Although the M-1 zone height requirements for structures and buildings are limited to 35 feet adjacent to a residential or commercial area Title 21 (discussed below) provides the County with flexibility for such requirements.

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. However, Inyo County indicated that additional setbacks may be necessary; a 50-foot setback may be required to buffer the project from nearby properties, Tecopa Road (Old Spanish Trail Highway), as well as provide adequate right-of-way requirements for road improvements. In addition a larger setback may be necessary if it is determined that the glint and glare from the project would have adverse impacts to drivers on Tecopa Road and nearby residents. In the applicant's data responses Set 2E received on May 4, 2012 (CH2 2012y), the applicant proposes a landscape area of 20 feet along with a non-paved roadway setback behind the fencing of 12 feet. However, a recent letter from Inyo County Department of Public Works has requested entrance drives of 170 feet and right-of-way for road improvements at a minimum of 24 feet along the project frontage. It is not clear at this time whether the landscaping setback and right-of-

way dedication along with an internal setback would meet Inyo County development standards.

As discussed in Inyo County's February 23, 2012 letter (INYO 2012c), alternatives to the zone reclassification could include a zoning text amendment, a Planned Unit Development (PUD), a Renewable Energy Development Agreement, and/or a Renewable Energy Permit.

## 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, or enter into a Renewable Energy Development Agreement with Inyo County. Both of 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.

Inyo County can use Title 21 to implement the requirements of the development agreement 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 in lieu of a Zoning Reclassification.

The HHSEGS project is currently not in compliance with Title 21, Inyo County Renewable Energy Ordinance. Inyo County has indicated that they have not received the proper documentation to provide adequate input to Energy Commission staff for development of appropriate conditions of certification that would allow them to implement desired development standards or to mitigate any land use inconsistency issues.

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. The **BIOLOGICAL RESOURCES** section of this **PSA** includes a requirement for a revegetation/reclamation plan in accordance with Title 21. 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 ROW grant, including reclamation of the site upon completion of the term[9].

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.

## Other Considerations

The project site consists of 172 parcels with each 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

[9] 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 the public lands.

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 provide 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. This Reversionary Map will need to be submitted to Inyo County for approval and the applicant states this process would be initiated immediately after the project certification.

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. The county is still verifying the public rights-of-way onsite and no further information has been provided as to the details on what would be required for this process. Please refer to the **TRAFFIC and TRANSPORTATION** section of this document for additional discussion as it relates to traffic.

## 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. 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. If the applicant had submitted land use entitlements to the county, staff would have worked in coordination to determine appropriate development standards, and if necessary, mitigation measures to decrease inconsistency related items for the proposed project.

The applicant has not yet submitted the land use entitlements that would allow Inyo County to analyze the project as it relates to the current general plan and to incorporate any necessary development standards to decrease land use inconsistency related items.

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 are 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 county land use approvals, such as a General Plan Amendment and a rezone or in lieu of the rezone a Renewable Energy Permit or Renewable Energy Development Agreement and corresponding environmental review for the change in land use, staff does not have information to completely remedy this conflict or mitigate for potential impacts that were not accounted for in the County of Inyo's 2001 General Plan for development of this site.

In addition, for the project to be constructed the applicant would be required to submit a reversionary map to Inyo County in order to comply with the California Subdivision Map Act.

## Transmission Lines and Gas Pipelines

Although the HHSEGS project would be located on privately owned land in California, the transmission and natural gas lines, once they leave the HHSEGS site, would be located on public land managed by the BLM Southern Nevada District Office. Small

segments of the transmission line would be located within the city limits of Boulder City, Nevada.

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 project is called “Hidden Hills Transmission Project”. A Notice of Intent (NOI) was prepared and published in the Federal Register on October 11, 2011 and public scoping meetings were held in November, 2011.

The proposed Hidden Hills Transmission Project is located in both Nye and Clark counties in southern Nevada. The applicant for the Hidden Hills Transmission Project, Valley Electric Association, has requested a right-of-way authorization for the construction, operation, maintenance, and termination of transmission infrastructure improvements in Pahrump and Sandy Valley to Jean, Nevada, which would terminate at Eldorado Substation near McCullough Pass.

Two 230-kV transmission lines from the proposed solar power towers would be undergrounded and connected to the onsite common area switchyard before extending east into Nevada. A new 12- to 16-inch gas pipeline would exit the HHSEGS site from the common area and cross over the state line into Nevada.

As indicated, the natural gas pipeline and transmission line will be analyzed in a separate Environmental Impact Statement (EIS) prepared by BLM in accordance with NEPA. As part of this analysis, impacts related to land use within Nevada for the gas pipeline and transmission line will be assessed. The environmental analysis for the Hidden Hills Transmission Project is currently in process and a Draft EIS is scheduled for publication in June 2012.

### 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 a 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.

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 that it's consistent with the intent of the zoning ordinance. Inyo County has indicated that the project is inconsistent with the general plan and the zoning ordinance. Staff cannot make these findings on behalf of the county if it has been determined that the project as proposed is inconsistent with the general plan. There are remedies to this determination that the county has outlined in their letter to the Energy Commission dated November 29, 2011 (INYO 2011a).

Regardless of what land use applications were used to remedy any inconsistencies, the county would go through a public process to determine whether the project as proposed is consistent with applicable LORS. Inyo County would need to be make findings based upon information contained in the project entitlement application to ensure that the project would be appropriate and this would also include a determination on the compatibility with surrounding land uses. Inyo County would normally review the applicable land use entitlements and place restrictions or development standards necessary to adequately address any land use inconsistencies and compatibility issues. As part of these entitlements, the county would also go through a public process that could provide additional input on development standards to alleviate land use compatibility issues further.

Staff has reviewed these findings and has determined that the project, as proposed, is not consistent with applicable county LORS and required findings for land use compatibility. It is the applicants intent to submit appropriate land use entitlements for the proposed project to ensure that they will be consistent with Inyo County LORS.

Although staff has determined that the project is currently inconsistent with applicable LORS, staff has provided some analysis to assist with any determinations that may need to be made without the appropriate county approvals.

## 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. According to their Facebook page, the St. Therese Mission is in the process of constructing the various project buildings.

The siting of the proposed project at the existing location would not create significant adverse impacts in the following areas: **AIR QUALITY, HAZARDOUS MATERIALS MANAGEMENT, NOISE and VIBRATION, PUBLIC HEALTH, and TRANSMISSION LINE SAFETY and NUISANCE**. Please refer to those sections in this **PSA** for the detailed analyses of the air quality, dust, hazardous materials, noise, and public health hazards or 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 the Old Spanish National Historic Trail in California. The area adjacent to the site in Nevada is largely BLM designated wilderness areas 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 adjacent to current residences and would be visible from the surrounding BLM wilderness areas and the Old Spanish Trail. The Inyo County Zoning Ordinance requires a variance for structures over 30 feet in the OS zone and 35 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.

From a land use perspective, the proposed project could have a significant impact on surrounding land uses. The height of the power towers are substantially over the height limit in the OS zone and cannot be screened from the adjacent residents or the public that use the various recreational and wilderness areas within California and Nevada. If the applicant were to submit applications under Title 21, the county could implement development standards that take the place of the zoning ordinance if the project was consistent with the general plan, although it is unknown whether or not the county would determine that visual impacts could be lessened to any degree. Visual Resource staff have concluded that the project would have significant and unmitigable adverse direct and cumulative impacts that cannot be mitigated. 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.

## Military Special Use Airspace

A military airspace area, called R-2508 Special Use Airspace Complex, lies approximately 10 to 15 miles west of the project site. The airspace and associated land area is comprised 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, that 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. Anthony Parisi and a confirmation of this assessment was received from Mr. Parisi on February 8, 2012 (CEC 2012*l*). 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. Anthony Parisi stated that although a more formal review may be conducted, the formal response would likely not be any different. Please refer to the **TRAFFIC and TRANSPORATION** section of this document for further information.

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 Figures 1** and **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 | Less than one mile from HHSEGS, extending 9.7 miles to Highway 160, Nevada and beyond. | DEIS Pending (BLM lead) |

| Jurisdiction | Project | Project Description | Location/ Distance from Proposed HHSEGS Project Site | Status of Project |
|---|---|---|---|---|
| | | facilities. | | |
| Clark County (Nevada) | Sandy Valley (NVN090476) | Solar Power Tower Plant on 15,190 acres of 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[10]. 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 has filed a Right of Way (ROW) application with the BLM Las Vegas Field Office on September 9, 2010 for the development of a solar photovoltaic project approximately six 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 within BLM ROW along the California and Nevada state line. 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 introduce a

[10] Notice of Determination, Inyo County, Conditional Use Permit #2010-02//St.Therese Mission, June 23, 2010.

new 53.7 mile 500kV single-circuit transmission line from the Gamebird Substation to the El Dorado Substation near Boulder City, Nevada. A new 28.1 mile 230kV transmission line would run from the Gamebird Substation to Pahrump, replacing an existing 138kV line.

BLM plans to publish a draft Environmental Impact Statement (DEIS) for the VEA Hidden Hills Transmission Project on June, 2012. The DEIS will include an assessment of cumulative impacts of the projects planned in Nevada. At that time, Energy Commission staff will reference BLM's preliminary findings.

Another project under consideration along the Nevada border is the proposed BrightSource Energy (BSE) Sandy Valley project that will use BSE's proprietary "power tower" technology on BLM land along Highway 160. 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.

### 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 and 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 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 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 in Nevada. In addition, there are no projects adjacent to the proposed HHSEGS project in Nevada that would combine with the proposed project to create any land use inconsistencies or contribute to nuisance impacts related to noise, public health and safety, visual, air quality or hazardous materials.

## 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 earlier. When the plant is permanently closed, a decommissioning 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 the **PSA**) 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 172 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. The setbacks for 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 Tecopa Road (Old Spanish Trail Highway).

Staff is still in the process of obtaining information from the applicant and Inyo County to determine appropriate development standards. Staff has considered the information contained in these letters as it relates to land use and has incorporated these elements to the extent possible into this analysis.

## CONCLUSIONS AND RECOMMENDATIONS

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.

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).

The applicant has responsed to staff's data requests regarding land use inconsistencies by stating that they would work with Inyo County to determine appropriate land use entitlements. 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, Renewable Energy Ordinance.

## 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.

## 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 proposal to the CPM and Inyo County for review (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. The agreement shall allow 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, do not properly decommission the project or restore the property to its original 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 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 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 plan.

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 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.

## REFERENCES


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# NOISE AND VIBRATION

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 Preliminary Staff Assessment (PSA).

## 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.

[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:**<br>Occupational Safety & Health Act (OSHA): 29 U.S.C. § 651 et seq.<br><br>U.S. Environmental Protection Agency (USEPA) | Protects workers from the effects of occupational noise exposure<br><br>Assists state and local government entities in development of state and local LORS for noise |
| **State:**<br>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:**<br>Inyo County General Plan | Establishes acceptable levels for noise, based on land use.<br><br>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 decibel (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).

## SETTING AND EXISTING CONDITIONS

HHSEGS would be located on approximately 3,277 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

[3] The Inyo County General Plan may be accessed online at the following link - http://inyoplanning.org/general_plan/index.htm.

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 believes 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 | Highest Construction Noise Level $L_{eq}$ (dBA) [1] | Measured Existing Ambient, Average Daytime $L_{eq}$ (dBA) [2] | Cumulative, Construction Plus Ambient | Change |
|---|---|---|---|---|
| CR1 | 53 | 45 | 54 | +9 |
| M1 | 44 | 42 | 46 | +4 |

Sources: [1] 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, to 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, 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).

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 20 dBA represents a quadrupling in noise level, and would likely constitute an annoyance. Since pile driving is only a temporary operation lasting a week or two in the areas near the noise-sensitive receptors, staff believes that limiting pile driving to daytime hours would result in impacts that are tolerable to residents. Staff proposes Condition of Certification **NOISE-6**, below, to limit this operation to daytime hours.

### 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

[4] Title 21, Chapter 21.20.20, (Development Standards for Renewable Energy Development) of the Inyo County Code -- http://qcode.us/codes/inyocounty/

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, staff proposes Condition of Certification **NOISE--4** which limits the project's noise levels to the above predicted levels 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 following conditions of certification, 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**.

**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 **Method and Threshold 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. Because the project would operate during the daytime hours and would not operate at night, when people are trying to sleep, staff considers the above noise impacts at CR1 and M1 to be less than significant.

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. 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.

## 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 believes 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.

## FINDINGS

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** At least 15 days prior to the start of ground disturbance, the project owner shall notify all residents within one mile of the project site boundaries and ½-mile of the linear facilities, 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 until the project has been operational for at least one year.

**Verification:** 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 both the local jurisdiction and the CPM that 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 54 dBA $L_{eq}$ measured at or near monitoring location CR1 and an average of 52 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

[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.

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 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 site exceeds the above value during the above time period, mitigation measures shall be implemented to reduce noise to a level of compliance with this limit.

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 limit, 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.

Concrete pouring during hot summer days may be performed outside the above hours, with the 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, and the approximate distance of this activity to CR1 an M1.

**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.

**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).

## REFERENCES

HHSG 2011a – BrightSource Energy/J. Woolard (tn: 61756) Application for Certification, Volume 1 & 2. 08/5/2011

INYO 2011a – Inyo County/J. Hart (tn: 63054) Request for Agency Participation.11/29/2011 -- Inyo County 2011 – Inyo County General Plan, Public Safety Element

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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<br>Kitchen with Garbage Disposal Running | Loud |
| Freeway (100') | 70 | | Moderately Loud |
| Vacuum Cleaner (100') | 60 | Data Processing Center<br>Department Store/Office | |
| Light Traffic (100') | 50 | Private Business Office | |
| Transformer (200') | 40 | Quiet Residential Area<br>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 |
| Figures in this table are accurate to ± 1 dB. | |

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:

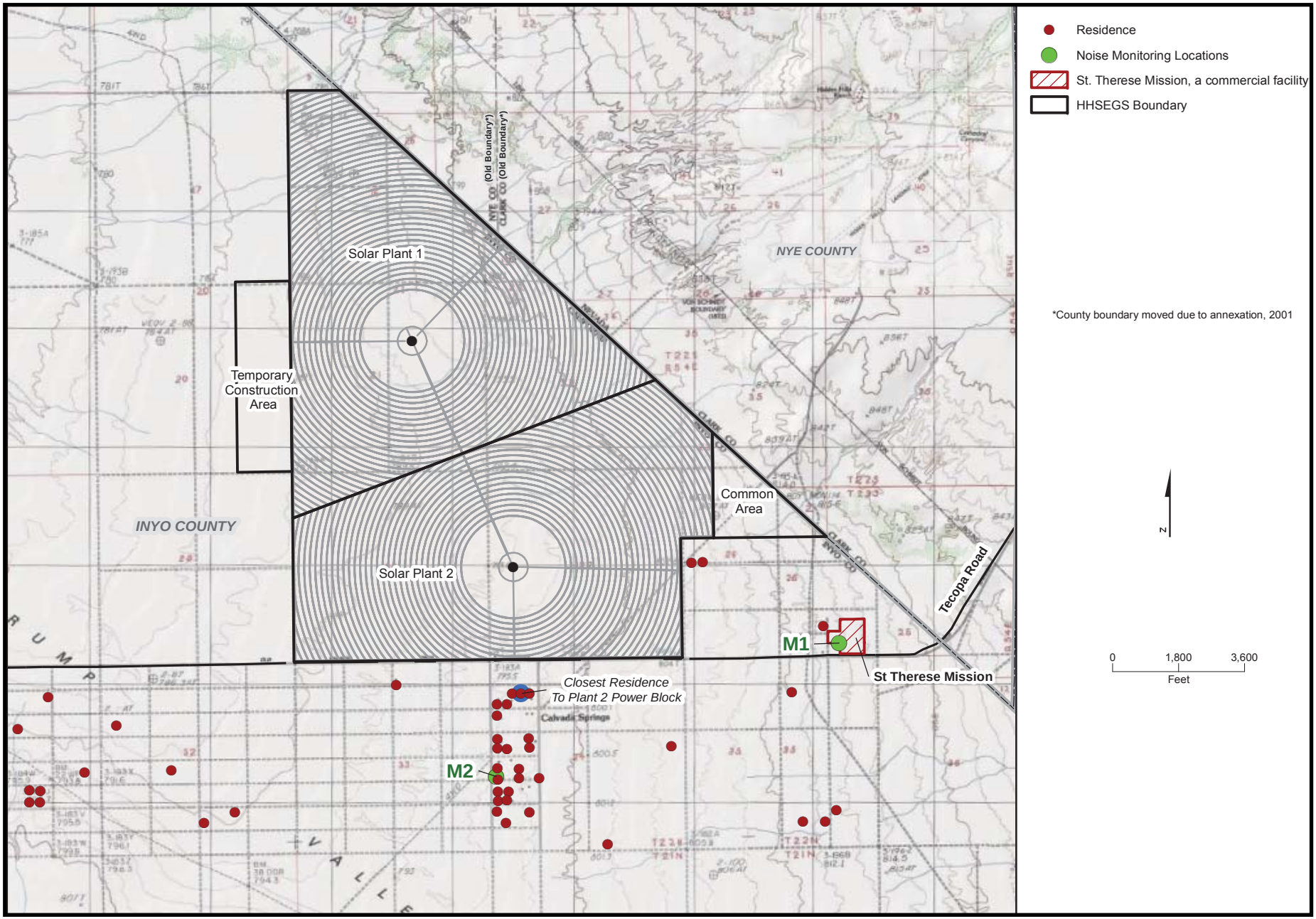
**Noise Table A4**
**OSHA Worker Noise Exposure Standards**

| 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




NOISE

**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: HHSEG AFC, Figure 5.7-1, August 2011

# PUBLIC HEALTH

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 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 Preliminary Staff Assessment (PSA) 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 addresses the potential impacts of regulated or criteria air pollutants in the **Air Quality** section of this PSA, and assesses 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 Hydrology** 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 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 | These regulations require a quantitative health risk assessment for new or modified sources, including power plants that emit one or more toxic air |

| Applicable Law | Description |
|---|---|
| Regulations (CCR) section 1752.5, 2300–2309 and Division 2 Chapter 5, Article 1, Appendix B, Part (1); California Clean Air Act, Health and Safety Code section 39650, et seq. | contaminants (TACs). |
| **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. |

## 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- to 16-inch in diameter and approximately 35.3 miles in total length (HHSG 2011a, section 2.0).

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 the HHSEGS property boundary is approximately 300 feet west of the project boundary. 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. The closest town to the project is Pahrump, Nevada, located approximately 8 miles 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 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 2004 and 2008. However, these rates (of 19.8 per 1,000,000, combined male/female) remain about 20 percent higher in Inyo County than the statewide average of 16.5 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, 2009) 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

[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.

purview or the expertise of the Energy Commission staff to duplicate the expertise and statutory responsibility of these agencies.

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 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 be 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. And staff would 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 $10 \times 10^{-6}$. 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 1million 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 how 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 fourth quarter of 2012 to the third quarter of 2015 (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 are 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 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**. They 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 $µg/m^3$. The cancer unit risk value from HARP for the assumed a 9-year exposure is 5.33x10-5 per $µg/m^3$, which is lower than the cancer unit risk of $3x10^{-4}$ $(µg/m^3)^{-1}$ 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 $µg/m^3$. 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 the 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 ($NO_2$).

[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 $µg/m^3$ × 5.33x10-5 per $µg/m^3$ = $7.41x10^{-6}$

**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.

HHSEGS is proposed for an area where the fungus that causes Valley Fever[3] (*Coccidioides immitis)* occurs naturally. Construction would disturb approximately 3,276 acres[4] of top soil which could harbor the spores of this fungus possibly exposing humans to the risk of Valley Fever. On-site workers could be exposed from inhaling these fungal spores from wind-blown dust generated from soil excavation work. To minimize the potential for getting Valley Fever, staff would recommend that workers in the vicinity of such dust generation areas wet the soil before any excavation activities and wear protective masks as appropriate. Staying indoors during dust storms and closing all doors to avoid dust inhalation are measures recognized by the regulatory agencies as effective against Valley Fever in endemic areas where the risk of human exposure cannot be eliminated altogether. Staff considers the applicant's dust suppression plans as adequate to minimize the risk of contacting Valley Fever as generally happens in endemic areas. Please refer to staff's **Worker Safety and Fire Protection** section for more information.

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 Management** section 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

[3] Valley fever is an infection that occurs when the spores of the fungus Coccidioides immitis enter human body through the lungs.
[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 section 5.6).

emission from the facility. The other sources would include specific operational and maintenance activities necessary to operate and maintain the proposed and similar 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.

The potentially emitted pollutants 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.

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 Environmental Protection Agency (EPA) AP-42 database of emission factors. **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 4**
**The Main Pollutants Emitted from the Proposed Project**

| Criteria Pollutants | Non-criteria Pollutants |
|---|---|
| Carbon monoxide | Acetaldehyde |
| Oxides of nitrogen | Acrolein |
| Particulate matter | Ammonia |

[5] Million British thermal units, stands for one million BTUs. BTU is a standard unit of measurement used to denote both 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.

| | |
|---|---|
| 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

**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, consumption of locally grown plant foods, 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)<br>300 (8-hr) |
| Acrolein | — | 0.35 | 2.5 (1-hr)<br>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)<br>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 and the U.S. Environmental Protection Agency (EPA). 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, n.d.) 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 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, the sensitive receptors, the 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. Its consideration as a potential sensitive receptor location is from the fact that it would include a chapel, garden, restaurant, a visitor's center that will include a children's playground, and a 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 common facility area), and three diesel fire pump engines (one in 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 relatively 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 and receptor, 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)
- 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 (per million) | Chronic HI | Acute HI[a] | Cancer Risk (per million) | Chronic HI | Acute HI |
| **PMI** | 2.64 | 0.0013 | 0.0028 | 2.8 | 0.001 | 0.003 |
| **Nearest residence[b] 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 will not involve air permits include the Pahrump Valley General Aviation Airport (approximately 10 miles away) and the Element Power Solar Project (approximately 6.5 miles away). 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, staff does not expect their additive impacts to be significant.

As discussed above, the contribution of HHSEGS to both cancer risk and chronic and acute 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.

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 will 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

No comments have been received from the public or from agencies regarding public health.

## PROPOSED FINDINGS OF FACT

Based on the staff's analysis, we recommend 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 |
| 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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# SOCIOECONOMICS

Steven Kerr

## 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, or parks, and would not have a socioeconomic impact on any environmental justice population. 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.

Staff expects to provide additional analysis of impacts to law enforcement and emergency medical services prior to the Final Staff Assessment (FSA), pending review of the Site Security Plan and the applicant's submittal of a Fire Protection and Emergency Services Risk and Needs Assessment. HHSEGS would both create new fiscal revenues for Inyo County as well as new costs associated with providing project-related services and infrastructure. Staff is preparing a fiscal and economic analysis to determine the benefits and the costs of the HHSEGS to Inyo County. This analysis will be available in the FSA.

Staff-proposed Condition of Certification **SOCIO-1** would ensure project compliance with state and local laws, ordinances, regulations, and standards (LORS).

## 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. The subject areas of utilities, fire protection, water supply, and wastewater disposal are analyzed in the **Reliability**, **Worker Safety and Fire Protection**, and **Water Resources** sections of this document.

## 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, §§ 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 26 miles[1] south of Pahrump, Nevada, and approximately 45 miles west of Las Vegas, Nevada. A sparsely populated rural residential subdivision, 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 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) and the remainder of the county grew 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).

While Inyo County is the second largest county in California in land area, it has the sixth smallest population of counties in California. Because much of the land in Inyo County is publicly owned and with a relatively small population, Inyo County is reliant on a tax base that is much smaller than many other counties in California. This can result in budgetary challenges for the county when trying to provide

[1] 26 miles is the driving distance from the proposed project to Pahrump. 8 miles is the direct distance from southern Pahrump to the proposed project's Solar Field 1.

services to remote areas within its borders that would not be of as much concern in other California counties with larger populations and budgets, such as San Bernardino County 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).

Staff defines the study area related to project impacts on population and housing as Inyo County, the California communities 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 of 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 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 radius 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*

[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.

*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 one or more U.S. Census blocks in the potentially affected area have a minority population greater than fifty percent. The 2010 Census shows the total population in California within the six-mile radius of the proposed site is 68 persons, with a minority population of 16 persons, or about 24 percent of the total population (US Census 2010c). (See **Socioeconomics Figure 1**). **Socioeconomics Table 2** presents the minority population data for the portion of Nevada within the six-mile radius and data for communities and counties in a larger geographic area. **Socioeconomics Figure 1 and Socioeconomics Table 2** do not indicate the presence of a minority population and there would be no socioeconomic impacts resulting from the construction or operation of the proposed project to an environmental justice population.

**SOCIOECONOMICS Table 2**
**Minority Populations within the Project Area**

| Area | Total: | White alone | Minority | Percent Minority |
|---|---|---|---|---|
| Six-Mile Radius- CA Only | 68 | 52 | 16 | 23.53 |
| Six-Mile Radius- CA and NV | 782 | 603 | 179 | 22.89 |
| 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

[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

poverty threshold. **Socioeconomics Table 3** presents poverty data for Inyo County, plus Clark and Nye counties.

**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.

## 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:

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).

- 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 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, staff included construction trades from the Bakersfield MSA (Kern County) 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]<br>2,325,456[H4] | 1,979,045[L4]<br>3,066,872[H4] | 27,776[L4]<br>1,115,603[H4] | 1.42[L4]<br>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 | Insulation Installer | Iron Worker[1] | Laborer | Millwright[2] | Painter | Pipefitter[3] | Plumber[3] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern Sierra Region (Alpine, Inyo, and Mono counties) | | | | | | | | | | | |
| Total Workforce, 2008 | 860 | 270 | 860 | 50 | - | 860 | 120 | - | 110 | 50 | 50 |
| Total Projected Workforce, 2018 | 840 | 270 | 840 | 40 | - | 840 | 130 | - | 100 | 50 | 50 |
| Growth from 2008 | -20 | 0 | -20 | -10 | - | -20 | 10 | - | -10 | 0 | 0 |
| Percent Growth from 2008 | -2.33 | 0 | -2.33 | -20 | - | -2.33 | 8.33 | - | -9.09 | 0 | 0 |
| Bakersfield MSA (Kern County) | | | | | | | | | | | |
| Total Workforce, 2008 | 13,680 | 1,780 | 470 | 2,300 | - | 13,680 | 3,780 | 660 | 760 | 810 | 810 |
| Total Projected Workforce, 2018 | 14,710 | 1,920 | 490 | 2,390 | - | 14,710 | 4,340 | 800 | 760 | 870 | 870 |
| Growth from 2008 | 1,030 | 140 | 20 | 90 | - | 1,030 | 560 | 140 | 0 | 60 | 60 |
| Percent Growth from 2008 | 7.5 | 7.9 | 4.3 | 3.9 | - | 7.5 | 14.8 | 21.2 | 0 | 7.4 | 7.4 |
| Las Vegas-Paradise MSA | | | | | | | | | | | |
| Total Workforce, 2008 | 67,891 | 17,456 | 3,196 | 6,676 | 964 | 1,220 | 7,414 | 686 | 3,689 | 5,781 | 5,781 |
| Total Projected Workforce, 2018 | 66,402 | 17,360 | 3,151 | 6,356 | 872 | 1,296 | 6,745 | 744 | 3,772 | 5,515 | 5,515 |

| | Boilermaker[1] | Carpenter | Cement Finisher | Electrician | Insulation Installer | Iron Worker[1] | Laborer | Millwright[2] | Painter | Pipefitter[3] | Plumber[3] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Growth from 2008 | -14,890 | -96 | -45 | -320 | -92 | 76 | -669 | 58 | 83 | -266 | -266 |
| Percent Growth from 2008 | -2.19 | -0.55 | -1.41 | -4.79 | -9.54 | 6.23 | -9.02 | 8.45 | 2.25 | -4.6 | -4.6 |
| Total Projected Workforce, 2018 for All Three MSAs | | | | | | | | | | | |
| | 81,952 | 19,550 | 4,481 | 8,786 | 872 | 16,846 | 11,215 | 1,544 | 4,632 | 6,435 | 6,435 |
| Total # of Workers for Project Construction by Craft* | | | | | | | | | | | |
| | 234 | 24 | 55 | 247 | 37 | 54 | 36 | 24 | 4 | 287 | 2 |

Notes: - Data not available. No data available for Equipment Operator and Instrument Tech
[1]Construction Trades Workers, [2]Industrial Machinery Mechanics, and [3]Plumbers, Pipefitters, and Steamfitters.
*Largest number of workers by trade by month plus 30 Equipment Operators and 33 Instrument Techs needed for project construction (CH2 2011e).
Source: CA EDD 2010, NDETR 2008, CH2 2011e.

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 first 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). Table 5.10-16 in the AFC identifies the number of workers needed at the project site. The workforce need would range from a high of 1,033 workers in month 14, a low of 35 workers in month 29, and an average of 637 workers during the entire 29-month construction period.

As stated above, the applicant has selected Bechtel as the engineering, procurement and construction contractor for the project, and Bechtel would likely enter in to a Project Labor Agreement that would use a union workforce. Because of the union structure and their construction workforce dispatch rules, the construction labor would come from California. As shown in **Socioeconomics Table 5**, the labor force within the Eastern Sierra Region, Bakersfield 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 area during project construction, 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 HHSEGS. An operations workforce of 120 workers would be needed for the project.

**SOCIOECONOMICS Table 6**
**HHSEGS Plant Operation Workforce**

| Operations Workforce | |
|---|---|
| MWM Operators | 42 |
| Technicians | 24 |
| Support Staff | 6 |
| Warehouse & Maintenance Staff | 13 |
| Administration & Support Staff | 35 |
| TOTAL | 120 |
| 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.<br>Source: CH2 2011e pg. 18 | |

The applicant estimates that most of the operation workforce would come from Las Vegas in Clark County as well as from the rural areas in 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 9** shows, the housing counts in the project area indicate a greater supply of available housing units than demand.

**Socioeconomics Table 10** 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 9 and 10**.

**SOCIOECONOMICS Table 9**
**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 |

| Geographic Area | Total | Occupied | Vacant | Percent Vacant |
|---|---|---|---|---|
| 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 10**
**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 |
| 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 near the project site or in 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 11 and 12** present the available temporary lodging within an approximately one-hour commute range from the project site. **Socioeconomics Table 11** shows there are over 148,000 motel/hotel rooms within one-hour commute of the project site; **Socioeconomic Table 12** shows abundant RV park spaces within a two-hour commute of the project site.

**SOCIOECONOMICS Table 11**
**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 12**
**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

Using the Ivanpah project as a precedent, the letter from the BTC indicates that if there is a Project Labor Agreement, construction work would be scheduled on a four-day per week, 10-hour per day basis. This would result in many construction workers commuting to the site Monday morning, seeking nearby lodging for three nights, then heading for home Thursday afternoon. 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 120 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 (114 employees) would come from Nye and Clark counties and 5 percent (6 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 9 and 10**, 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.

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. The County has also stated that the Tecopa Campground is designed to support transient use and does not have the sewer system capability to handle full-time use. Staff recognizes the county's concerns regarding the unsuitability of the Tecopa Campground for long-term use. Staff has identified a more than 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 reside temporarily in available housing, near commercial services, and would not significantly impact Inyo County social services.

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 schools and parks. Until staff has reviewed the Site Security Plan and the Fire Protection and Emergency Services Risk and Needs Assessment and discussed these documents with the Inyo County Sheriff's Department, Southern Inyo Fire Protection District, and Worker Safety and Fire Protection staff, staff cannot conclude that the proposed project would not significantly impact emergency medical and law enforcement 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 analyzed in the **Worker Safety and Fire Protection** section of this document.

### *Emergency Medical Services*

Affected Environment

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, pg. 14). A response from the Tecopa Station, 26 miles from the project site, would take about 30 to 40 minutes (HHSG 2011a, pg. 5.16-21, 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. All firefighters in SIFPD have first response medical training called Basic Life Support (BLS) training. All personnel currently respond as volunteers who are on call 24 hours per day, seven days per week. 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 Fire and Emergency Services Risk and Needs Analyses (FESNA) on May 9, 2012. 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 Pahrump Valley Rescue Services (PVRS) 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 established.

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 response time from Pahrump Valley is approximately 30 to 45 minutes (HHSG 2011a, pg. 5.10-

17). PVFRS is the closest responder to the project site with ALS capabilities and are staffed 24 hours a day. PVFRS would respond to trauma or industrial accidents with an ALS ambulance, Heavy Rescue, and can request a helicopter if necessary and based on their 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. For more information about traffic related impacts please see the **Traffic and Transportation** section of this document.

SIFPD is currently working on their own needs assessment and plan to meet with the applicant to have further discussions once the assessment is complete (CEC 2012h).

The SIFPD has not yet reviewed and commented on the FESNA. Discussions are ongoing and at this time, staff cannot fully assess the potential project impacts to emergency medical services.

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

Due to the minimal resources of the local SIFPD, staff agrees with the SIFPD that the anticipated emergency response requirements of HHSEGS would likely create a significant public impact. However, staff requires the review and comment of the local SIFPD on the applicant's plans. The applicant and SIFPD have met, and are continuing to meet, to discuss how best to provide services and address impacts. They have not yet reached an agreement.

Staff expects to receive comments from SIFPD regarding potential impacts and mitigation in the near future that will then enable staff to make the necessary detailed analysis of potential impacts and recommended mitigations, if the applicant and SIFPD fail to reach an agreement. Most of the transmission line and natural gas pipeline linears are 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 will be conducted by the BLM. For more information about 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, which is approximately 34 miles from the project site. There are two deputies stationed in Shoshone who are responsible for a 3,200 mile area to the west of the substation. 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).

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 applicant confirmed that staff at the San Bernardino

County Sheriff's office in Barstow would respond to any law enforcement incidents at the Ivanpah construction site.

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. 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).

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.

Depending on factors such as the number of security patrols, type of fencing, and lighting, the Sheriff may be willing to adjust his office's anticipated needs. However, he clarified no matter how comprehensive the site security plan is, the project's security force would still be limited in their authority; and a strong sheriff's office presence would still be necessary to adequately serve the project. For example, if an on-site security guard caught someone stealing or damaging the site, the security guard would need to call the sheriff's office to come take a report and arrest the individual, if the project owner (or construction contractor) wanted to press charges.

Conclusion

On April 16, 2012, the applicant submitted the Site Security Plan (ESH 2012e) under confidential cover, which staff, the Inyo County Sheriff and Southern Inyo Fire Protection District are all reviewing. The applicant also intends to schedule a meeting with the Inyo County Sheriff to brief him on the plan. As discussions are ongoing at this time, staff cannot fully assess the potential project impacts to law enforcement services. Staff anticipates receiving additional information to help determine impacts to sheriff services prior to the FSA, and plans to discuss this issue at the forthcoming PSA Workshop on June 14, 2012 in Pahrump, Nevada.

### *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 13** shows the current district enrollment and calculated capacity available for each school.

**SOCIOECONOMICS Table 13**
**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 13** shows, the district is within capacity, but the elementary and special/alternative education schools are above capacity.

**SOCIOECONOMICS Table 14**
**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 15** shows the enrollment and available capacity for each of the Pahrump Valley schools.

**SOCIOECONOMICS Table 15**
**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. With the Project Labor Agreement, it is likely that the work would be scheduled on a four day-per-week, 10 hour-per-day basis. and would allow construction workers who have temporarily relocated during the construction period to commute to the site Monday morning then head home Thursday afternoon. 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

A total of 120 workers are needed to operate the HHSEGS once constructed. The AFC states that five percent of the 120 operational employees (six 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 to six students to the Death Valley Unified School District. As shown in **Socioeconomics Table 6**, 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). Each department head who contributed to the letter presented an estimate of the fiscal impacts of construction and operation of the HHSEGS on their department to the Board of Supervisors at the March 13, 2012 public meeting. Department heads and representatives from the County also attended the May 9, 2012 Issues Resolution Workshop to present and discuss their estimates. 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 offices and resources are concentrated within the communities of Independence and Bishop, more than 200 miles northwest of the project site. Inyo County has identified fiscal impacts to the Assessor's Office,

Health and Human Services, Information Services, and the Inyo County Motor Pool Program as a result of construction and operation of the HHSEGS.

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 south eastern 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 has the requisite information they need to understand the potential impacts from the project. At the April 26 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. The applicant, staff, and Inyo County are still working together to provide information that may help mitigate or avoid impacts to the sheriff and fire services, and the costs to Health and Human Services, information services, the assessor's office, and the county motor pool. To help quantify economic and fiscal impacts the county noted in its February 16 letter, staff is preparing a fiscal and economic analysis of the project, which will be available in the FSA.

The February 16, 2012, letter from Inyo County also included preliminary cost estimates from the Inyo County departments of Public Works, Agriculture, Waste Management, and Water. These comments are addressed in the **Traffic and Transportation**, **Biological Resources**, **Waste Management**, and **Soils and Water Resources** sections of this document, respectively.

## 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. According to the AFC, HHSEGS construction is anticipated to begin in the first quarter of 2013 and continue through the fourth quarter of 2015 (HHSG 2011a, pg. 5.10-19). 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 come from unions in the counties of Kern, Inyo, and Mono, which the BTC serves. If there were no Project Labor Agreement, most of the workforce would be expected to come from Clark and Nye counties in Nevada. Additionally, the operations workforce is expected to primarily come from existing available workers in Clark and Nye counties. Furthermore, 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 workforce construction.

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 16** 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 16**
**Cumulative Socioeconomic Projects**

| ID # | Project Name | Peak Construction Workers | Operation Workers | Construction Begin | Construction End |
|---|---|---|---|---|---|
| | **HHSEGS** | **1,033** | **120** | **1st 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** | **2,929-3,249** | **207-240** | | |
| Source: US BLM 2012a, US BLM 2012b, US BLM 2012c, LADWP 2010 | | | | | |

The applicant estimates a peak construction workforce of 1,033 workers during HHSEGS construction. An operations workforce of 120 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 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 law enforcement and emergency services and would contribute to a cumulative impact in these areas.

## 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 third quarter of 2013 and the first 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 first quarter of 2014 and third quarter of 2014. **Socioeconomics Table 17** presents the IMPLAN results presented in the AFC for Inyo County and grouped Clark and Nye counties together. These IMPLAN results are based on the applicant's assumption that 95 percent of the construction workforce would be drawn from Nevada. If there is a Project Labor Agreement and the workforce is drawn from California instead, some of the fiscal benefits would be shifted from Nevada to California.

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).

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 is currently preparing a fiscal and economic analysis of impacts on Inyo County services, which will be available for review in the FSA.

**SOCIOECONOMICS Table 17**
**HHSEGS Economic Benefits (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: | | | |
| Construction (annual) | $733,150 | $14,180,540 | $14,913,690 |
| Operation (annual) | $410 | $38,990 | $39,400 |
| School Impact Fees (estimated) | $11,126.31 | $ 0 | $ 11,126.31 |
| Non-Fiscal Benefits | | | |
| Total capital costs | $2.7 billion | $ 0 | $ 2.7 billion |
| Construction payroll | $8.1 million | $ 153 million | $ 161 million |
| Operations payroll (annual) | $782,610 | $14,869,560 | $15,652,170 |
| Construction materials and supplies | $9.5 million | $179.8 million | $189.2 million |
| Operations and maintenance supplies (annual) | $27,000 | $513,000 | $540,000 |
| Direct, Indirect, and Induced Benefits | | | |
| Estimated Direct Benefits | | | |
| Construction Jobs (average) | 32 | 605 | 637 |

| | | | |
|---|---|---|---|
| Operation Jobs | 6 | 114 | 120 |
| Estimated Indirect Benefits | | | |
| Construction Jobs | 18 | 347 | 365 |
| Construction Income | $711,110 | $14,303,860 | $15,014,970 |
| Operation Jobs | 0 | 2 | 2 |
| Operation Income | $6,100 | $139,040 | $145,140 |
| Estimated Induced Benefits | | | |
| Construction Jobs | 12 | 398 | 410 |
| Construction Income | $399,200 | $17,105,240 | $17,504,440 |
| Operation Jobs | 3 | 107 | 110 |
| Operation Income | $109,490 | $4,616,900 | $4,726,390 |
| Source: HHSG 2011a, CEC 2011bb | | | |

## 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 is currently preparing a fiscal and economic analysis of project-related impacts on Inyo County services, which will address property taxes paid by the HHSEGS. This analysis will be available in the FSA.

## RESPONSE TO AGENCY AND PUBLIC COMMENTS

As of the publication of the Preliminary Staff Assessment (PSA), staff has not received any public comments regarding socioeconomic issues. Staff solicited comments from the Inyo County Sheriff and SIFPD regarding their ability to provide services for the project. Staff received a letter from SIFPD on February 15, 2012 and a letter from Inyo County including comments from the Sheriff on February 16, 2012; their comments are included in this analysis.

## PROPOSED FINDINGS OF FACT

Staff cannot conclude whether the HHSEGS would significantly impact law enforcement and emergency services at this time. However, 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, 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.

## 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.

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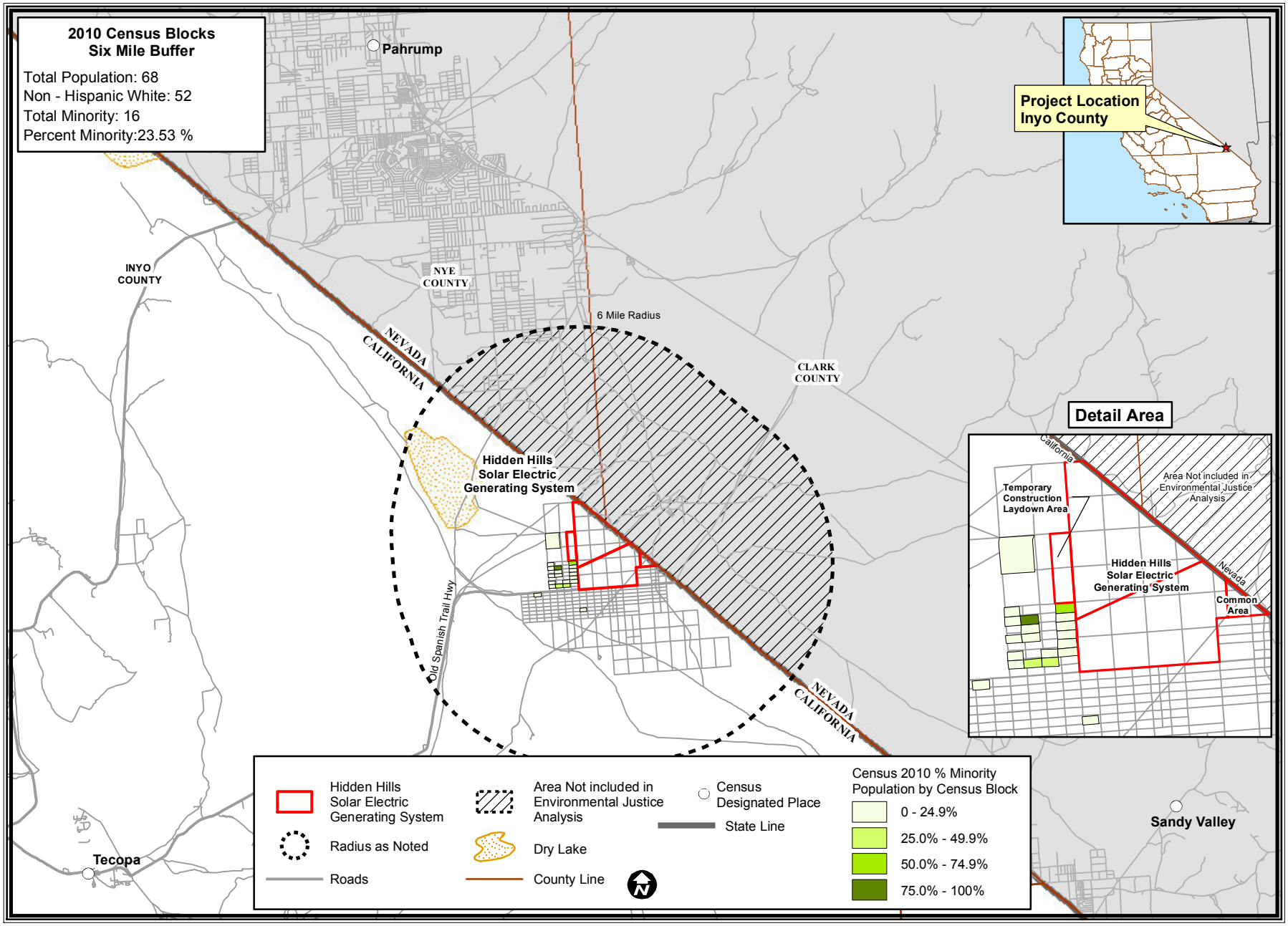
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## SOCIOECONOMICS - FIGURE 1

Hidden Hills Solar Electric Generating System (HHSEGS) - Census 2010 Minority Population by Census Block - Six Mile Radius



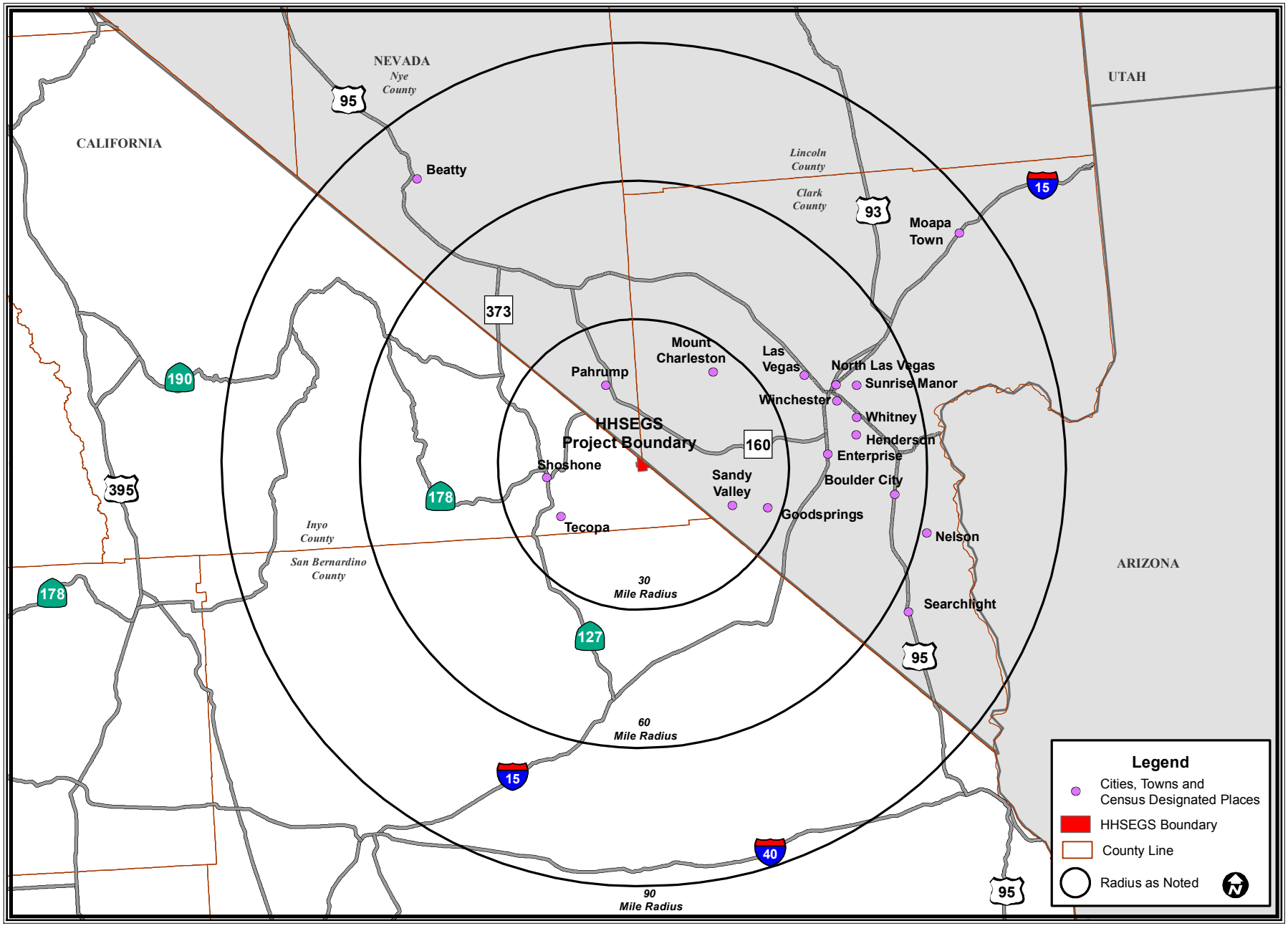

SOCIOECONOMICS

**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

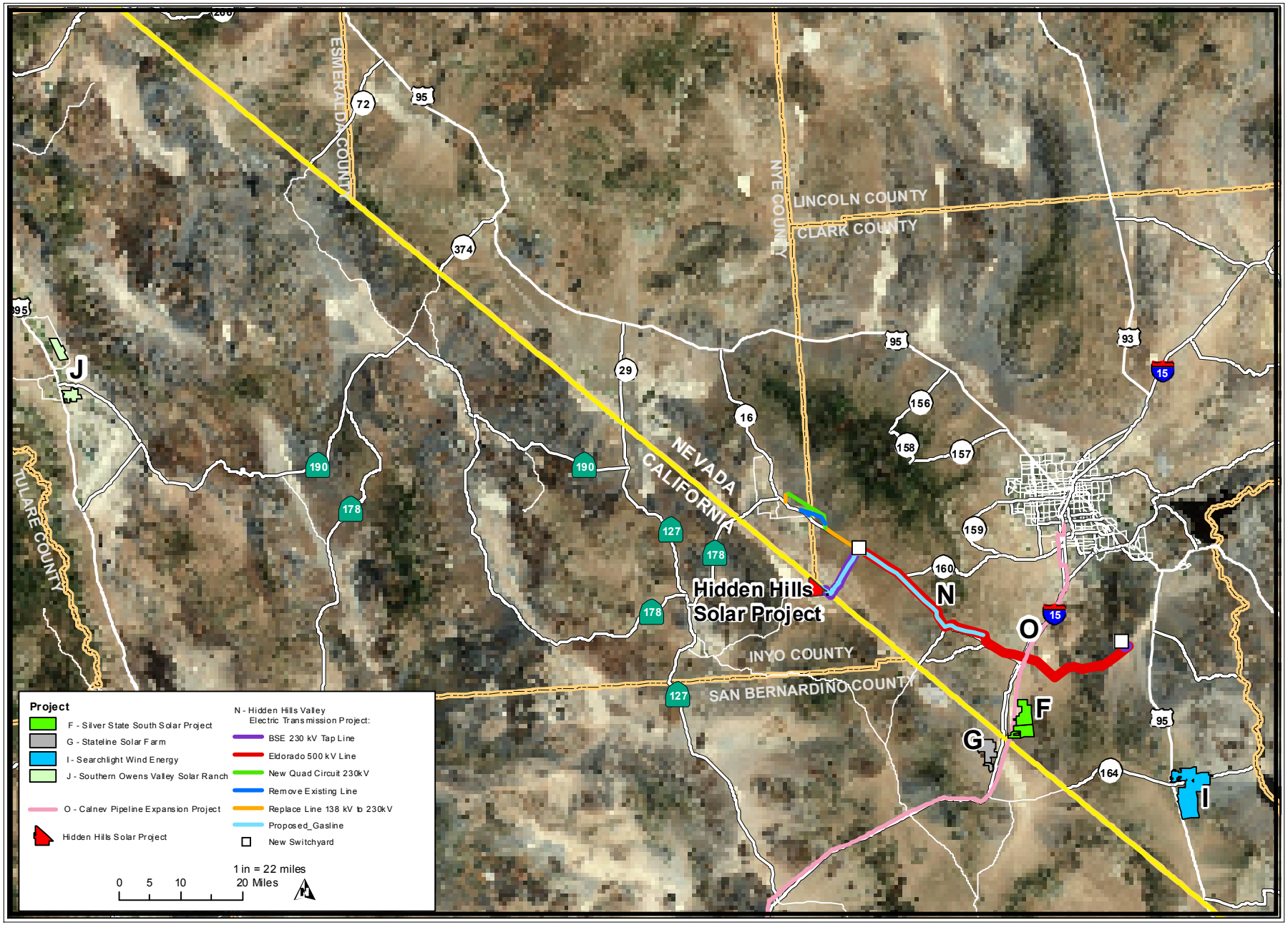



**CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

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

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 Preliminary 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 and 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 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. In addition, the project would avoid significant adverse impacts which could result from offsite flooding. Compliance with staff proposed Conditions of Certification **SOILS-1** through **-8** would reduce or avoid impacts to less than significant of soil erosion, contact runoff, discharge wastewater during construction and operations. Condition of Certification **SOILS-5** would reduce potential storm water impacts from damaged heliostat assemblies.

If U.S. Army Corp of Engineers and Lahontan Regional Water Quality Control Board determine that additional mitigation measures would be necessary to protect onsite water resources, staff may propose a Condition of Certification requiring those additional mitigation measures in order to reduce potential impacts.

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 Preliminary Staff Assessment (PSA) 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 **PSA** 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 states that the State must 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 and are routed within the 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 drain 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 entire Pahrump Valley watershed is contained in both California and Neveda. 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, both existing and potential, are listed in **Soils & Surface Water Table 2**. Basin Plan does not identify a receiving water for the Pahrump Hydrologic Unit.

**Soils & Surface Water Table 2**
**Lahontan RWQCB Basin Plan Beneficial Use Designation for 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 |

| Existing or Potential Beneficial Uses | Description |
|---|---|
| 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

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 (HHSG 2011a § 5.11.3). The remainder of the site is mostly bare soil with sparse natural vegetation, similar to the surrounding area. 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).

## Soil Features

The Project site is situated on 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 2011a)

**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. |
| 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 an onsite investigation to prepare a Preliminary Geotechnical Evaluation 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. Table 5.11-2).

## 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 (HHSG 2011a § 5.11.4.4). 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.

A total of 80 ephemeral washes were mapped in the project area by the applicant and identified as potential "Waters of the State." 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**. The California Department of Fish and Game is currently reviewing the project to determine whether any of the onsite washes are "Waters of the State". For further discussion on the jurisdictional determination, please refer to the **BIOLOGICAL RESOURCES** section of this PSA.

The Federal Emergency Management Agency (FEMA) prepares 100-year flood maps for flood insurance purposes and for floodplain management use by local agencies. FEMA map panels 06027C-4625D and 06027C-4175D cover the project site. Two areas, located at the north tip of the site and the southwest corner of the site (see **Soils & Surface Water Figure 3**) have been mapped by FEMA as Zone A, which means 100-year flood zone with no base flood levels determined. These are considered approximate flood zones.

FEMA maps do not cover all floodplains. The applicant completed a Preconstruction Hydrology Analysis that modeled onsite peak flows, runoff volumes, maximum velocities and maximum depths during more frequently occurring storm events. **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 4**). The majority of runoff flows through the southern portion of the site due to offsite flows originating from the east.

**Soils & Surface Water Table 5**
**Estimated Peak Discharge along Western Boundary**

| **Rain Event** (percent occurrence[1)] | **100-year** (1%) | **25-year** (4%) | Compared to 100-year | **10-year** (10%) | Compared to 100-year |
|---|---|---|---|---|---|
| CS4 | 778.1 cfs | 515.6 cfs | 66% | 313.9 cfs | 40% |
| CS5 | 251.5 cfs | 111.4 cfs | 44% | 52.3 cfs | 21% |
| CS6 | 5590.3 cfs | 2578.3 cfs | 46% | 1227.3 cfs | 22% |
| CS7 | 5241.3 cfs | 1976.9 cfs | 38% | 941.3 cfs | 18% |

(Source: HHSG 2011a)
Note 1: The probability of the rain event occurring in any given year.
cfs – cubic feet per second

## Groundwater Resources

For a detailed discussion of the regional groundwater resources, refer to the **WATER SUPPLY** section of this **PSA.**

# PROJECT DESCRIPTION

BrightSource Energy, Inc. (the applicant) proposes to construct the Hidden Hills Solar Electric Generating System (HHSEGS), located on approximately 3,277 acres (5.12 square miles) 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 near each Solar Plant occupying approximately 8.5 acres each (HHSG 2011a § 2.1.2.3).

Refer to the **PROJECT DESCRIPTION** section of this **PSA** 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 § 2.0) and the applicant's related supplemental material.

# PROJECT CONSTRUCTION

Construction of HHSEGS is expected to take place from the first quarter of 2013 to the second 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 § 2.4.1.1).

### 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 § 2.4.2).

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[1], 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 § 2.4.2).

Solar field development would maintain unobstructed sheet flow, with water exiting the site 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 § 2.4.2).

### Solar Fields – Roads

The HHSEGS project would contain three main types of roads (see **Soils & Surface Water Figure 5**):

- 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 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 § 5.15.3.2.2).

### 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

[1] Grubbing of vegetation includes the removal any remaining roots or stumps after cutting vegetation to clear land.

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)[2]. 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. 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. 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 §§ 5.11.4.6.3, 5.13.3.2.2).

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 would be comprised of 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§ 5.13.3.2.2).

### 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 § 5.11.4.6.1).

Similar to the power plant sites, storm water management for the administration complex would include a permanent diversion channel comprised of 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 § 5.11.4.6.4).

### 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 at each power plant site.

[2] 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.

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 § 2.1.2.3).

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 once all heliostats are installed onsite and the project is complete (HHSG 2011a § 5.11.4.6.4 ).

**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 6** are located along onsite 20-ft wide paved access roads (CH2 2012u).

***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 (BLM 2011) including:

- Approximately 9.7 miles of new 230 kilovolt (kV) transmission line from the HHSEGS project site to a new ten acre BrightSource Tap Substation
- Approximately 53.7 miles of new 500 kV transmission line from the proposed Tap Substation to the existing Eldorado Substation
- Underground installation of 9.3 miles of 12-inch natural gas pipeline and 26 miles of 36-inch natural gas pipeline
- Construction and operation of new and existing access roads along each of the proposed transmission alignments

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. Because the proposed transmission facilities would be on BLM land, the project is

considered a federal action 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 | Soil Disturbance Area (construction activities) | Impervious Area (post-construction) |
|---|---|---|---|
| Solar Field – Heliostats | 2,994 acres | negligible[1] | 806 acres[2] |
| Solar Field – Roads<br>Paved Roads<br>Dirt Roads | | 16 acres<br>189.2 acres | 16 acres<br>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)

Note 1: No grading required. All-terrain vehicles would install pylons and mount heliostat assembles. Assuming negligible soil disturbance.
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 roads. Soil disturbance area of these linear facilities is considered concurrent with the paved 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, and piping and vessel hydrostatic test water. 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. Hydrostatic test water, approximately 400,000 gallons total for both solar plants, 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. Commercial operation is estimated to begin in First Quarter 2015 for Solar Plant 1 and Second Quarter 2015 for Solar Plant 2. It is anticipated that the facilities would normally operate at high average annual capacity factors during periods of sunlight (HHSG 2011a).

### Soil Erosion

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. 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.

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.

### Storm Water Control

As discussed above, permanent diversion channels would be constructed around Solar Plant 1, Solar Plant 2, and the administration complex. These would be maintained during the operational life of HHSEGS. Periodic maintenance would be conducted as 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).

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. 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 § 5.11.4.6). An onsite retention area would be created along the western site boundary by elevating the middle two-thirds of the western perimeter roadway above existing grade. The berm created by the elevated roadway would address the increase in peak flows from project development by retaining runoff and allowing water to infiltrate and evaporate (HHSG 2011b § 5.15.3.2.2).

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 § 5.11.4.5).

## 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

### General Facility Drainage

Each HHSEGS Solar Plant would collect contact[3] runoff from the power block to prevent this potentially contaminated water from comingling with non-contact storm water runoff. The contact runoff would be collected along with wastewater from the plant's raw water use (such as equipment wash water, if cleaning chemicals are not used) through a system of drains, hub drains, sumps, and piping and routed to the oil/water separator, and then to the waste collection tank. From there, the water would flow to a thermal evaporator system with the process wastewater (HHSG 2011a § 5.14.4).

### Process Wastewater

The primary wastewater collection system would collect process wastewater from all of the solar plant equipment, including blowdown[4] from the SRSG, natural-gas-fired boiler,

[3] 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).

[4] 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.

demineralization, auxiliary cooling system, and water treatment equipment. Additional sources of wastewater include oil/water separator effluent from power block storm water runoff and equipment washing. 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 planned treatment scheme (HHSG 2011a § 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. 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 to construction or site workers (refer to the **WASTE MANAGEMENT** section of this **PSA** 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 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.

## METHOD FOR DETERMINING SIGNIFICANCE

Impacts leading to soil erosion or depletion or degradation of water resources are among those staff believes could be most potentially significant soil and water resource issues associated with the HHSEGS. The determination of significance for these issues 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 **PSA**). 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.

To evaluate if significant CEQA impacts to soil or water resources would occur, the following questions were addressed. Where a potentially significant impact was identified, staff or the applicant proposed mitigation to ensure the impacts would be less than significant.

- 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?

## 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 by applying threshold criteria 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 slopes. 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 stormwater run-on or onsite stormwater 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 position and to promote the sheet flow of stormwater 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 by Valley Electrical Association for the Hidden Hills Valley Electrical Transmission Project activities in Nevada.

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)[5] have been determined by the SWRCB and RWQCBs to be the most effective, practical

[5] 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.

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 will 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, several changes to the project have occurred such as the facility layout and basic shape of each power block, the undergrounding and new alignment of onsite linear facilities, relocation of the project switchyard, and modifications to the west perimeter retention area. 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 **PSA** 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.

The estimated amount of total soil disturbance 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 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 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 an approved DESCP accordance with Condition of Certification **SOILS-1** would reduce the impacts of soil erosion during operation of the proposed project.

Although these BMPs are generally effective on most projects, staff considers that the proposed project does constitute an unusual circumstance. The proposed project is of a very large scale compared to other projects constructed on active alluvial fans in the past. Although modeling and calculations can be used in an attempt to estimate future scenarios and provide a basis for structural design parameters, these methods are based on assumptions and projections that are imprecise and untested in this environment. Should these assumptions and calculations be inaccurate, 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.

## 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 soil material 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 material into, a river, stream, lake, wetland or water of the US and/or water of the State[6], or into a buffer area for one of these water bodies. Impacts or losses to these special aquatic resources may require specific mitigation measures.

[6] Refer to the **Biological Resources** section of this PSA for further discussion on jurisdictional determination of wetlands or watercourses as a Water of the US (by the Army Corp of Engineers) or a Water of the State (by California Department of Fish and Game and Lahontan RWQCB).

- Storing equipment, raw materials, finished products, or waste products in a manner that exposes them to precipitation and/or storm water runoff. Contact runoff[7] 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 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.

To prevent the discharge of soil material, 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.

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 7**), would slowly drain storm water offsite through an 18-in culvert at a flow rate matching 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 the applicant identifies BMPs to reduce erosion caused by the flows through the culvert, staff does not identify any significant impacts to water quality as a result of the retention area.

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 **PSA**) 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.

[7] 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).

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. For that reason, staff may propose a Condition of Certification requiring those additional mitigation measures in order to reduce potential impacts to less than significant.

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 materials 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.

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[8]. In addition, a Hazardous Materials Management Program (HMMP) would be developed by the applicant for the storage, handling and clean-up of hazardous wastes on the site. The HMMP addresses handling and usage, emergency response, spill control and prevention, training, record keeping, and reporting. Other conditions of certification in the **WASTE MANAGEMENT** section of this **PSA** address wastes, including cleanup of all spills of hazardous substances.

To prevent the discharge of untreated industrial wastewater or untreated sanitary wastewater from entering nearby water resources, 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.)

## Flooding and Flood Hazards

Flooding is usually defined as the inundation of dry land adjacent to a channel when excess flow exceeds its banks. Because ephemeral streams do not have permanent flow, their banks are formed in response to rainfall events which are 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.

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 well as 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

[8] 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.

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 851 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.

Another possible cause of increased onsite flooding is a change in existing drainage patterns. 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 some flood flows during storm events (see **Soils & Surface Water Figure 4**). The Preconstruction Hydrology Analysis shows that a 100-year, 24-hour storm event[9] 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. 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. Similarly, additional temporary diversion channels would also redirect flows around construction laydown and temporary parking areas during the construction activities of the project.

The applicant submitted an Existing Condition Hydrologic & Hydraulic Analysis (HHSG 2011a, Appendices 5.15C, 5.15E) and a Final Post Construction Hydrologic & Hydraulic Analysis (HHSG 2011b) to provide a determination of the difference 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. 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 7**).

The retention area would be created 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[10].

[9] 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.

[10] 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 Old Spanish Trail Road and would return back to existing elevation approximately 2100 feet prior to the north end of the road.

The applicant estimates that the retention area would decrease post construction runoff to better match preconstruction runoff. For smaller, more frequent rain events such as the 10-year, 24-hour storm, the road would essentially create a berm to stop runoff flow, allowing the retained water to infiltrate and evaporate. An 18-inch culvert 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[11]. For larger storms, the retained water would build up to above the road elevation and weir over it. For the 100-year, 24-hour storm, the post construction peak flow would be 10,783 cfs compared to the preconstruction peak flow of 10,790 cfs.

The elevated west perimeter road would decrease post construction runoff to better match preconstruction runoff, but this created retention area would also clearly cause substantial onsite flooding. For the 100-year, 24-hour storm, the west perimeter road would retain 195.4 acre-feet of water across over 100 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 elevated road would function as a weir, the estimated onsite flooding would occur at the western site border, as shown on **Soils & Surface Water Figure 7**. Assuming the proposed 18-inch culvert 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.

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 modeling is imprecise and untested in this desert environment. Should these assumptions and calculations be inaccurate, the consequences of flash flood damage or modified sedimentation and erosion rates may be significant. To reduce these potential impacts, staff proposes Condition of Certification **SOILS-5** requiring an analysis of storm events and heliostat stability as part of a Pylon Insertion Depth and Heliostat Stability Report.

Staff also notes that long-term sediment transport to this retention area could alter the expected storage capacity at the base of the road and could increase the size of inundated onsite area over time. Also, the west perimeter road may experience potential damage from the weir flow over time[12]. In addition, standing water onsite might have impacts to biological resources (see **BIOLOGICAL RESOURCES** section of this **PSA**).

### Offsite Area Flooding

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

[11] The applicant's preliminary geotechnical subsurface investigation recommended slowly draining the retention area due to the nature of soils at the site.

[12] Permanent erosion control measures and sediment management for the west perimeter road should be identified and discussed in the Drainage, Erosion, and Sediment Control Plan (DESCP).

exceed these shallow channels (see **Soils & Surface Water Table 5**) and result in flooding. 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 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 would be reduced. Furthermore, although the retention area would cause substantial onsite flooding, the inundated area (as shown in **Soils & Surface Water Figure 7**) would not extend past the proposed site's borders to flood offsite areas east of the project site. Staff agrees with the applicant that HHSEGS would avoid significant adverse impacts which could result from offsite flooding.

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 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, various flood hazard maps were developed by the Federal Emergency Management Agency (FEMA) from comprehensive studies of statistical data for river flow, storm tides, hydrologic/hydraulic analyses, and rainfall and topographic surveys. 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[13].
- 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 designated 100-year floodplain. In addition, the project would not be affected by dam

[13] 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.

failure, tsumani, 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 **PSA**.)

## Water Supply

Refer to the **WATER SUPPLY** section of this **PSA** for a detailed analysis of the potential effects on groundwater supplies and groundwater quality.

## 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[14] 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, Appendix 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 potential impacts of the anticipated wash water are not specifically addressed in the DESCP/SWPPP. More information is needed in order for staff to determine whether the HHSEGS project's proposed management and disposal of wash water during construction would result in significant impacts.

[14] 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.

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[15] 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.

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-2003-0034 (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-6** requiring the project owner to either obtain the appropriate permit(s) from Lahontan RWQCB and/or the SWRCB or 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-6** 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.

[15] Passivating fluid is used to treat or coat a metal pipe in order to reduce the chemical reactivity of its surface.

Staff proposes Condition of Certification **SOILS-7** 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-7** 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 establishes specific requirements for the discharge of sewage within the state of California. 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 (INYO 2011b).

Consistent with the Energy Commission's in-lieu permit provisions, staff proposes adoption of Condition of Certification **SOILS-8** requiring compliance with the requirements of the Inyo County Code Title 7, Section 7.52.060 and the California Plumbing Code (California Code of Regulations Title 24, Part 5) for all project sanitary waste disposal facilities, such as septic systems and leach fields. Adoption of Condition of Certification **SOILS-8** 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

Likely indirect impacts affecting soil and water resources would be in response to additional construction activities. For example, additional housing may be needed to accommodate workers for construction and operation of the 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 impacts of the HHSEGS 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 **PSA** 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 **PSA** notes that the new electrical and natural gas resources could be used for future development, but concludes that the economic development in the area would face serious constraints due to the scarcity of local groundwater resources and the existing land use designations. 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 **PSA** 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 7** 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 8 (**also see **Cumulative Effects Figure 2)** displays the project locations on a map in relation to the proposed HHSEGS site.

**Soils & Surface Water Table 7**
**Projects Reviewed for Cumulative Impacts**

| Map ID | Project Name (Agency ID#) | Location | Ownership | Status | Project Description |
|---|---|---|---|---|---|
| A | St. Therese Mission | Old Spanish Trail 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 north of HHSEGS site) | First Solar Development | POD submitted[1] | 100 MW photovoltaic project with 2,560 acres of BLM land requested |
| 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 | 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 avoid or substantially lessen the cumulative problem[16]. The HHSEGS project's contribution would not be "cumulatively considerable" and, thus, not significant.

### Water Supply and Groundwater Quality

Refer to the **WATER SUPPLY** section of this **PSA** for a detailed analysis of the potential 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

[16] 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).)

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-6**, 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-7**, 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 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.

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**, **-2**, **-3**, and **-4** 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 through a culvert. However as discussed in "Water Quality" above, staff does not identify any significant impacts to water quality as a result of the retention area.

## 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[17] by strategically routing flows, increasing surface roughness, and disconnecting[18] 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.

[17] 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.

[18] The impacts of disconnected impervious surfaces are considerably less severe than a contiguous stretch of impervious area.

- 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.

## FACILITY CLOSURE

HHSEGS is designed for an operating life of 25 to 30 years (HHSG 2011a). Facility closure can be either temporary or permanent, and closure options range from "mothballing," 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** section of this **PSA**). 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 **PSA,** 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.

## RESPONSE TO AGENCY AND PUBLIC COMMENTS

Staff will respond to agency and public comments relating to water quality or hydrology in the forthcoming Final Staff Assessment.

## 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.
- The project would avoid significant adverse impacts which could result from offsite flooding.
- 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, tsumani, 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 **-6** 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-7** and **-8** are met.
- Compliance with Conditions of Certification **SOILS-2** through **-8**, 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 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. 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.
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.

**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, California Department of Fish and Game (CDFG), and 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. The CPM shall consider comments received from Inyo County and RWQCB and approve the DESCP.

- 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:** Thirty (30) days prior to site mobilization, the project owner shall submit the construction SWPPP to the CBO and CPM for approval. A copy of the approved construction SWPPP shall be kept accessible onsite at all times.

## INDUSTRIAL - NPDES GENERAL PERMIT (CEMENT BATCH PLANT)

**SOILS-3:** For the operation of the temporary cement 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 cement 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 cement 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 ensure that the heliostats are designed and installed to withstand storm water scour that may occur as a result of a 100-year 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 applicant. This analysis will incorporate results from site-specific geotechnical stability testing, as well as hydrologic and hydraulic storm water modeling performed by the applicant. 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 heliostats that fail due to storm water flow or otherwise break and scatter mirror debris on to the ground surface.

The basis for determination of pylon embedment depths 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.

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 the methodology presented in "FAN, An Alluvial Fan Flooding Computer Program, FEMA, 1990."
   - 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.

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 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;
- 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 downstream playa surface when impacted by sedimentation 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: 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.
- Downstream Playa Surface: 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 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.
- 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 construction, 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, cause of the failure, and cleanup and mitigation performed for each failed heliostat.

## CONSTRUCTION WASTEWATER DISCHARGE

**SOILS-6:** 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-2003-0034 (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-7:** 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-8:** The project owner shall comply with the requirements of the Inyo County Environmental Health Services Department (Inyo County Code 7.52.060) and the California Plumbing Code (California Code of Regulations Title 24, Part 5) while designing 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. Use of the permanent facility septic systems and leach fields for onsite disposal of domestic wastes generated from temporary worker housing is prohibited without prior approval from the CPM.

**Verification:** 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 at least thirty (30) days prior to use of the septic systems. Any requests to use the permanent facility septic systems for onsite disposal of domestic wastes generated from temporary worker housing must be made at least ninety (90) days in advance of the proposed use and shall be accompanied by a complete technical assessment demonstrating that the proposed use is consistent with the Inyo County sanitary waste disposal facility requirements and would not cause the system to fail or exceed regulatory standards.

## REFERENCES


BLM 2011 – Bureau of Land Management. Project Fact Sheet: Hidden Hills Transmission Project. November 2011.

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

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

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RWQCB 2005 – California Regional Water Quality Control Board, Lahontan Region. Water Quality Control Plan for the Lahontan Region (Basin Plan), amended 2005.

J&S 2001 – Jones & Stokes. Goals and Policies Report for the Inyo County General Plan, prepared for Inyo County. December 2001.

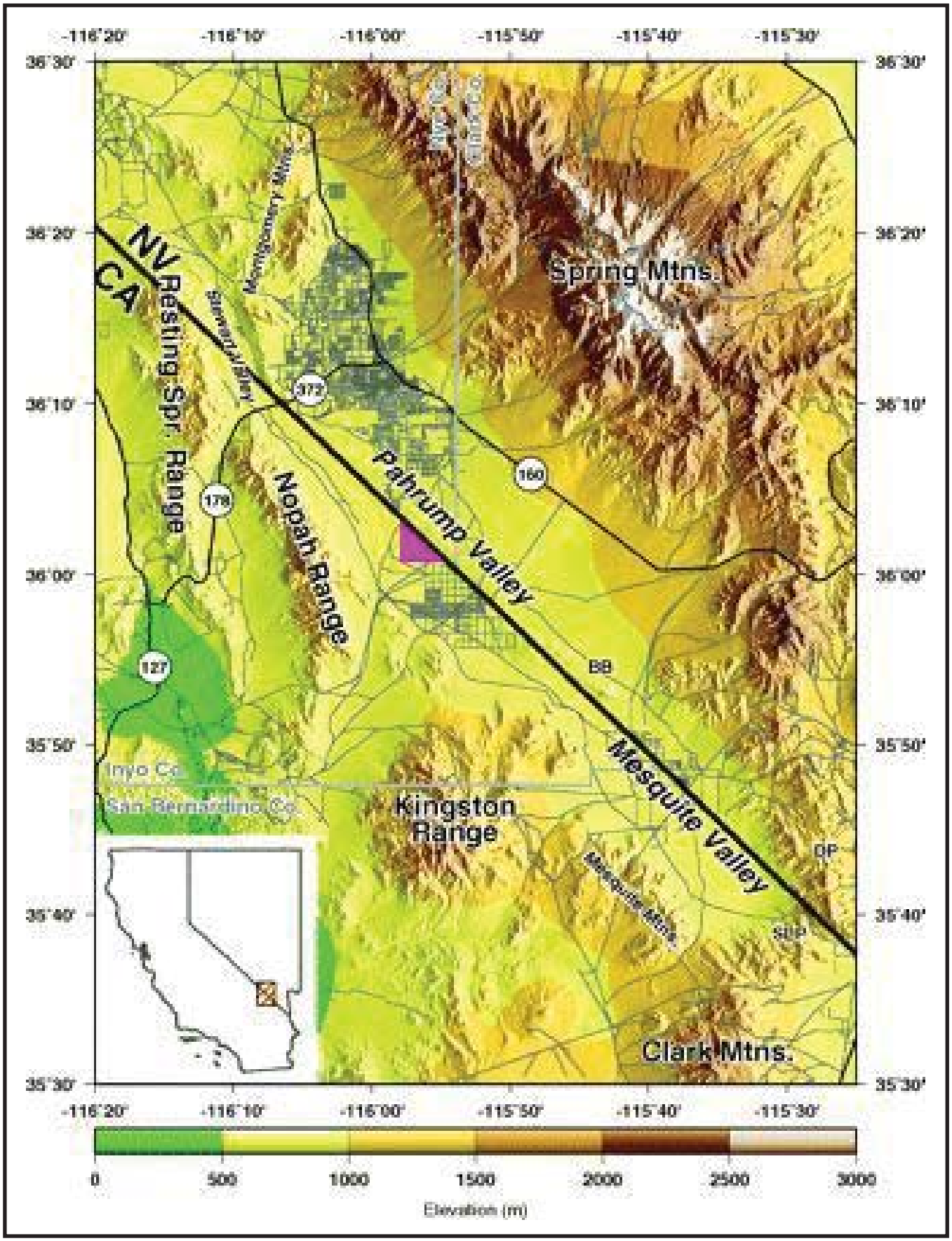
## ACRONYMS

**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 |
| 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 AND SURFACE WATER - FIGURE 1**

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

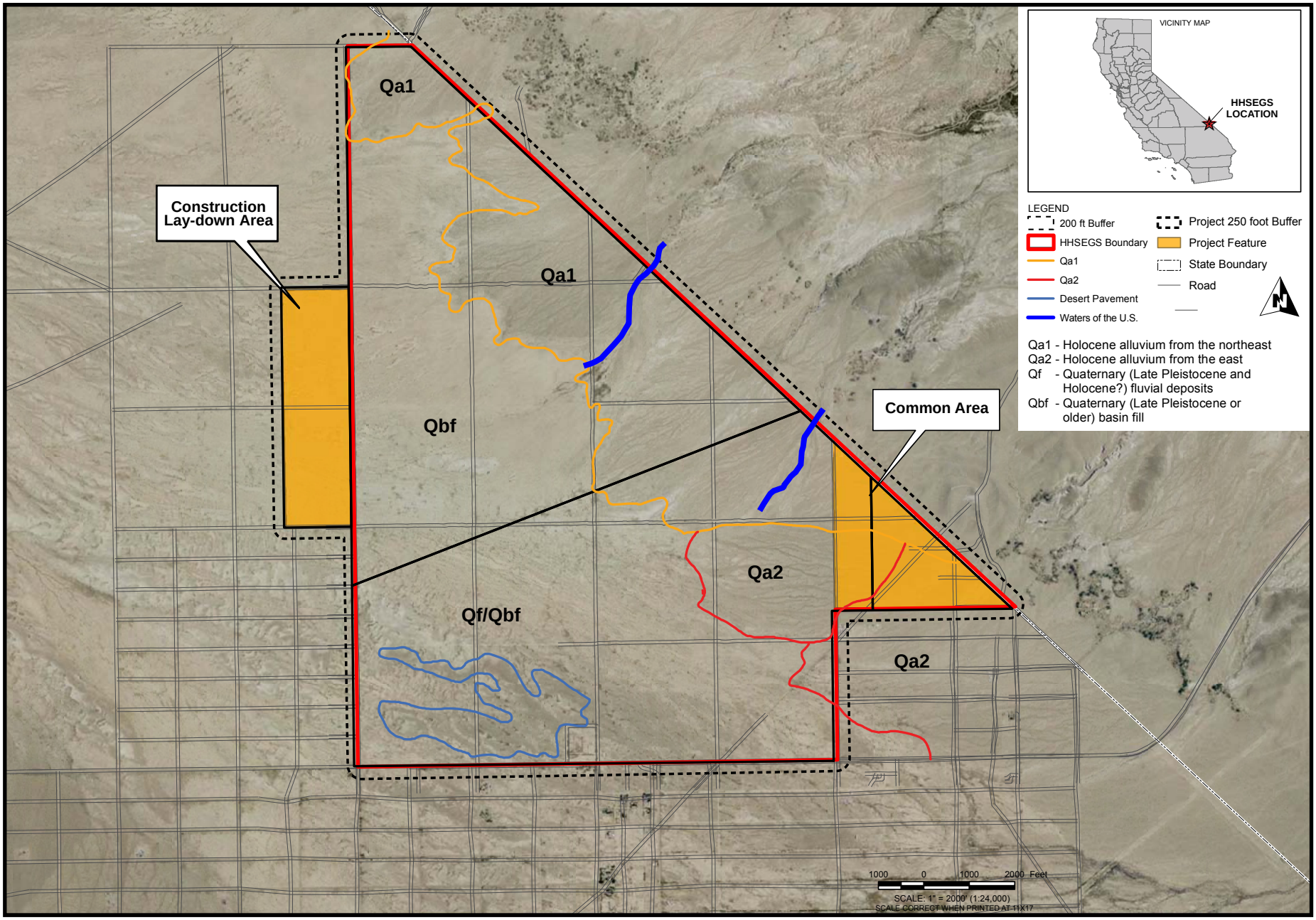



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SOURCE: Geosphere, April 2010, Figure 1, Page 94

**SOILS AND SURFACE WATER - FIGURE 2**

Hidden Hills Solar Electric Generating System (HHSEGS) - Alluvial Fans and Waters of the U.S.



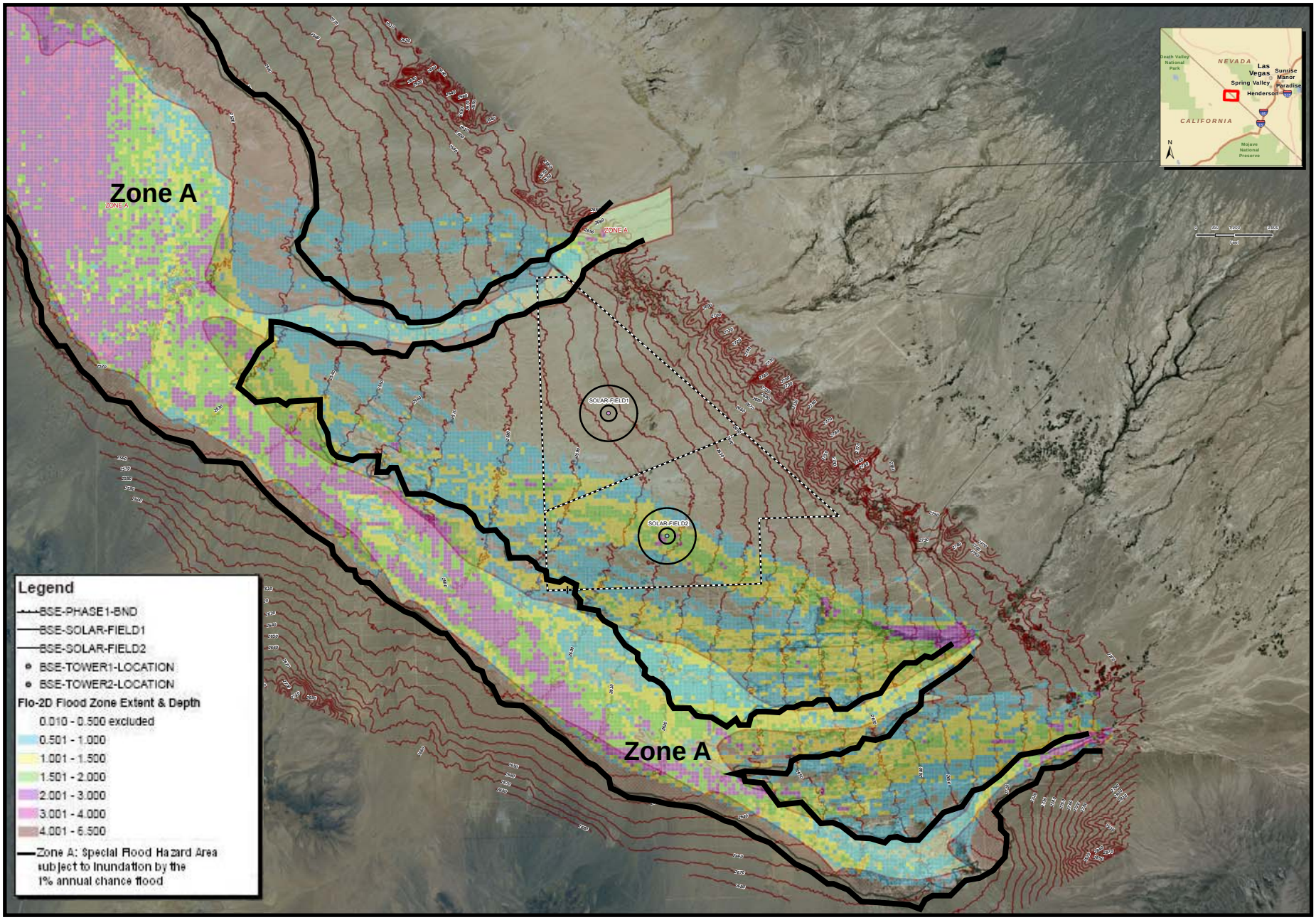

SOIL AND SURFACE WATER

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SOURCE: Figure DR 101-1, Land Surface Units; CH2MHill, Fig 1, URS and Bright Source Energy

**SOILS AND SURFACE WATER - FIGURE 3**

Hidden Hills Solar Electric Generating System (HHSEGS) - Federal Emergency Management Agency – Flood Insurance Rate Map

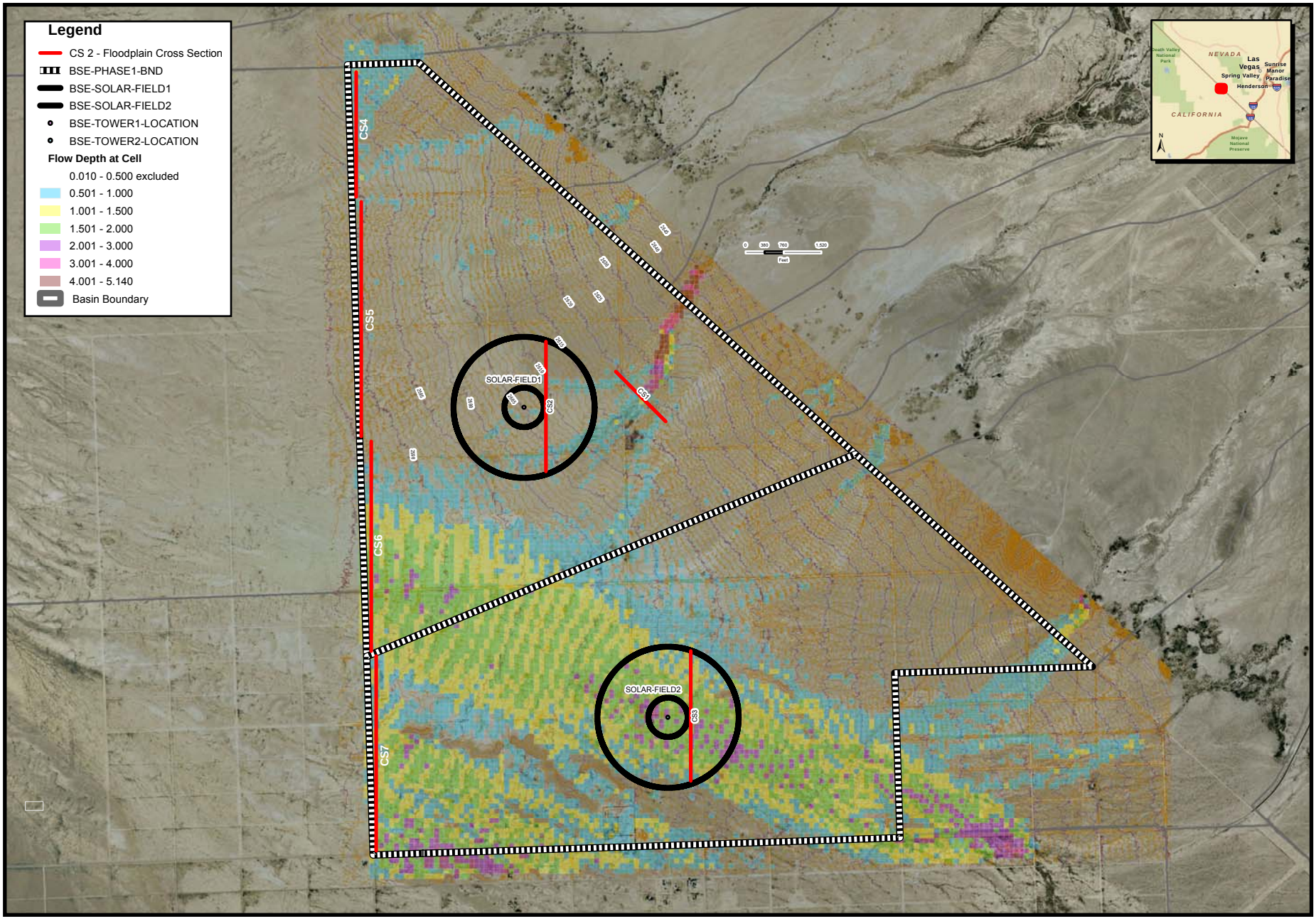



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SOURCE: 3/28/2011, VTN Consulting and BrightSource Energy

**SOILS AND SURFACE WATER - FIGURE 4**

Hidden Hills Solar Electric Generating System (HHSEGS) - Preconstruction depth Map (24 hour - 100 year Rain Event)



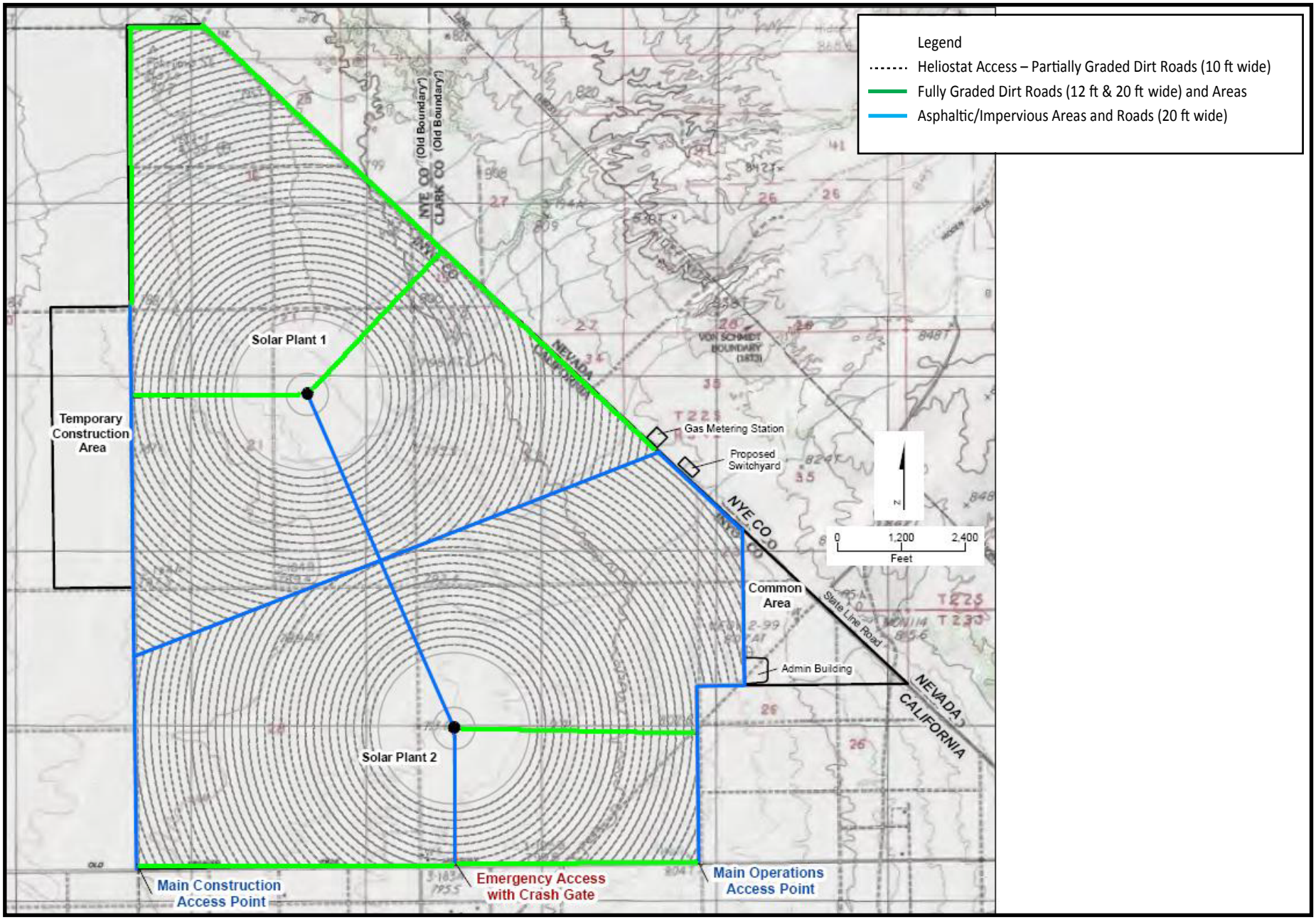

SOIL AND SURFACE WATER

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SOURCE: 4/4/2011, VTN Consulting and BrightSource Energy

**SOILS AND SURFACE HYDROLOGY - FIGURE 5**

Hidden Hills Solar Electric Generating System (HHSEGS) - Road Types



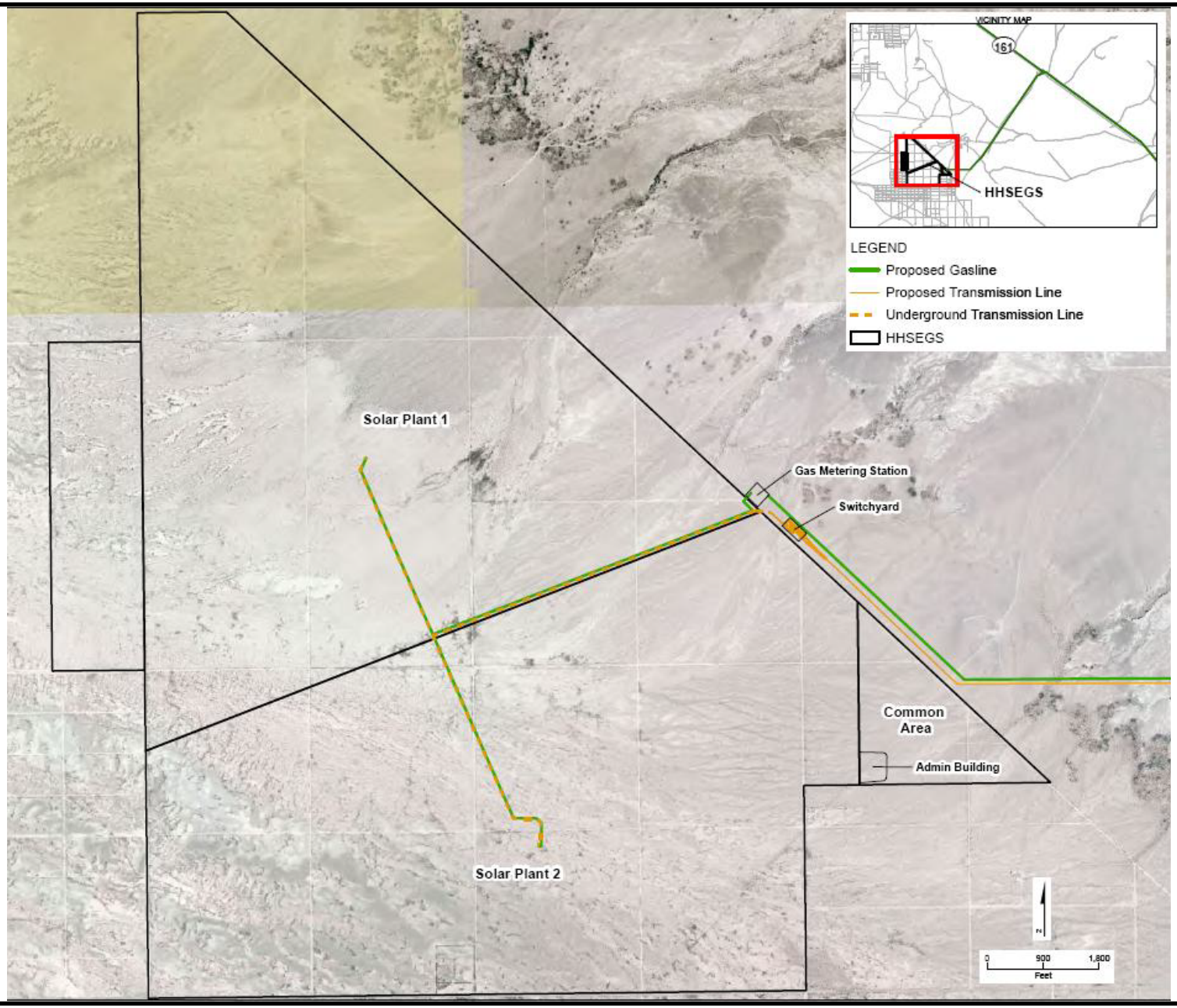

SOIL AND SURFACE HYDROLOGY

**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: Figure TT1-1, CH2MHill

**SOILS AND SURFACE WATER - FIGURE 6**

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

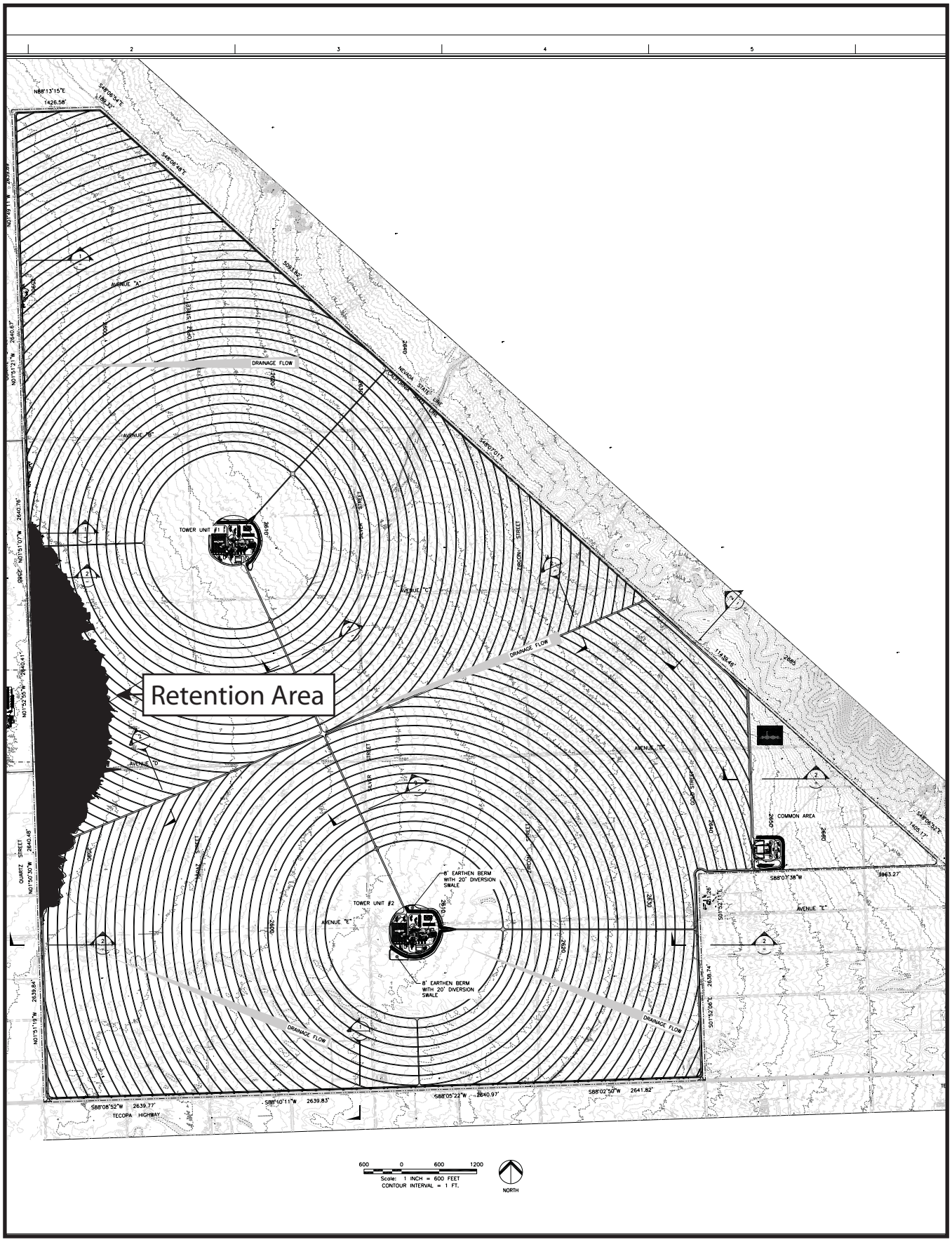



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SOURCE: PD2-1, CH2MHill

**SOILS AND SURFACE WATER - FIGURE 7**

Hidden Hills Solar Electric Generating System (HHSEGS) - Retention Area

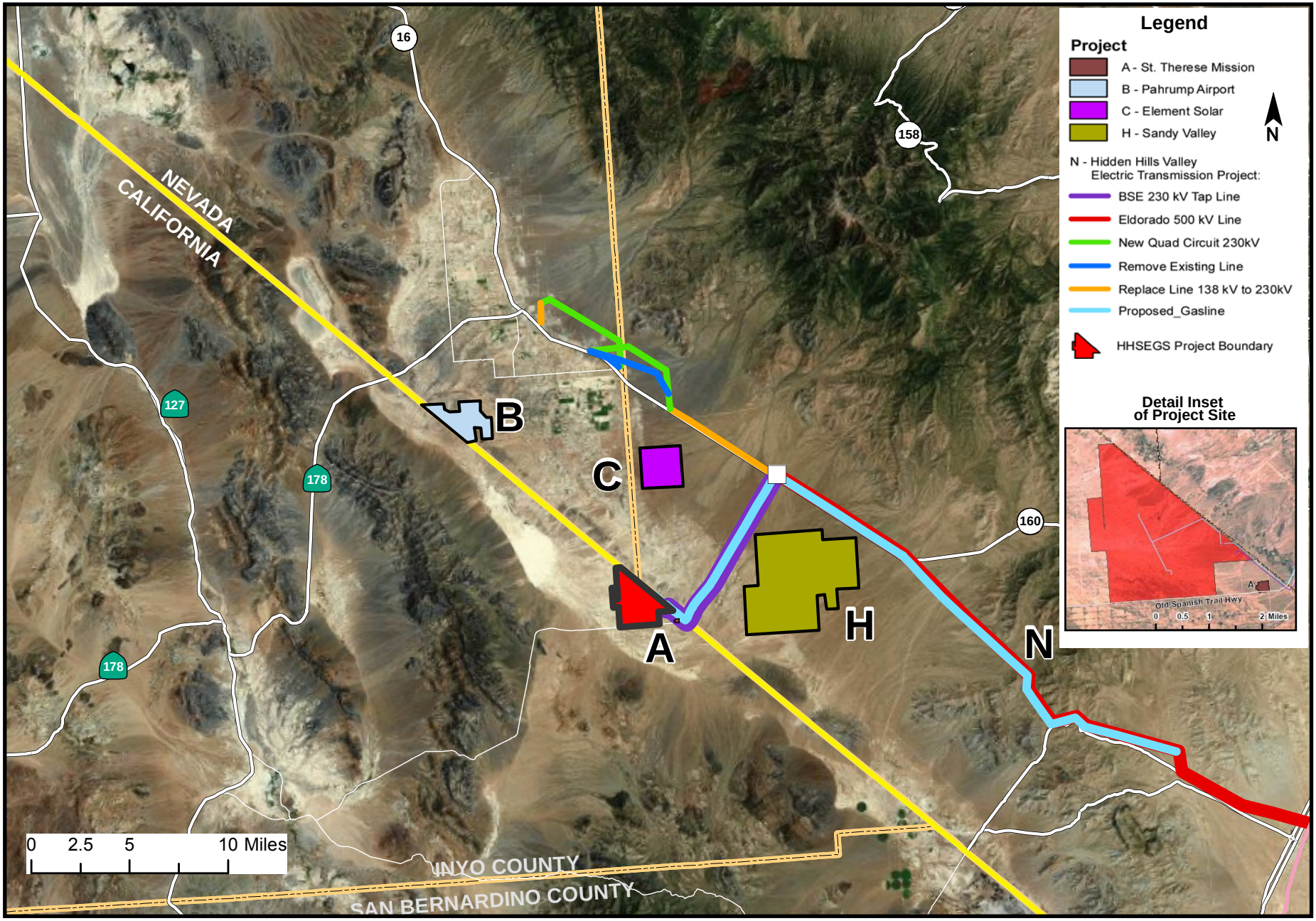



**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: 4/22/2011, Dwg No. C-2000, BrightSource Energy and CH2MHill

**SOILS AND SURFACE WATER - FIGURE 8**

Hidden Hills Solar Electric Generating System (HHSEGS) - Cumulative Impacts Map




SOIL AND SURFACE WATER

**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

Candace M. Hill and Gregg Irvin, PhD.

## SUMMARY OF CONCLUSIONS

This section of the Preliminary Staff Assessment (PSA) 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.

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 glint and glare in the area of the project site. Energy Commission staff proposes Conditions of Certification **TRANS-1** through **TRANS-9** to reduce most of 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-9**, the proposed project would not cause significant impacts to traffic and transportation. The glare effects from the solar receiver steam generators (SRSG's) are unavoidable and will 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.

## 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).

Section 15277 of the CEQA Guidelines states "CEQA does not apply to any project or portion thereof located outside of California which will be subject to environmental impact review pursuant to the National Environmental Policy Act of 1969 or pursuant to a law of that state requiring preparation of a document containing essentially the same points of analysis as in an Environmental Impact Statement prepared under the National Environmental Policy Act of 1969".

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, Clark and Nye Counties, Nevada in the *Federal Register – Volume 76, Number 196.*

| | |
|---|---|
| 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:<br>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.<br><br>Policy 2.2.1: Proper access – Provide proper access to residential, commercial and industrial areas. |
| Inyo County Regional Transportation Plan:<br>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.<br><br>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. |

## 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

Two transmission options are being considered with the Valley Electric Association (VEA): the Tecopa Road[2]/State Route 160 Option and the Eldorado Option. The Tecopa Road/State Route 160 Option would require an approximately 10-mile-long gen-tie line from HHSEGS to the proposed Tap Substation, where the project would interconnect to the electric grid. The transmission line would originate at HHSEGS's onsite switchyard, cross the state line and follow it on the Nevada side southeast turning northeast along Tecopa Road to the Tap Substation. The Tecopa Road/ SR 160 Option also includes a 230-kV transmission line from the Tap Substation into the town of Pahrump with approximately 28.1 miles of transmission line and a 2-acre switch on private land with a one-mile long connection to the Eldorado Substation.

The second option, the Eldorado Option would be a 500-kV transmission line that would interconnect to the electric grid at the Eldorado Substation in Boulder City, Nevada. The gen-tie line would follow the same 10-mile-long route to the Tap Substation as the Tecopa Road/State Route 160 Option, and would continue for approximately 53.7 miles to the Eldorado Substation in Boulder City, Nevada, for direct interconnection to the California Independent System Operator (CAISO) controlled grid. The proposed gen-tie line would likely be a multi-generator transmission line that could be available to serve other projects in the region.

#### Natural Gas Pipeline

HHSEGS would require a 12- to 16-inch-diameter natural gas pipeline. 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

[2] The road is also referenced as Old Spanish Trail Highway. Both names – Tecopa Road and Old Spanish Trail Highway are generally used interchangeably.

border and travel on the State of Nevada side southeast along the state line, then northeast along Tecopa Road until it crosses under State Route 160. From this location, a 36-inch line would turn southeast and continue approximately 26 miles following the proposed Eldorado Option transmission line corridor, to intersect with the Kern River Gas Transmission (KRGT) pipeline. A gas metering station would be required at the tap point to measure and record gas volumes from the KRGT metering station. The total length of the natural gas pipeline would be approximately 35.3 miles.

## SETTING

The proposed HHSEGS would be located on approximately 3,277 acres (5.12 square miles) of privately-owned land 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 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 developed, the grid pattern roadways remain. This grid pattern also extends into the area of developed private land to the south of the project site.

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 and State Route 160 within the State of Nevada[3]. **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

[3] State Route 160 traverses through Clark County and Nye County, State of Nevada.

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" 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 automobile-oriented 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 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).

### 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). The following information about critical roadways is based on the Traffic and Transportation section of the AFC (HHSG 2011a) as well as traffic data from the California Department of Transportation (Caltrans); Inyo County Public Works Department and the State of Nevada Department of Transportation (NDOT).

### Interstate 15

Interstate 15 (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 located to the southeast of HHSEGS and crosses into the State of Nevada (within San Bernardino County) approximately 37 miles southeast of the project site.

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 (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)[4] counts, I-15 at the Nevada State line[5] 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[6] vehicles. **Traffic and Transportation Figure 4** depicts the street network ADT.

## State Route 160

State Route 160 (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[7], with a stop-sign on Old Spanish Trail Highway. A separate westbound left turn lane is provided on SR 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.

According to the 2008 Nevada Department of Transportation traffic counts, SR 160 carried approximately 8,900[8] vehicles east of the Old Spanish Trail Highway turnoff and

[4]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."

[5] The California Department of Transportation (Caltrans) Postmile 186.238.

[6] Nevada Department of Transportation Traffic Count Stations – Station Number 0030040.

[7] A juncture where a minor road connects to a larger road and forms the shape of the letter T.

[8] State of Nevada Department of Transportation Traffic Count Stations – Station Number 0033180.

approximately 40,000[9] vehicles at .3 miles north of Dean Martin Road. **Traffic and Transportation Figure 4** depicts the street network ADT.

## State Route 127

State Route 127 (SR 127), also known as Death Valley Road, is a paved two-lane conventional highway[10] that traverses southeast Inyo County. 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[11], 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 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).

According to the California Department of Transportation (Caltrans) 2008 average annual daily traffic (AADT) counts[12], SR 127 carried approximately 780 vehicles south of the SR-127/Old Spanish Trail Highway intersection.

## Old Spanish Trail Highway/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 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[13] carried an average of approximately 258 vehicles traveling west and 275 vehicles traveling east a day in 2007.

[9] State of Nevada Department of Transportation Traffic Count Stations – Station Number 0030044.

[10] 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."

[11] 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."

[12] The California Department of Transportation (Caltrans) Postmile 6.510.

[13] The location of the traffic count was approximately .2 miles west of the State of Nevada line.

## 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 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 volume/capacity (V/C) ratios and levels of service (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 roadway LOS for associated V/C ratios.

**Traffic and Transportation Table 2**
**Level of Service Criteria for Roadways and 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 and the California Department of Transportation. Staff used the County of Inyo LOS standards to evaluate potential HHSEGS generated traffic impacts. The following is a list of the applicable California Department of Transportation and Inyo 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[14] (TCR) is a long range planning document that describes the current characteristics of the State Route 127 (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 four segments. The Average Annual Daily Traffic (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 is LOS C. The SR 127/Old Spanish Trail Highway intersection falls within segment 2 which is 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)[15] 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.

## 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[16] 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.

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

[14] Published October 2011 by California Department of Transportation (Caltrans) District 9, System Planning.

[15] 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".

[16] Adopted by the Clark County Board of County Commissioners on July 16, 2003; Last Amendment December 3, 2008.

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[17] (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 intersection in the project area located within the State of Nevada. 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 currently operates at LOS A.

**Traffic and Transportation Table 3**
**Existing Level of Service**
**State of Nevada**
**State Route 160/Old Spanish Trail Highway Intersection**

| Existing Conditions | Approach/Movement | AM Peak | | PM Peak | |
|---|---|---|---|---|---|
| | | Seconds of Delay* | LOS | Seconds of Delay* | LOS |
| | Northbound left/right | 9.3 | A | 9.7 | A |
| | Westbound left | 8.1 | A | 7.9 | A |

*Source: Hidden Hills Solar Electric Generating System Application for Certification, Table 5.12-3*

** 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).*

Assumptions for **Traffic and Transportation Table 3** are based on the following:

1. Peak hour volumes were estimated for the SR 160/Old Spanish Trail Highway intersection because approximately 95 percent of the project traffic (100% truck trips and 95% automobiles) is anticipated to travel through this intersection.

2. Peak hour volumes were extrapolated from existing average daily traffic (ADT) assuming that approximately 15 percent of the daily traffic on Old Spanish Trail Highway would occur during the peak hour, with a directional split of 70 percent towards Las Vegas, Nevada and 30 percent towards Pahrump, Nevada (HHSG 2011a Page 5.12-11).

[17] Approved by the Pahrump Regional Planning District July 20, 2005.

## 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[18] 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) [19] 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 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.

[18] Fixed routes are town to town and in-town routes with fixed schedules and fixed stops.

[19] 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.

## 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 on BLM land. 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.

The Town has received Airport Improvement Program grant funds to assist in the cost of preparing an Environmental Impact Statement (EIS) for the proposed project. The Town is in the process of establishing a cost recovery account with the Bureau of Land Management (BLM) to provide for the BLM's 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[20]; 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.

[20] The FAA recommends that pilots avoid overflight of plume-generating industrial sites below 1,000 feet AGL (FAA 2006).

## Study Location

The below roadway segment, located within the State of Nevada, was selected for evaluation because it provides the most direct route to the project site and would most likely be affected by project traffic during project construction and operation.
**Roadway Segment:**

- The intersection of State Route 160/Old Spanish Trail Highway.

## 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 following is a breakdown of the 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 on 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. Refer to **Traffic and Transportation Figure 5** and **Traffic and Transportation Table 6** for Project Trip Distribution Percentages.

The construction of HHSEGS (from perimeter fencing, site preparation, grading and commercial operation) would be completed over an approximately 29 month period. Solar Plant 1 construction would begin in the first quarter of 2013 and begin commercial operation the first quarter of 2015. Solar Plant 2 construction would begin in the first quarter of 2013 and begin commercial operation in the second quarter of 2015. The common area facilities would be constructed during construction of Solar Plant 1.

The construction workforce would peak during Month 14 with approximately 1,033 workers and average approximately 634 workers a month during the course of construction. By month seven, 890 construction workers are projected (82 percent of the peak workforce during Month 14).

In addition, approximately 42 workers would be required to construct the gas and transmission line and linear compliance support which would occur during month 14. 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, Monday through Friday, and would include a morning shift (5:00 am to 3:30 pm) and a swing shift (6:00 pm to 4:00 am). Up to 40 additional employees (consisting of project managers and other on-site representatives of the owners) would work a more standard day from 6:00 am to 4:30 pm. During the summer season the daily work hours would be adjusted earlier (in half hour increments) to take advantage of the cooler temperatures and promote worker safety.

The potential traffic impacts have been analyzed for the morning 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 (930 employees). Given the remote location of the project site, the high cost of gas, and the type of construction being conducted, it is estimated that 15 percent of workers would carpool. Therefore, approximately 7.5 percent of the construction traffic would be carpools (with a typical vehicle occupancy rate of two persons per vehicle).

Based on this assumption, HHSEGS would generate a total of 1,910 daily auto trips, with 860 trips occurring during the morning peak hour and 860 trips occurring during the afternoon peak hour. The total project trip generation, including the construction truck traffic, during the peak construction month is summarized in **Traffic and Transportation Table 4**. The workforce trips per shift for Month 14 are summarized in **Traffic and Transportation Table 5.**

**Traffic and Transportation Table 4**
**Peak Construction Trip Generation (Month 14)**

| | | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|---|
| | **Daily Trips** | **In** | **Out** | **In** | **Out** |
| Automobiles | 1,910 | 860 | 0 | 0 | 860 |
| Trucks* | 834 | 47 | 0 | 0 | 47 |
| Total | 2,744 | 907 | 0 | 0 | 907 |

*Source: Source: Hidden Hills Solar Electric Generating System Application for Certification,Table 5.12-4.*
*****Assumes truck trips are spread equally throughout the day from 6:00am to 6:00pm.

**Traffic and Transportation Table 5**
**Peak Construction Workforce and Trips (Month 14)**

| Project Site Workforce | Morning Shift (5:00am to 3:30pm) | Swing Shift (6:00pm to 4:00am) | Day Shift (6:00am to 4:30pm) | TOTAL |
|---|---|---|---|---|
| Craft | 812 | 60 | 0 | 872 |
| Non-Craft | 38 | 3 | 0 | 41 |
| Compliance | 80 | 0 | 0 | 80 |
| Owners | 0 | 0 | 40 | 40 |
| | | | | |
| Total Workforce | 930 | 63 | 40 | 1,033 |
| | | | | |
| Workforce Trips | | | | |
| | | | | |
| Number of Carpools (7.5%) | 70* | 5** | 3*** | 78**** |
| Total Employee Vehicles | 860***** | 58 | 37 | 955 |
| Total Trips (In/Out) | 1,720 | 116 | 74 | 1,910 |

*Source: Hidden Hills Solar Electric Generating System Application for Certification, Table 5.12-5*

*930 (Total Workforce) * .075 (7.5 % carpools) = 69.75
**63 (Total Workforce) * .075 (7.5 % carpools) = 4.725
***40 (Total Workforce) * .075 (7.5 % carpools) = 3
****1,033 (Total Workforce) * .075 (7.5 % carpools) = 77.475
***** Assumes one incoming trip per vehicle during am peak and one outgoing trip per vehicle during pm peak.

A worst-case scenario, where all workers commute with only one occupant per vehicle, would yield a peak trip generation of approximately 860 inbound trips during the morning peak period and another 860 outbound trips during the evening peak period.

The applicant estimates that most of the operation workforce would come from Las Vegas in Clark County as well as from the rural areas in 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 project trip distribution is summarized in **Traffic and Transportation Table 6.**

**Traffic and Transportation Table 6**
**State of California and State of Nevada**
**Project Trip Distribution**

| | | | Automobiles | | | Trucks | |
|---|---|---|---|---|---|---|---|
| **Road** | **Direction (To/From)** | **Destination** | **Percentage** | **Peak Hour Trips** | | **Percentage** | **Peak Hour Trips** |
| State Route 160 | West | Pahrump, Nevada | 20% | 172 Trips | | 0% | 0 Trips |
| Old Spanish Trail Highway/Tecopa Road | South | Barstow, California I-15 southbound | 5% | 43 Trips | | 0% | 0 Trips |
| State Route 160, West of I-15 | East | Enterprise/Spring Valley, Nevada | 10% | 86 Trips | | 0% | 0 Trips |
| I-15 | North | Las Vegas, Nevada | 35% | 301 Trips | | 100% | 47 Trips |
| State Route 160/East Windmill Lane | East | Towards Henderson, Nevada | 30% | 258 Trips | | 0% | 0 Trips |
| | | | | | | | |
| Total | | | 100% | 860 Trips | | 100% | 47 Trips |

*Source: Hidden Hills Solar Electric Generating System Application for Certification, Table 5.12-7*

**Traffic and Transportation Table 7** depicts the intersection of State Route 160 and Old Spanish 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 operational 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.

**Traffic and Transportation Table 7**
**State of Nevada**
**Comparison of State Route 160/Old Spanish Trail Highway Intersection**
**Existing Plus HHSEGS LOS**

| | **Approach/Movement** | **AM Peak** | | **PM Peak** | |
|---|---|---|---|---|---|
| Existing Conditions | | Delay | LOS | Delay | LOS |
| | Northbound left/right | 9.3 | A | 9.7 | A |
| | Westbound left | 8.1 | A | 7.9 | A |
| Existing conditions with HHSEGS | Northbound left/right | 9.8 | A | 100+ | F |
| | Westbound left | 16.2 | C | 7.9 | C |

*Source: Hidden Hills Solar Electric Generating System Application for Certification, Table 5.12-8*

The decrease of the LOS is consistent with the proposed construction traffic patterns as it is anticipated that approximately 95 percent of the project construction traffic is estimated to travel through the SR 160/Old Spanish Trail Highway intersection. Seconds of delay would increase from 9.8 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, staff recommends Condition of Certification **TRANS-5** which would require development and implementation of a traffic control plan to reduce construction traffic impacts to LOS and to ensure sufficient parking and emergency access to the site.

The Nevada Department of Transportation commented that the required storage for the left turn lane on SR 160 should be determined and be lengthened if needed (CEC 2012v). Energy Commission staff is continuing to coordinate with NDOT to address the required storage and improvements on State Route 160 and Clark County to address any additional roadway improvements on the Nevada portion of the Old Spanish Trail Highway and the feasibility of the inclusion of the applicant's proposed mitigation measures, shown below, which would be required to reduce the significance of traffic impacts on the proposed roadway system within Nevada to be utilized by HHSEGS.

### Physical Improvements

If LOS E or F conditions occur, even with ridesharing and staggered shifts, temporary physical improvements to the intersection may be required and may include installation of a separate northbound right-turn lane.

### Rideshare Program

If the traffic monitoring program identifies LOS E or F conditions (delays over 35 seconds for an extended period), a structured and comprehensive rideshare program would be implemented to reduce the number of trips to the site during the PM peak period. This analysis assumes 7.5 percent of the construction traffic would be carpools.

However, given the high vehicle fuel cost and the remote location of the site, this percentage could be significantly higher with a structured rideshare program in place. The rideshare program should target a 30 percent carpool rate to maintain LOS D at the intersection. 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.

### Traffic Monitoring Program

Traffic operations at the SR 160/Old Spanish Trail Highway (Tecopa Road) intersection would be visually monitored by the applicant once per week, during the afternoon peak hour during peak construction months as the construction workforce would increase gradually over the 29-month construction period, with a peak workforce occurring during Month 14.

### Staggered Work Shifts

If LOS E or F conditions occur at the intersection even with ridesharing, additional work shifts may need to be staggered so workers leave the site over a longer period of time (instead of all at once), thus reducing the potential for queues at the intersection. Staff agrees with the applicant's proposed rideshare program, traffic monitoring plan and staggered work shifts. 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. In the Final Staff Assessment (FSA), staff will address any physical improvements required and recommend a condition of certification(s), if appropriate.

### 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. Although the deliveries would peak at 717 trucks during Month 5, the truck deliveries have been evaluated during Month 14, when the construction workforce is at its peak and total project trip generation would be at its highest. During Month 14, it is estimated that there would be 417 delivery vehicles per day (equivalent to 834 total truck trips), in addition to the construction worker trips. It is assumed that the truck trips would be spread evenly throughout the day, beginning at 6:00 am and ending at 6:00 pm, resulting in 47 trips during the morning peak hour and 47 trips during the afternoon peak hour. **Traffic and Transportation Table 8** depicts the construction delivery schedule.

**Traffic and Transportation Table 8**
**Construction Delivery Schedule (Number of Trucks/Trips by Month)**

| Month | Equipment and Materials | Heliostat Components | Total Vehicles | Daily Trips (In/Out) |
|---|---|---|---|---|
| 0 | 35 | 0 | 0 | 70 |
| 1 | 55 | 0 | 55 | 110 |
| 2 | 480 | 0 | 480 | 960 |
| 3 | 420 | 245 | 665 | 1330 |
| 4 | 407 | 245 | 652 | 1304 |
| 5 | 472 | 245 | 717 | 1434 |
| 6 | 438 | 245 | 683 | 1366 |
| 7 | 411 | 245 | 656 | 1312 |
| 8 | 112 | 245 | 357 | 714 |
| 9 | 120 | 246 | 366 | 732 |
| 10 | 148 | 246 | 394 | 788 |
| 11 | 141 | 246 | 387 | 774 |
| 12 | 137 | 246 | 383 | 766 |
| 13 | 165 | 246 | 411 | 822 |
| 14 | 171 | 246 | 417 | 834 |
| 15 | 155 | 245 | 400 | 800 |
| 16 | 137 | 245 | 382 | 764 |
| 17 | 132 | 245 | 377 | 754 |
| 18 | 108 | 245 | 353 | 706 |
| 19 | 104 | 245 | 349 | 698 |
| 20 | 96 | 245 | 341 | 682 |
| 21 | 70 | 0 | 70 | 140 |
| 22 | 55 | 0 | 55 | 110 |
| 23 | 43 | 0 | 43 | 86 |
| 24 | 36 | 0 | 36 | 72 |
| 25 | 28 | 0 | 28 | 56 |
| 26 | 28 | 0 | 28 | 56 |
| 27 | 10 | 0 | 10 | 20 |
| 28 | 0 | 0 | 0 | 0 |
| 29 | 0 | 0 | 0 | 0 |

*Source: Hidden Hills Solar Electric Generating System AFC Table 5.12-6.*

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. Refer to **Traffic and Transportation Table 6** for the truck trip generation.

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 2,744 daily automobile and truck trips during the peak month with 907 trips occurring during the morning peak hour and 907 trips occurring during the afternoon peak hour.

The addition of 2,744 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 and could pose a significant public hazard 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 SR-160.

In order to accommodate the increased vehicle traffic, Inyo County has requested additional right-of-way along Old Spanish Trail Highway which would provide for acceleration and deceleration lane. Therefore, staff has recommended Condition of Certification **TRANS-2** to require the project owner dedicate 24-feet of right-of-way along Old Spanish Trail Highway and Condition of Certification **TRANS-3**, which requires that the project owner repair and restore all roads damaged during construction activities.

As previously discussed, 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. Inyo County has stated to accommodate the proposed HHSEGS, the roads would have to be abandoned. **Traffic and Transportation Figure 6** depicts the grid pattern of roads within the project area.

Energy Commission staff is continuing to research the appropriate mechanism to abandon the roads pursuant to the requirements of the California State and Highways Code (Public Streets, Highways, and Service Easements Vacation Law, Section 8300 et.seq.) and Inyo County. In the FSA, staff will address the abandonment and recommend a possible condition of certification.

### 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. Due to the fact that the bus stops are west of the project construction entrance and 5 percent of the project trips consisting of automobiles only would travel in the same direction of the bus routes on Old Spanish Trail Highway, impacts to the two bus stops on Old Spanish Trail Highway would be less than significant.

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.

### 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 180 acre temporary laydown area would provide vehicle parking, office trailers and small fabrication areas to accommodate project construction.

### 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.

## Operational Impacts and Mitigation

### Workforce Traffic

The project would require 120 full-time employees during project operation. Both Solar Plant 1 and Solar Plant 2 would require 36 employees and the administration office, shop and warehouse facility would require 48 employees. The plant would be operated seven days a week. Of the 120 employees, 40 would be required for the daytime shift and 80 employees would be required for the evening shift.

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 (114 workers) would come from Nye and Clark counties and 5 percent (6 workers) would come from Inyo County. (HHSG 2011a, pg. 5.10-28) 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 9** – Housing Supply Within Two-Hour Commute of the Project Site **and Socioeconomics Table 10** – 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.

In addition, 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 240 vehicle daily trips. However, out of the 240 vehicle trips, only 40 employee vehicle trips would be generated during the morning peak hours and the remaining 80 employee vehicle trips would be generated during the evening peak hours. The 240 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 120 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-handicapped, 4 for handicapped) in the common area. As shown in Figure 2.2-1R1, there are 26 proposed parking spaces at each power block (24 for non-handicapped, 2 for handicapped).

### 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 Preliminary Staff Assessment. 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 of Safety Management Plan that addresses the delivery of al liquid hazardous materials during the construction, commissioning, and operation of the project would further reduce the risk of any accidental release not specifically addressed by the proposed spill prevention mitigation measures. For more information on the hazardous materials proposed for use during project operation and applicable regulations, see the **HAZARDOUS MATERIALS MANAGEMENT** section of this Preliminary Staff Assessment.

### 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 Preliminary Staff Assessment.

### 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 CFR 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-9** which would require the project owner to notify the FAA if the construction cranes would be 200 feet tall.

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 HHSEGS produce sufficient glare and/or excessive perceived brightness to comprise an observers performance. 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.

Glint is difficulty seeing in the presence of a transient bright light source and is generally considered to be intermittent. 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 (SRSG's) are unavoidable and will 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.

Refer to **Appendix TT1** -**Glint and Glare** for a full discussion of glint and glare and proposed conditions of certification. In addition, Energy Commission staff has also determined that the visual impact of the SRSGs solar reflections will have a significant

and unavoidable impact. See **Appendix VR-2** for a detailed analysis of the visual impacts of the SRSGs.

## COMPLIANCE WITH LORS

**Traffic and Transportation Table 8** provides an assessment of the HHSEGS's compliance with applicable laws, ordinances, and regulations (LORS) pertaining to traffic and transportation.

**TRAFFIC AND TRANSPORTATION Table 8**
**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** and **TRANS-9.** |
| 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 load on any one wheel or wheels supporting one end of an axle is limited to 10,500 pounds. | The project would be consistent with this regulation with the inclusion of Condition of Certification **TRANS-1**. |
| 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:<br>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.<br><br>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.** |
| Inyo County Regional Transportation Plan:<br>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.<br><br>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.** |

## 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. Title 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 9** lists the known projects from the master cumulative list that could have overlapping construction schedule with HHSEGS.

**Traffic and Transportation Table 9**
**Cumulative Projects**

| ID # | Project Name | Project Description and Status | Peak Construction Workers | Operation Workers | Construction Begins | Construction Ends |
|---|---|---|---|---|---|---|
| | **HHSEGS** | | **1,033** | **120** | **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 | 200 MW of PV on 3,100 acres in southern Owens Valley; Draft Environmental | 300 | 10 | 3rd Qtr 2012 | 3rd Qtr 2015 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | California | Impact Statement in preparation. | | | | |
| N | Hidden Hills Valley Electric Transmission (NVN 089669) – State of Nevada | 10 acre BSE Tap 230/500 kV Substation; Draft Environmental Impact Statement pending. | 66 | | 4th Qtr 2012 | 1st Qtr 2015 |
| 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 240 daily vehicle trips, a minimal increase in traffic that would have a less than significant impact on overall traffic counts as out of the 240 vehicle trips, only 40 employee vehicle trips would be generated during the morning peak hours and the remaining 80 employee vehicle trips would be generated during the evening peak hours. 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 be the only identified cumulative project to 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 Interstate 15 (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.

### *Hidden Hills Transmission Project*

The Valley Electric Association project would provide the system improvements necessary to support the development and delivery of the 500 MW generated by HHSEGS into the VEA. 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

Comments were provided in writing regarding access and circulation concerns from Inyo County (INYO 2012h). Staff has addressed the comments within the **Total Construction Traffic** discussion.

## 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**,**TRANS-8 and TRANS-9** the construction and operation of the Hidden Hills Solar Electric Generating System project would not result in a significant traffic and transportation impacts according to the California Environmental Quality Act (CEQA) Guidelines.

Staff has reviewed **Socioeconomics Figure 1** showing the environmental justice population is less than 50 percent within a six-mile radius of the proposed HHSEGS. However, there are census blocks within the radius which have minority populations greater than 50 percent. Some of these census blocks are located in the vicinity of south Pahrump, Nevada. Traffic impacts in this area were found to be less than significant, therefore there are no environmental justice issues related to traffic and transportation.

There are also census blocks located in Charleston View, California, which exceed 50 percent minority population. These census blocks are located directly across from HHSEGS, where staff concludes traffic impacts in this area were found to be less than significant. The glare effects from the solar receiver steam generators (SRSG's) are unavoidable and will 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 and would be less than significant impact to minority or low income populations.

**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 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. The traffic and transportation of HHSEGS in combination with past, present and reasonable foreseeable projects in the Pahrump Valley would not be cumulatively considerable on traffic and transportation in the State of California or State of Nevada.

11. The HHSEGS as proposed with Conditions of Certification would not result in significant direct, indirect or cumulative traffic and transportation impacts. The traffic impacts and glare impacts would be less than significant impact to minority or low income populations.

12. With the Conditions of Certification, the HHSEGS would comply will all applicable LORS related to **Traffic and Transportation**.

13. Condition of Certification **TRANS-1** limits the vehicle size and weights to ensure compliance with limitations on use on roadways.

14. Condition of Certification **TRANS-2** requires granting right-of-way along Old Spanish Trail Highway.

15. Condition of Certification **TRANS-3** ensures all public roads, easements and rights-of-way are restored to their original condition if damaged by project- related construction.

16. Condition of Certification **TRANS-4** specifies the construction truck traffic route.

17. Condition of Certification **TRANS- 5** would require development and implementation of a traffic control plan to reduce construction traffic impacts to LOS and to ensure sufficient parking and emergency access to the site.

18. Condition of Certification **TRANS-6** ensures safe transport of hazardous materials.

19. Condition of Certification **TRANS-7** requires obstruction marking and lighting for aviation safety

20. Condition of Certification **TRANS-8** requires a heliostat operations positioning and monitoring plan.

21. Condition of Certification **TRANS-9** would require the project owner to notify the Federal Aviation Administration (FAA) that the construction cranes would be 200 feet tall.

## 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**

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.

**Verification:** Prior to the start of construction, the project owner shall provide evidence to the CPM that the dedication of right-of-way to Inyo County has been completed.

**TRANS-3 Restoration of All Public Roads, Easements, and Rights-of-Way**

The project owner shall restore all public roads, easements, and rights-of-way that have been damaged due to project-related construction activities. 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 or better 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. 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, 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 occurs during construction, the project owner shall 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 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 to the project site. Throughout the construction and operation of the project, the project owner shall document, 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.

**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**

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 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'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.

**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.

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 Obstruction Marking and Lighting

The project owner shall install obstruction marking and lighting on the two solar power towers and construction cranes 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.

**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 exhaust stack 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.

**Trans-8 Heliostat Operations Positioning and Monitoring Plan**

The project owner shall prepare a Heliostat Operations Positioning and Monitoring Plan (HPMP) that would accomplish the following:

1. Identify potential sensitive receptors and receptor locations including observers in aircraft, residential observers, local pedestrian and hikers, motorists on Old Spanish Trail Highway, and motorists who could access locations closer to the project;

2. Prepare a HPMP that would avoid potential for human health and safety hazards at locations of sensitive receptors including the potential for momentary and continuous solar radiation exposure to occur greater than the Maximum Permissible Exposure (MPE) thresholds of significance of:

    a. MPE for momentary exposure (for a period of 0.25 second or less) is 2
    b. MPE for continuous exposure (for a period greater than 0.25 second) is 1 kw/m2

3. Identify the heliostat movements and positions that could result in exposure of the identified observers to reflected solar radiation from heliostats and integrate these into the HPMP, to the extent possible, for exposure avoidance (forbidden zones) during all heliostat positioning transitions using defined safe path algorithms;

4. The HPMP will identify the set of heliostat movements and positions which would occur during reasonably possible malfunctions, which could lead to potential exposure of observers at locations outside the site and integrate these into the HPMP defined safe path algorithms.

5. 5. Prepare a HPMP that would:

    a) Verify that the HPMP would avoid the potential for human health and safety hazards at locations of sensitive receptors,

    b) Verify the HPMP minimizes the potential for direct heliostat solar reflections using the defined safe path algorithms,

    c) Provide requirements and procedures to document, investigate and resolve complaints regarding glint and/or glare exposure from the heliostats.

The monitoring plan should be coordinated with the CPM and Inyo County

Airport Land Use Commission and be updated on an annual basis for the first 5 years, and at 2-year intervals thereafter for the life of the project.

**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 Inyo County Airport Land Use Commission 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.

**TRANS-9 Federal Aviation Administration Notification of Construction Cranes**

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 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.

## 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:** _____

**Approximate 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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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 $1.6x10^9$ candellas (cd)/$m^2$ (clear sky at noon).

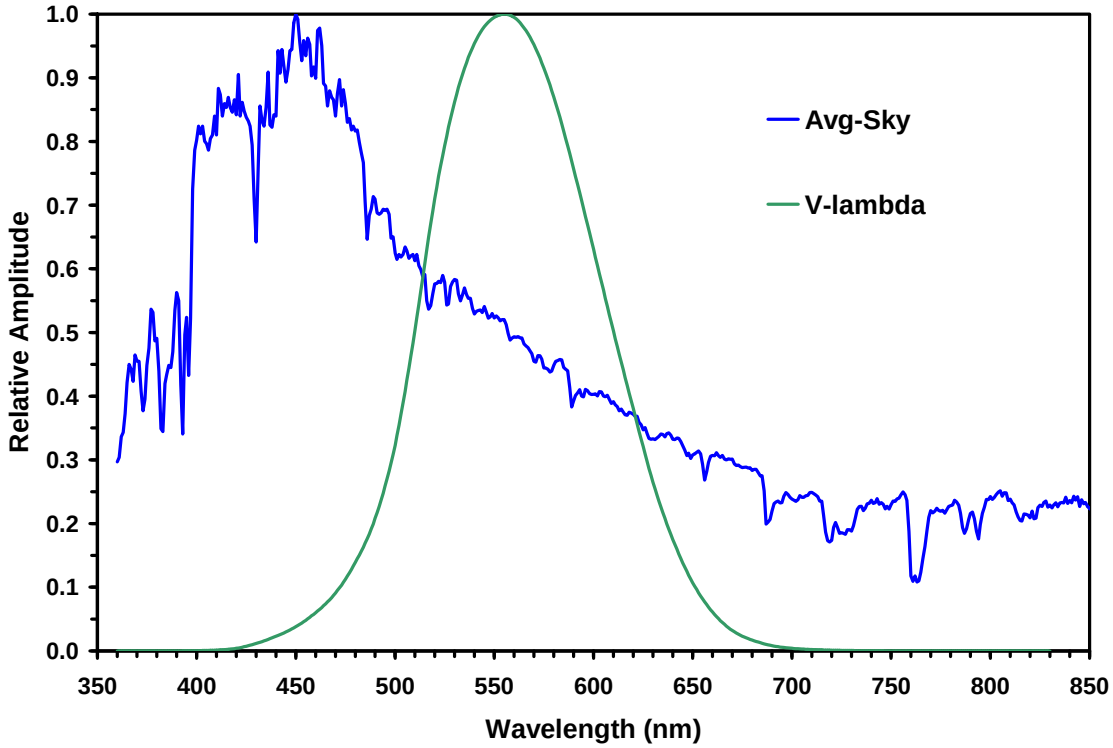
Irradiance is a measure of the power incident on a surface, also called radiant flux density, and is expressed as Watts/$cm^2$. Irradiance characterize the total amount of radiation present, at all frequencies, and is the appropriate metric for the determination of retinal damage thresholds. The human visual system, however, is only sensitive to a narrow range of these frequencies described by the photopic luminous efficiency function (V□). 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 l'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 radiation.

Empirical 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 □m 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 in the CIE 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).

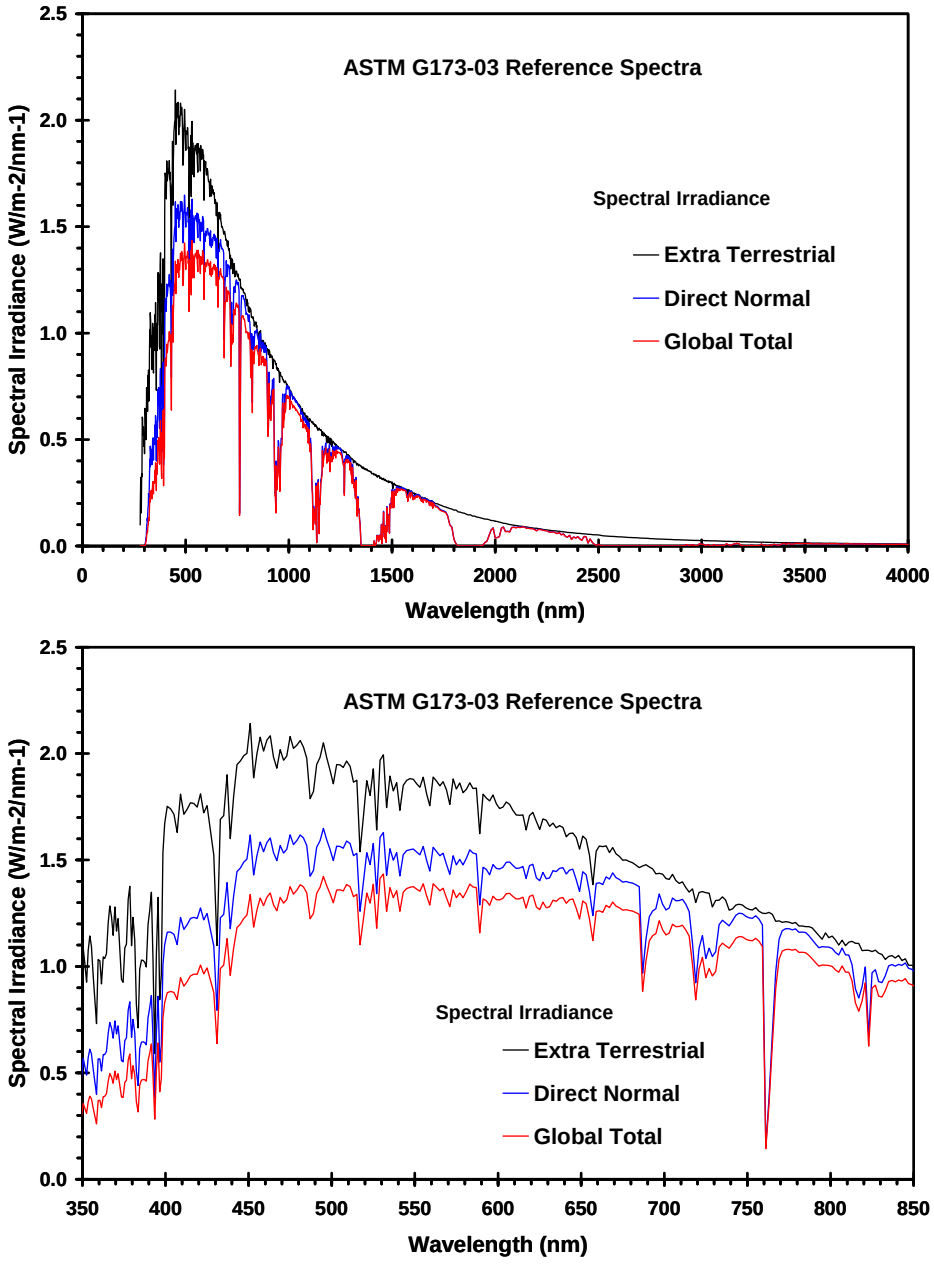



**Figure 2**. American Society for Testing and Materials G173-03 Reference Spectra.

### 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. 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.
- *Removal of flux due to high winds and all other known scenarios* – These are considered normal operation and covered by the operations mentioned above.

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 544,000 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 88 times more luminous (544,000/6,175) 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 2,941 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 82, and the brightness of the sun as 1,170. Thus, perceptually, although the SRSG is 88 times more luminous than the background sky, the perceived brightness is only 4.5 times as great (82/18). Further, the sun would be perceived as 14 times brighter than the SRSGs (1,170/82) and 64 times brighter than the sky (1,170/18).

| | Luminance (cd/m$^2$) | Relative Brightness |
|---|---|---|
| **Sun** | **1,600,000,000** | **1,170** |
| **Tower SRSG** | **544,000** | **82** |
| **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 that that of the background sky. This level of brightness is certainly prominent and may be distracting but is not considered as debilitating. 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 and be reduced by atmospherics. For closer ranges within the solar field perceived brightness could increase substantially as the visual size of the SRSGs increases.

Further, at these stated luminance levels there would be some constant level of glare. However, the glare would be anticipated to be at a slight to medium discomfort level and insufficient to be considered as a disability glare.

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

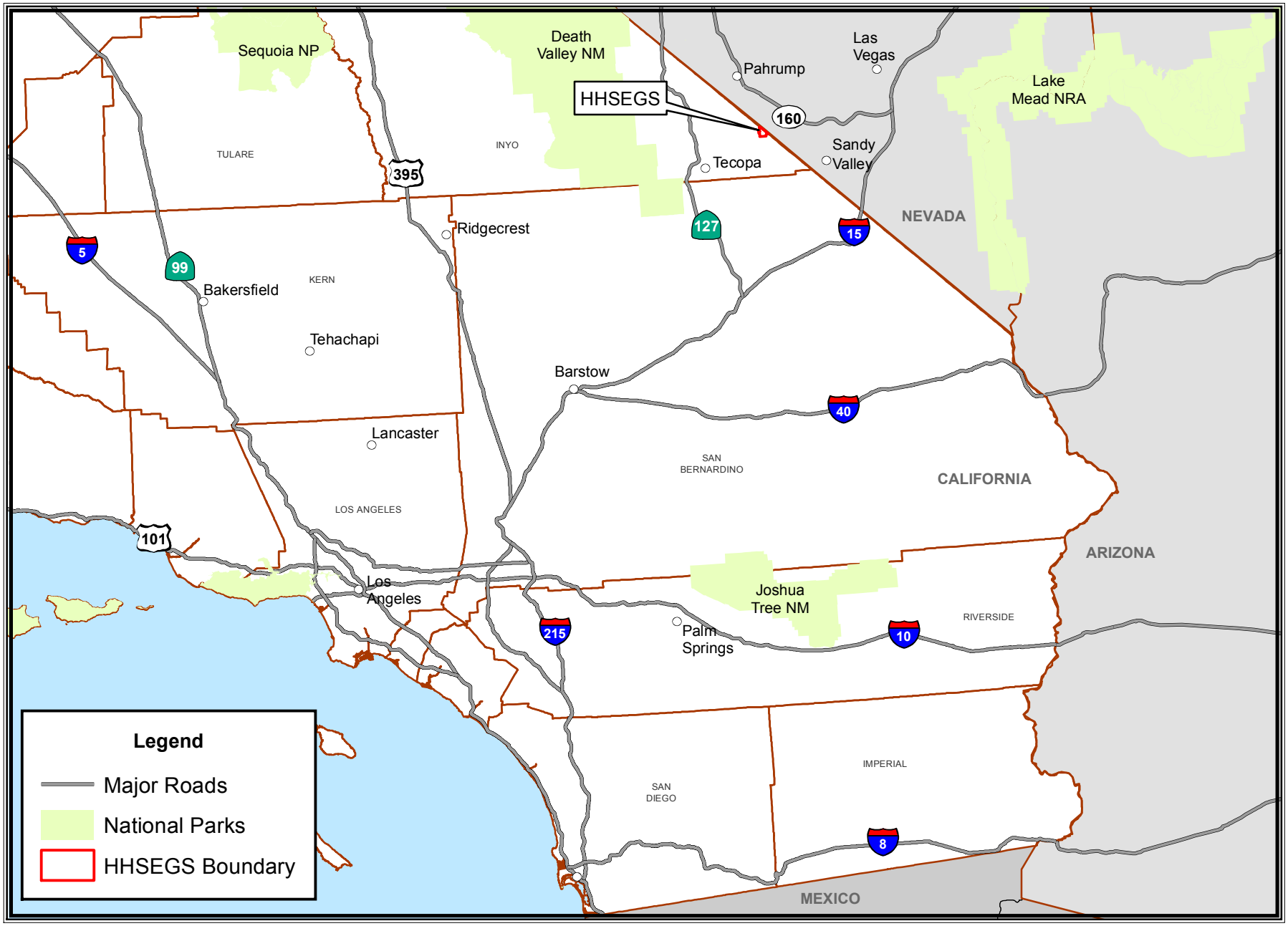
as a function of age[2]. Glare related scatter effects remain nearly constant as a function of age until 40-45 years when scatter rises exponentially and triples by the age of 60. As such any glare effects produced by the SRSGs may be more pronounced in the aging population.

## Conclusions

Staff concludes that the glare effects from the tower solar receiver steam generators (SRSGs) receivers are significant and unmitigable. The brightness of the SRSG would be clearly visible and prominent. The relatively high level of brightness and the resulting glare effects from the SRSG's will produce a distinct visual distraction effect. However, these glare effects are not considered as sufficient to be visually debilitating 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 AND TRANSPORTATION - FIGURE 1**

Hidden Hills Solar Electric Generating System (HHSEGS) - Regional Street Network



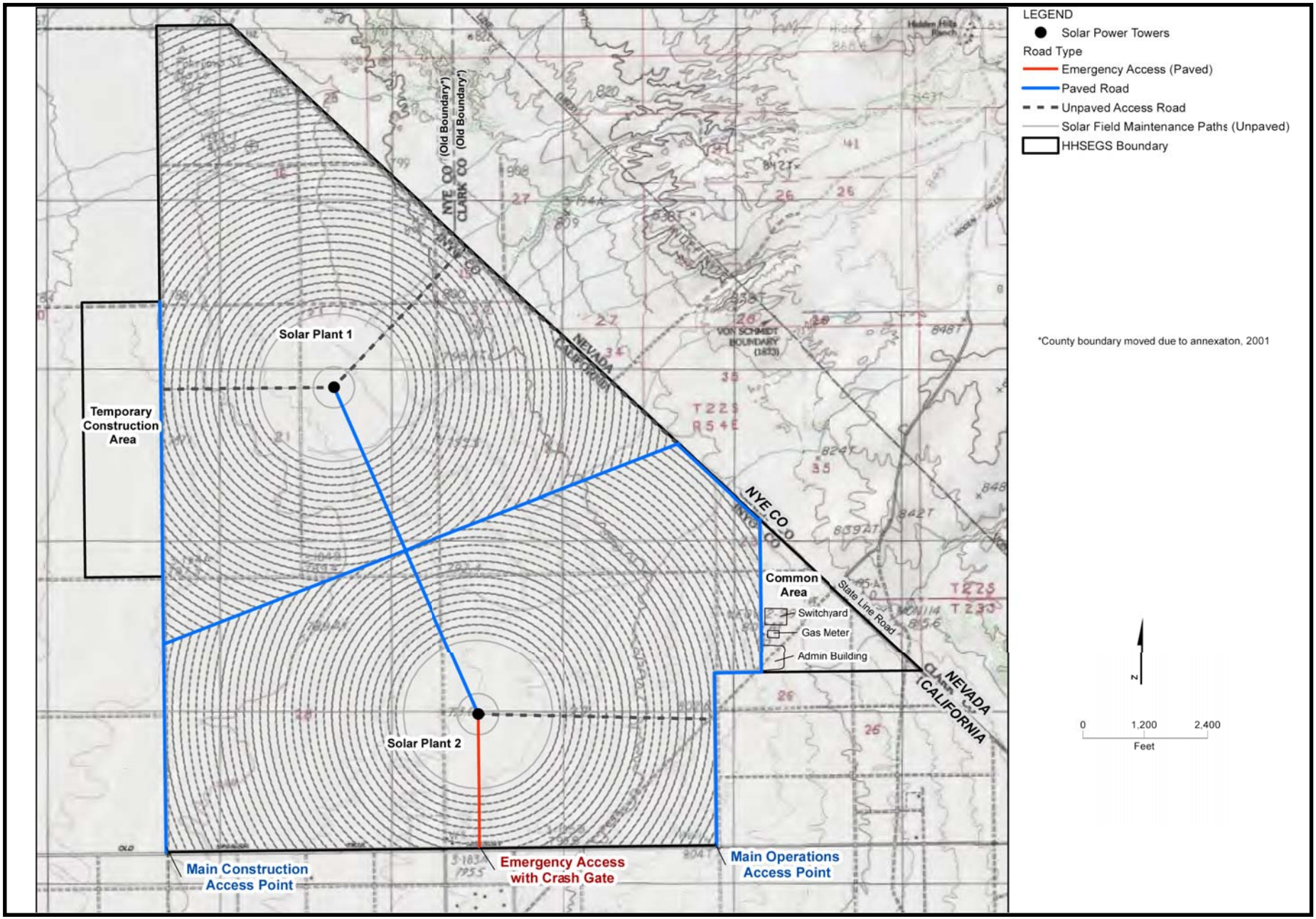

TRAFFIC AND TRANSPORTATION

**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

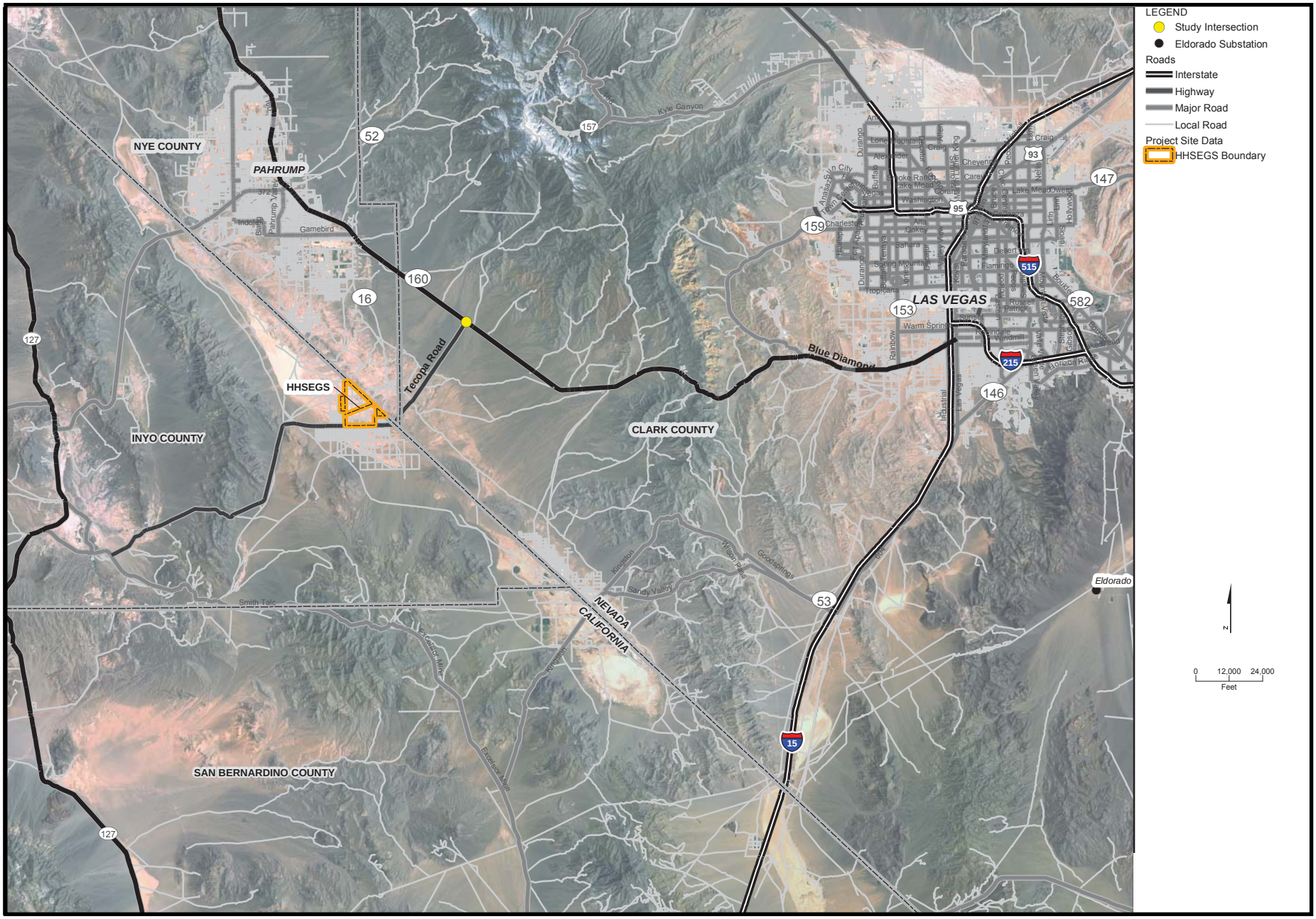



**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: CH2MHILL \ DR

**TRAFFIC AND TRANSPORTATION - FIGURE 3**

Hidden Hills Solar Electric Generating System (HHSEGS) - Local Street Network



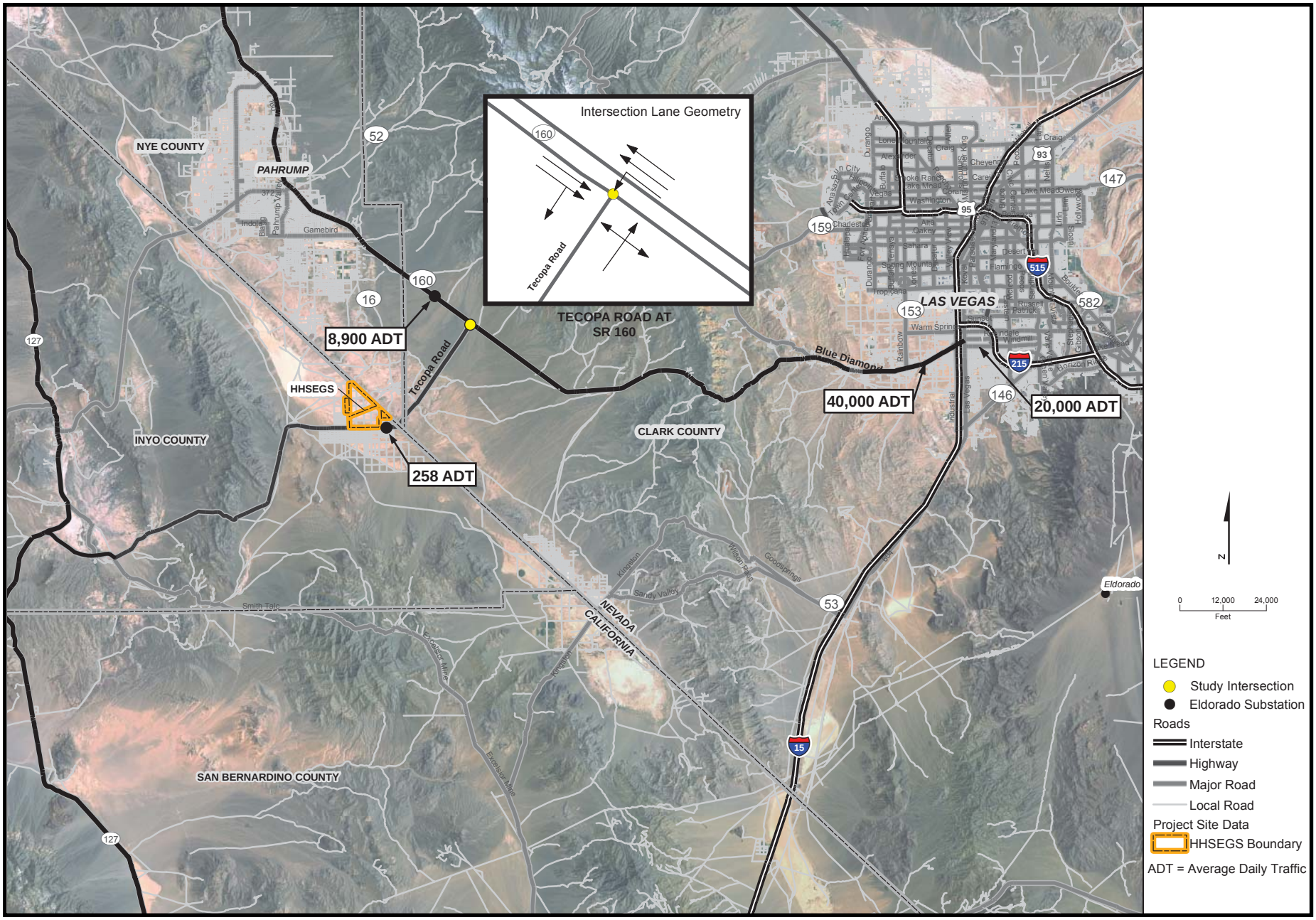

TRAFFIC AND TRANSPORTATION

**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: AFC Figure 5.12-2

**TRAFFIC AND TRANSPORTATION - FIGURE 4**

Hidden Hills Solar Electric Generating System (HHSEGS) - Local Street Network ADT



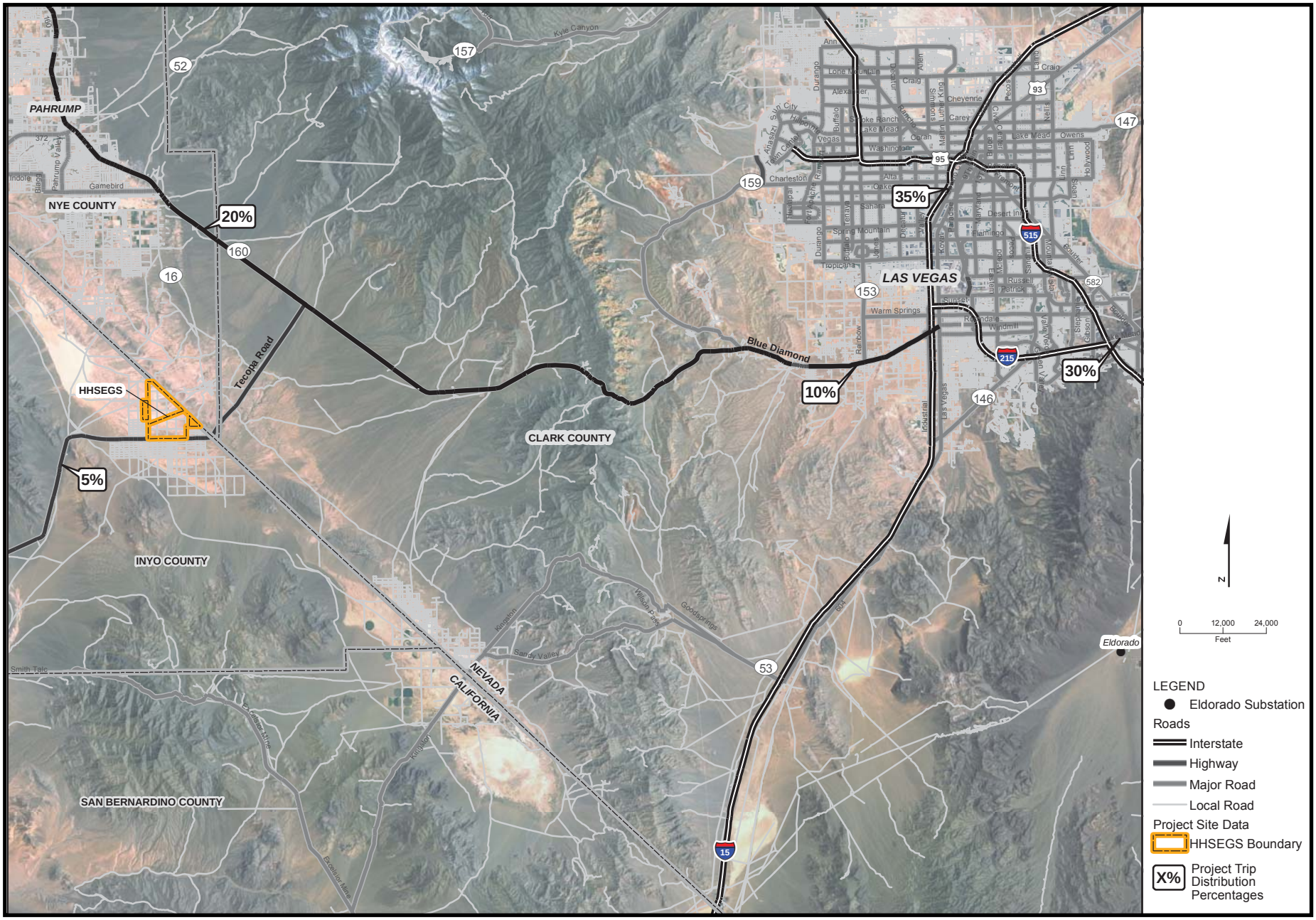

TRAFFIC AND TRANSPORTATION

**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

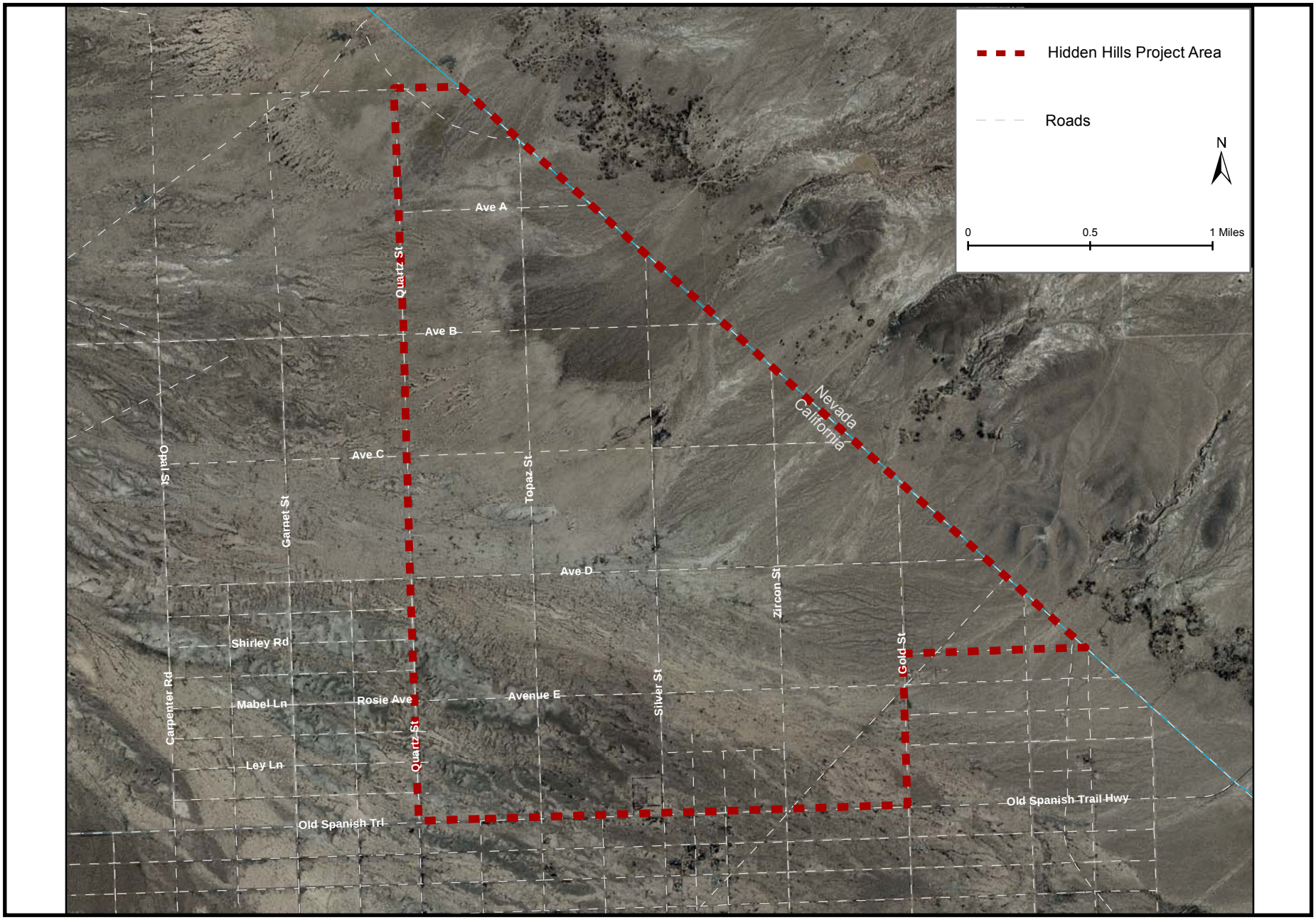



**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: AFC Figure 5.12-4

**TRAFFIC AND TRANSPORTATION - FIGURE 6**

Hidden Hills Solar Electric Generating System (HHSEGS) - Grid Pattern of Roads within the Project Area.



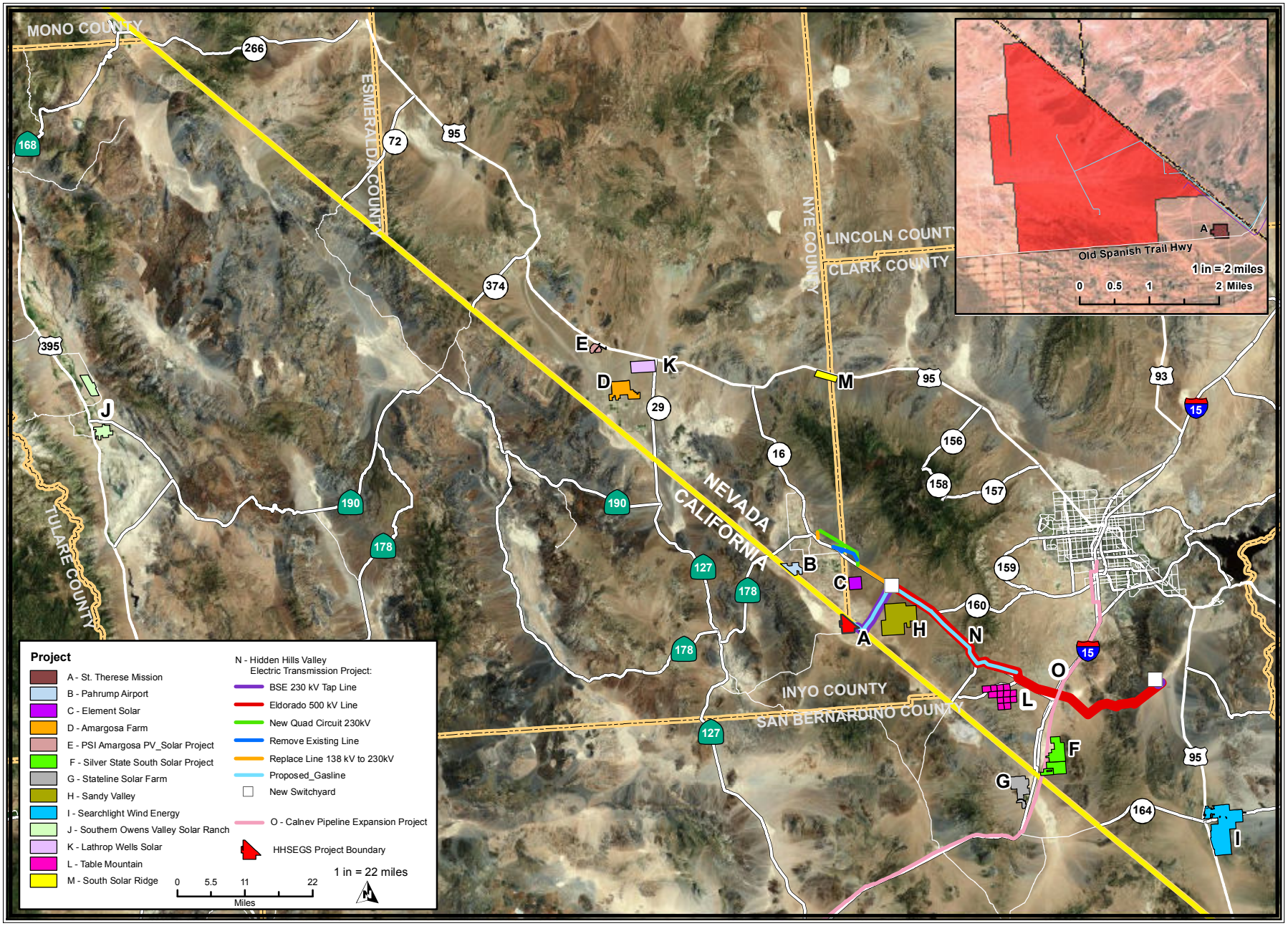

TRAFFIC AND TRANSPORTATION

**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.

# TRANSMISSION LINE SAFETY AND NUISANCE

Obed Odoemelam, Ph.D.

## SUMMARY OF CONCLUSIONS

The California Energy Commission staff concludes that construction and operation of either of the two candidate transmission lines 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 chosen 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.

Environmental aspects of the parts of the transmission lines located in Nevada will 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 routes of the two candidate lines. 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 candidate 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. Staff's analysis examines the project's compliance with these requirements as related to the two possible lines.

## 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 would be located on approximately 3,277 acres or 5.12 square miles of privately owned land in unincorporated Inyo County California, adjacent to the Nevada border. The site is approximately 8 miles 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). As more fully discussed by the applicant (HHSG 2011a, p. 3-3) the generated power would be transmitted from each plant’s power block first to the common on-site switchyard and then across the California/Nevada line into the area’s Nevada power grid. For each plant, the gen-tie 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 into the on-site switchyard.

Each transmission line option as identified in this analysis would be a 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 this 900-foot stretch within California that is assessed in this staff report together with the noted underground/overhead section from the power block to the switchyard. 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).

The area around HHSEGS and each of the two candidate connecting lines is open undisturbed desert land with relatively sparse vegetation and no nearby residences. The nearest residence to each line on the assessed California side would be approximately 300 feet east of the fence line while the nearest to either of 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 potential short-term worker exposures or exposure to the ordinary individual crossing over the line.

## PROJECT DESCRIPTION

The environmental impacts of each of the two possible connecting lines are best assessed in two parts: the impacts from the underground sections and impacts from the overhead sections. The other portion of the proposed connection scheme would be the 900-foot segment from the on-site switchyard to the California/Nevada border which would mark the end of the segment under California's jurisdiction. The first option would be a 10-mile 230-kV line extending from the project's on-site 230-kV switchyard to a new Valley Electric Association (VEA) substation (Tap Substation) in Clark County Nevada at the intersection of Tecopa Road and Nevada State Route (SR) 160. It would be known as the Tecopa/SR 160 Option. The route would specifically run from the HHSEGS on-site switchyard across the California/Nevada state line into Nevada, and then run parallel to the border line southwards, before turning to the northeast along Tecopa Road to connect with the Tap Substation. This line option would also include a 28.1-mile 230-kV line from the Tap Substation into the town of Pahrump. It would have a 2-acre switchyard on private line to be connected to the Colorado Substation with a 1-mile line segment.

The other candidate line for HHSEGS is a 500-kV transmission line connecting the HHSGS switchyard with the electric grid at the Eldorado Substation in Boulder City, Nevada and would be known as the Eldorado Option. The line would also begin at the on-site switchyard and follow the same ten-mile-long route to the Tap Substation as would the Tecopa Road/SR 160 Option but would continue for approximately 53.7 miles to the Eldorado Substation from which it would connect to the power grid. This line option would serve as a multi-generator transmission line that could be available for other projects in the region (HHSG 2011a, p. 2)

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.

Either of the two candidate lines would be designed, built and operated by the applicant according to the guidelines of the major area utility, which in this case, is Southern California Edison (SCE). Specifications in SCE's guideline 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.

## 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 the 500-kV Colorado Option. Given the use of SCE's 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.

## 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.

## 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.

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# VISUAL RESOURCES

Melissa Mourkas, ASLA

## SUMMARY OF CONCLUSIONS

Energy Commission staff have analyzed visual resource-related information pertaining to the construction and operation of the Hidden Hills Solar Electric Generating System (HHSEGS), and concluded that the proposed project would cause substantial adverse visual impacts according to the California Environmental Quality Act (CEQA) Guidelines. Staff concludes that the proposed project, after implementing all staff-recommended conditions of certification, would still have significant and unavoidable adverse direct visual impacts. Examples of these significant visual effects are provided by analysis of several Key Observation Points.

The project in combination with existing and foreseeable future projects within the project viewshed would not cause significant unavoidable cumulative visual impacts were the analysis limited to California. 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 Inyo County Zoning Ordinance (Title 18) and Renewable Energy Ordinance (Title 21).
If the Energy Commission approves the project, staff recommends that all of staff's proposed conditions of certification be adopted in order to minimize 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 impacts on visual resources resulting from the construction and operation of the HHSEGS. Staff bases its evaluation on information contained in the California Environmental Quality Act (CEQA) Guidelines, Aesthetics, to determine if the project would:

1. Comprise a significant impact under CEQA.

2. 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 18 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

[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

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. 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.

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 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 analysis.

**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

[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

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 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.

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

[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.

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.

[6] 11-AFC-02, Figure 5.2-3 Vegetation Map.

[7] 11-AFC-02, Figure 5.11-1, Soil within 1 mile of HHSEGS.

**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 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 |
| 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 |
| 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 EIR process by BLM. The on-site underground transmission lines originate at Solar Plants 1 and 2, and extend under the heliostat arrays to the substation.

The Nevada transmission corridor is shown in Figure TSE-2, 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 to 16" pipeline is anticipated and it would exit the project site at the state border, connect with the gas meter in Nevada 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 human consumption and 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 will enter through the main HHSEGS entry drive, however, a later figure, Access Roads and Paved Internal Roadways (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 Application for Certification (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 of 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 finds the proposed project to 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. 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 will 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 General Plan, Goals and Policies Report, December, 2001. Land Use Element, Land Use Designations, Diagram 29. | The proposed project would be located on parcels currently designated as REC, Resort/Recreational and OSR, Open Space and Recreation. |
| 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. |
| 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:<br>• Maintain small town character;<br>• Preserve panoramic views;<br>• Maintain open natural character of the County;<br>• 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. |
| 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 Zoning Ordinance, Chapter 18.12.OS (Open Space) | Maximum height of buildings in OS Zone: Principal buildings 30 feet, accessory buildings 25 feet. |

| | |
|---|---|
| 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.<br>• Police powers of the County include protection of the environment of Inyo County, including biological and other natural resources, aesthetics, recreational attractiveness.<br>• 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.<br>• 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. |

## 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 and adversely impacted by the project. 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 be impacted in a significant and adverse way, as will some views from 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 negative 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 will 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. These impacts 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 impact of the construction and lighting of the power towers, and would remain a significant and unavoidable visual effect.
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 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.

Staff has reviewed Socioeconomics Figure 1 showing the environmental justice 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, four KOPs were identified within the AFC and are analyzed for the California portion of the project 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[8], 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. 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[9]. Staff observations concur with those figures. This is a low number of viewers[10]. Upon completion of the St. Therese Mission, the number of

[8] http://www.sttheresemission.com/

[9] E-mail to Candace Hill from Joshua Hart, Inyo County Planning Director, April 3, 2012.

[10] CEC staff characterizes daily motor vehicle trips of 151-300 as low and 501-2,500 as low-moderate.

viewers from KOP 3 may increase by up to 40 per day[11]. For the purposes of this analysis, based on existing traffic data, the number of viewers will be 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[12]. 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 will experience a moderate view duration. The completion of the St. Therese Mission campus will increase the view duration significantly as, not only will visitors be entering the property in automobiles and busses, but will be lingering on the property for hours. This will 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, is 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 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.

[11] Visitation expectations included in Conditional Use Permit #2010-02/St. Therese Mission, and Negative Declaration associated with the permit.

[12] 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.

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 DR-154 that the "tee-pee" effect will 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** will provide remedial mitigation for the loss of scenic views from KOP 3. 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 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 occupied13. 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.

## 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[14]. 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

[13] CH2MHILL - Census 2010 PL 94-171 Data

[14] 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.

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 will 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.

## 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** will 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** will 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** will 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 will be different for motorists and recreationists. At this fixed point, the view will 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 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. 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[15]). 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 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** will 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 will 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 Springs Mountains rise majestically, with Mount Charleston crowning the range with its snow capped peak. The bluish cast of the

[15] Google Earth 2012

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 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 obstructed, 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 will 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 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 alters the landscape substantially. The vast scene of natural features and broad horizontality is disrupted by the strong vertical lines of the power towers in the middle ground. The smooth, cylindrical towers, with their luminescent caps, are 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. Were the towers and related facilities closer to the viewer, the dominance would be 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 will reduce the overall impact to less than significant. Adoption of Condition of Certification **VIS-6** will 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 project in Nevada, Energy

Commission staff have analyzed the visual impacts on the KOPs in Nevada. To reduce or eliminate the visual impacts of the power towers and SRGS from KOP 2, mitigation may be required after consultation with BLM staff. A Condition of Certification may be developed for the Final Staff Assesment.

## 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 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.

With the Nopah Range as the backdrop for the KOP, 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. 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 tower and transmission structures will collectively dominate the view and while there is no view disruption or skylining (structures breaking the horizon line) from this viewpoint, overall contrast and dominance will create a high degree of visual change to the view. Even with a low level of viewership (see traffic figures in KOP 3 analysis), the visual impacts would be 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)[16]. 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. Introduction of the project's power towers into the simulated view adds two vertical elements that provide a high degree of contrast with the existing conditions. While the distance begins to moderate the contrast, there remain distinct changes in lines, forms, and texture. 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. Once again, there is no skylining, and with the foreground terrain partially blocking the view of the towers, they appear co-dominant with other elements in the view. There is therefore, a moderate to high degree of visual change.

Based on the status as an ACEC, visual sensitivity is high, even though the actual number of viewers may be quite low. The only feasible mitigation for this view would be to consider planting dense desert vegetation on BLM land at the highest point of elevation in the middle ground or to manipulate the terrain in the middle ground to block the view of the towers. This would necessarily have to be done within the guidelines of the resource management plan for Stump Springs ACEC and with further study by BLM.

## 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. Located within a residential area, across the street from some houses, the existing view is composed of desert landscape from foreground to middle ground and the Pahrump Valley Wilderness and distant Kingston Ranges 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 quality to the view.

The visual simulation of the project 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

[16] http://www.blm.gov/nv/st/en/fo/lvfo/blm_programs/lvfo_recreation/accessing_your_public/acec_information.html

horizon line of the mountain range and would appear more distinct from the background if it were a cloudless day with blue sky. As it is shown, the contrast of brightness of the solar receiver to the background is poorly represented in this simulation. The SRGS would be much brighter and highlighted against the medium to dark tones of the mountain range. 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. The sensitivity of the view, while typically considered to be high for residential areas, is moderated by the low number of viewers and the short duration of views, whether on foot or in an automobile on Homestead Road. Without clear dominance, view disruption or contrast, the overall visual change is moderate. The visual impact from the tower structures themselves is less than significant in KOP 6.

## Overall Project Operation Impacts on Existing Visual Character or Quality

Project operation impacts from all 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 partial screen of vegetation and fencing that will 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 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. Suggested mitigation for KOP 2 in Nevada would potentially lower the impacts to less than significant. No mitigation is suggested for KOP 1 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 | |
| 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 |
| 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 | | | |
| 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 |
| 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 | Medium | High | Significant and unavoidable | There is no feasible mitigation for KOP 1. |
| 2 | High | Moderate-High | Significant and unavoidable | Screening plantings or terrain manipulation may lessen the |

| | | | | |
|---|---|---|---|---|
| | | | | impacts less than significant. |
| **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** will 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** | | | 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 Historic Old Spanish Trail does not reduce the impacts to less than significant. |

## Linears

Transmission Lines

Two distinct transmission options are being considered because of a unique situation concerning Valley Electric Association (VEA). Under the first option, the project would interconnect via a 230-kilovolt (kV) transmission line to a new VEA-owned substation (Tap Substation) at the intersection of Old Spanish Trail Highway and Nevada State Highway 160 (the Tecopa/SR 160 Option). The other option is a 500-kV transmission line that interconnects to the electric grid at the Eldorado Substation (the Eldorado Option), in Boulder City, Nevada. Neither of these routes are located within California and therefore are not subject to Energy Commission review.

Pipelines

A 12-to-16 inch diameter natural gas pipeline would be required for the project. After exiting from the project site at the Nevada border, it would travel along Old Spanish Trail Highway in Nevada until it crosses under Highway160. Turning southeast at this location, a 36-inch underground pipeline would continue approximately 26 miles to intersect with the Kern River Gas Transmission (KRGT) pipeline. 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 will 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 will 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 will 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. No comments have been received from residents of Charleston View.

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 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, address 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 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. 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. 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 will have a significant and unavoidable impact. See Appendix VR-2 for a 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[17] | County | Distance from Project Site | Visual Resources Characteristics | Status of Project |
|---|---|---|---|---|
| **St. Therese Mission** | Inyo (California) | 0.5 mile | A 15.5-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. New 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) |
| **Sandy Valley (NVN090476)** | Clark (Nevada) | 8 miles east-southeast of | Solar Power Tower Plant on BLM-managed land. | Plan of Development |

[17] See Visual Resources Figure 25 for locations of the listed projects.

| Project[17] | County | Distance from Project Site | Visual Resources Characteristics | Status of Project |
|---|---|---|---|---|
| | | HHSEGS near Highway 160. | | |

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[18]. 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 roadbed. This low-profile development will 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)[19]. 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.**

[18] Notice of Determination, Inyo County, Conditional Use Permit #2010-02//St.Therese Mission, June 23, 2010.

[19] Inyo County General Plan, Land use and Conservation/Open Space Elements, Diagram 29.

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 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.

BLM will publish a draft Environmental Impact Statement (DEIS) in June, 2012. The DEIS will include an assessment of cumulative impacts of the projects planned in Nevada. At that time, Energy Commission staff will reference BLM's preliminary findings.

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 will 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  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 is result would be 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** |
| **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 will 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**. |
| **LOCAL** | | | |
| Inyo County General Plan, Goals and Policies Report, December, 2001. Land Use Element, Land Use Designations, Diagram 29. | The proposed project would be located on parcels currently designated as REC, Resort/Recreational and OSR, Open Space and Recreation. | No | Industrial uses are not included in the REC and OSR designations, which are intended for low-profile developments such as residential units, parks, ball fields, horse stables, greenbelts and compatible uses. |
| 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 | The County shall promote efficient water use by encouraging and enforcing water-conserving landscaping and other measures. | Yes, as conditioned | Compliance with WELO will meet this goal and is required in Condition of Certification **VIS-2**. |

| | | | |
|---|---|---|---|
| Use. | | | |
| 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. |
| 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:<br>• Maintain small town character;<br>• Preserve panoramic views;<br>• Maintain open natural character of the County;<br>• Maintain visual resources of scenic corridors, highways and roadways. | No | The project will have significant and unavoidable visual impacts on panoramic views within Inyo County. "Striking views of the contorted layers of the Nopah Range[20]" will be impacted. Condition of Certification **VIS-6** will provide remedial mitigation for the loss of scenic views within the County. |

[20] Inyo County General Plan, p. 2-8, description of Charleston View.

| | | | |
|---|---|---|---|
| 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. | Yes | Charleston View is a recognized community in the General Plan but has no design themes or historic characterizations associated with it. |
| 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** will 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** will 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 Zoning Code, Chapter 18.12.OS (Open Space) | Maximum height of buildings in OS Zone: Principal buildings 30 feet, accessory buildings 25 feet. | No | The proposed project structures are not in conformance with building height restrictions. |
| 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. | No | The project will have significant and unavoidable visual impacts on scenic views within Inyo County. The project will produce an unmitigable amount of glare due to the |

| | | | |
|---|---|---|---|
| | Other impacts may include light and glare. The County requires that adverse impacts are avoided or acceptably mitigated.<br>• Police powers of the County include protection of the environment of Inyo County, including biological and other natural resources, aesthetics, recreational attractiveness.<br>• 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.<br>• 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. | | 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** will provide remedial mitigation for the loss of scenic views within the County. |

## 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[21]. These impacts are noted and are detailed above.

## 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 and

[21] E-mail from Michael Elliott, National Trails Intermountain Region, NPS, March 21, 2012.

unavoidable aesthetic impact according to the California Environmental Quality Act (CEQA) Guidelines.

Staff also 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 will 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 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.

Staff has reviewed **Socioeconomics Figure 1** showing the environmental justice population is less than 50 percent within a six-mile radius of the proposed HHSEGS. However, there are census blocks within the radius which have minority populations greater than 50 percent. Some of these census blocks are located in the vicinity of KOP 6, in south Pahrump, Nevada. Visual impacts at KOP 6 were found to be less than significant, therefore there are no environmental justice issues related to Visual Resources at KOP 6. There are census blocks located in Charleston View, California, which exceed 50 percent minority population. These census blocks are in the vicinity of KOP 4, where staff concludes there are significant and unavoidable visual impacts from the construction and operation of the proposed project. The presence of an environmental justice population within that those census blocks, and, by extension, the visual impacts to the environmental justice population in Charleston View, leads staff to the conclusion that there are Visual Resources environmental justice issues related to the operation of this project and 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. Construction would occur over 29 months.

2. The project will have a substantial adverse effect on various scenic vistas because of its vast size, height, and disruption of the existing landscape.

3. The project has BLM designated wilderness areas to the south and west of the site.

4. There are views of and from scenic resources in the vicinity of the project that will 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.

5. The project is not adjacent to a scenic highway.

6. The existing visual quality in the project area is high, and the project will degrade the existing visual character of the site and its surroundings.

7. The project's proposed construction activities would substantially degrade the existing visual character or quality of the site and its surroundings.

8. The project's temporary construction activities' impact on visual resources cannot be mitigated to less than significant impact.

9. The project area is relatively dark at night, with little local lighting.

10. HHSEGS's new source of substantial light to nighttime views, including its aviation warning lights at the top of its power towers, will be significant even after the effective implementation of Condition of Certification VIS-3.

11. The luminosity of the solar tower receivers, and their height and dominance, will be visually obtrusive for viewers even at great distance, and is a significant impact that cannot be mitigated.

12. 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.

13. There will be no significant adverse impacts in California to visual resources resulting from the HHSEGS linears, which are located in Nevada.

14. The visual effects of HHSEGS in combination with past, present and reasonable foreseeable projects in the Pahrump Valley will be cumulatively considerable on Visual Resources in the viewshed of the greater Pahrump Valley.

15. 15. The project will not comply with Inyo County laws, regulations and standards regarding project design, building heights, scenic views and other requirements related to Visual Resources.

16. 16. There are Visual Resources environmental justice issues related to the operation of this project and minority or low-income populations would be significantly or adversely impacted.

## PROPOSED 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 will 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[22] and Invasive Species Council of California (ISCC)[23]. 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. In order to minimize the dangerous effects of glint and glare on passing motorists and on visitors to the St. Therese Mission, a solid wall of sufficient height to screen the view of the heliostat mirrored surfaces shall be included. 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.

[22] NRCS Invasive Species Policy, Invasive Species Executive Order 13112, Invasive and Noxious Weeds, California State Listed Noxious Weeds.

[23] **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).

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 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.) 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.) c) wherever feasible, safe and not needed for security, lighting shall be kept off when not in use.

d.) d.) 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.

Historical Visual Interpretation

VIS-6

The applicant/Project owner shall provide an Interpretive Center with parking and interpretive panels. The interpretive center shall be built within the roadway setback and as part of the landscape screening contained in **VIS-2**. A detailed plan shall be developed and shall include visitor interpretation of visual and cultural highlights which have been adversely impacted by the introduction of the project.

**Verification:** At least 120 days before beginning installation of any permanent landscape treatments along the Tecopa Road frontage, a detailed plan shall be submitted to the CPM for review and approval, and to Inyo County and to Native

American tribal representatives, identified by Cultural Resources staff, 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**).

e.) Design plans for interpretive panels or displays which take into consideration the following design aspects:

Pahrump Valley history, including the Wiley Ranch;
Native American history and uses and understanding of the landscape in the region after consultation with local tribal representatives identified by Cultural Resources staff;
History of the Old Spanish Trail and the Mormon Trail;
Identification of the wilderness and national recreation areas and the major landscape features visible from the site (i.e. mountain ranges and named peaks);
Introduction to the solar electric technology in use on the site.
Parking for passenger vehicles and one bus.
Appropriate number of shade trees for the parking and visitor area.
Maintenance plan for the interpretive area.

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 and the project owner shall have no further responsibility.

**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

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.

[1] Defined as "exposure to the sun's rays."

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.

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 time 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. Staff concludes that the impacts of the visual signature of the tower SRSGs during nominal power generation operations is significant and adverse to the daytime viewers? of the project site and surrounding area.

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 are significant in the adverse impact of the daytime view of the project site and surrounding area.
Staff concurs with the visual resource analysis that the impacts of the l visual change of the project will be significant and unavoidable with respect to visual quality. 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.

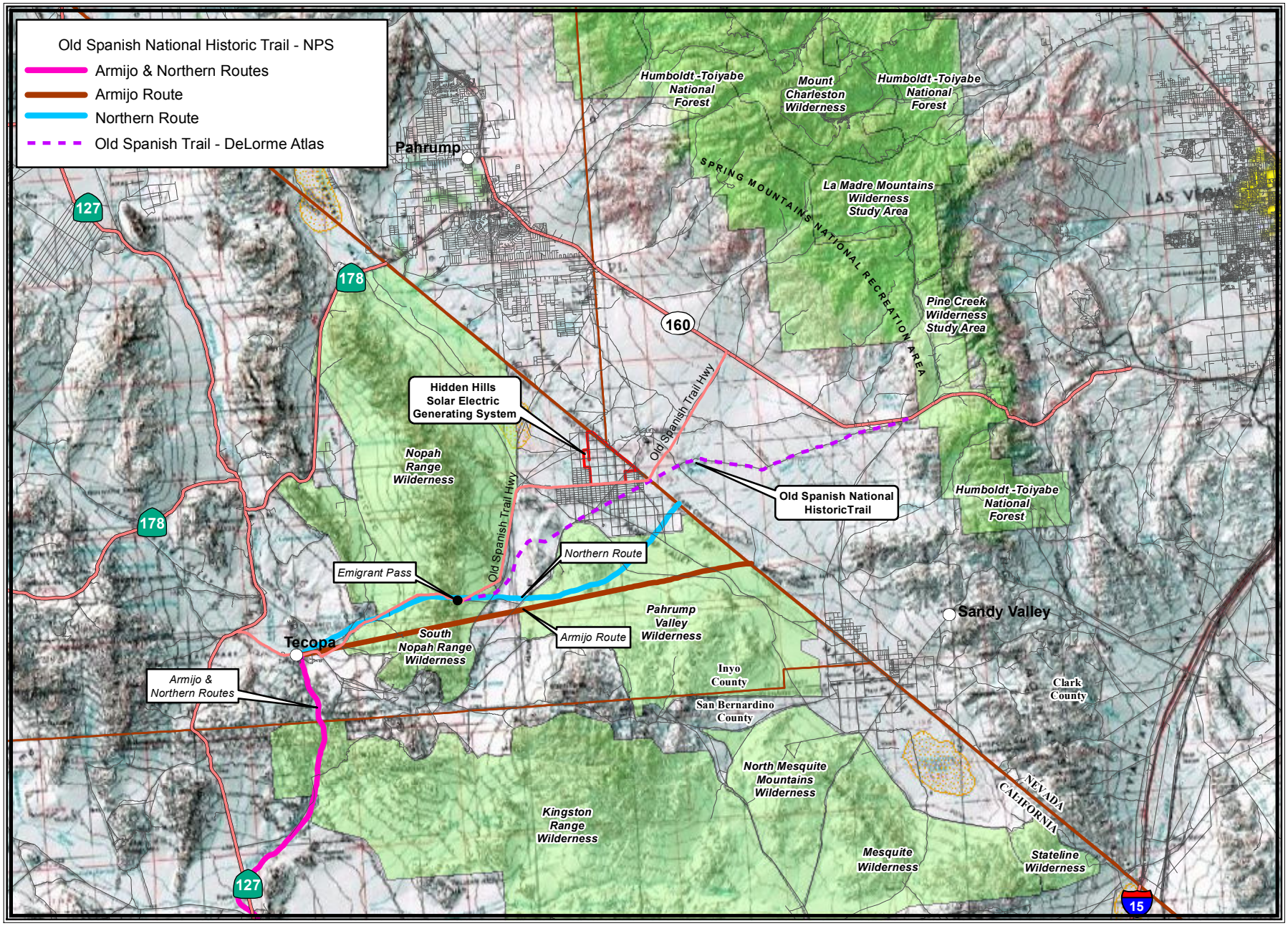
2. The visual impact of the Solar Receiver Steam Generators (SRSG) during power generation on visual resources is both significant and incapable of mitigation.

## 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 - FIGURE 1**

Hidden Hills Solar Electric Generating System (HHSEGS) - Trails, Recreation and Wilderness Areas in the Project Vicinity



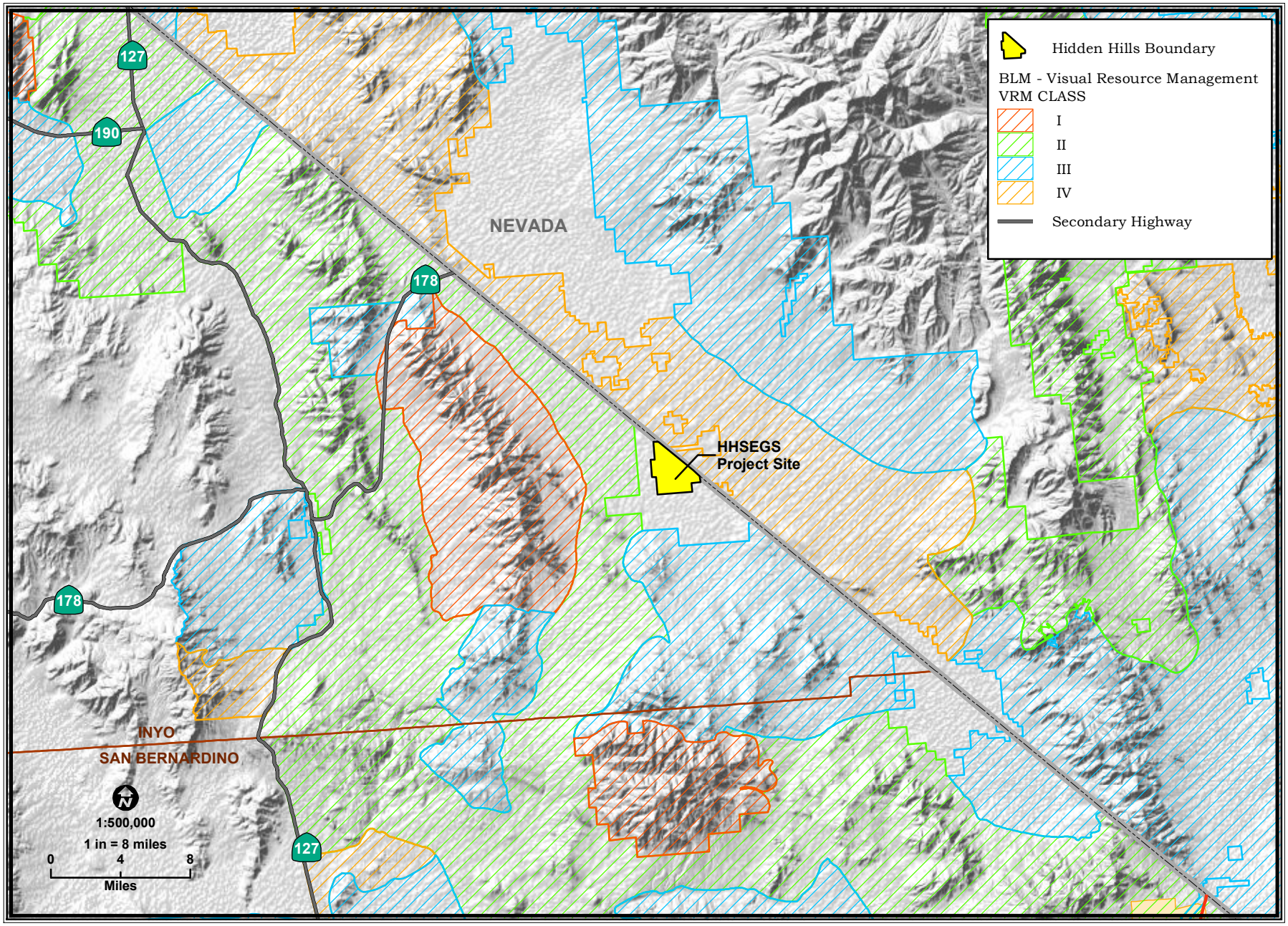

VISUAL RESOURCES

**CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: CH2MHILL, MultiNet, DeLorme Atlas, National Park Service

**VISUAL RESOURCES - FIGURE 4**

Hidden Hills Solar Electric Generating System (HHSEGS) - BLM Visual Resource Management



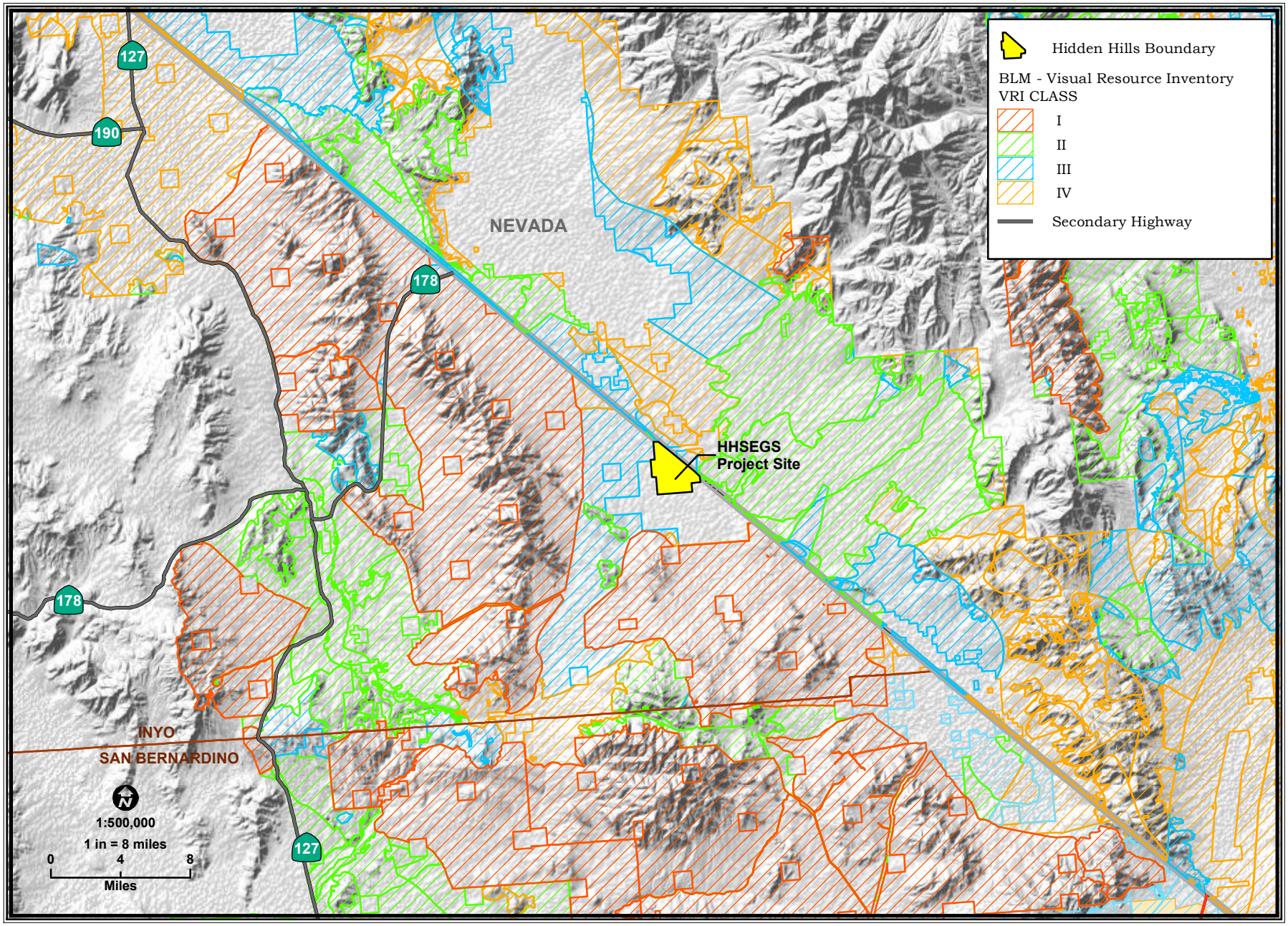

VISUAL RESOURCES

**CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: BLM Visual Resource Management

**VISUAL RESOURCES - FIGURE 3**

Hidden Hills Solar Electric Generating System (HHSEGS) - BLM Visual Resource Inventory



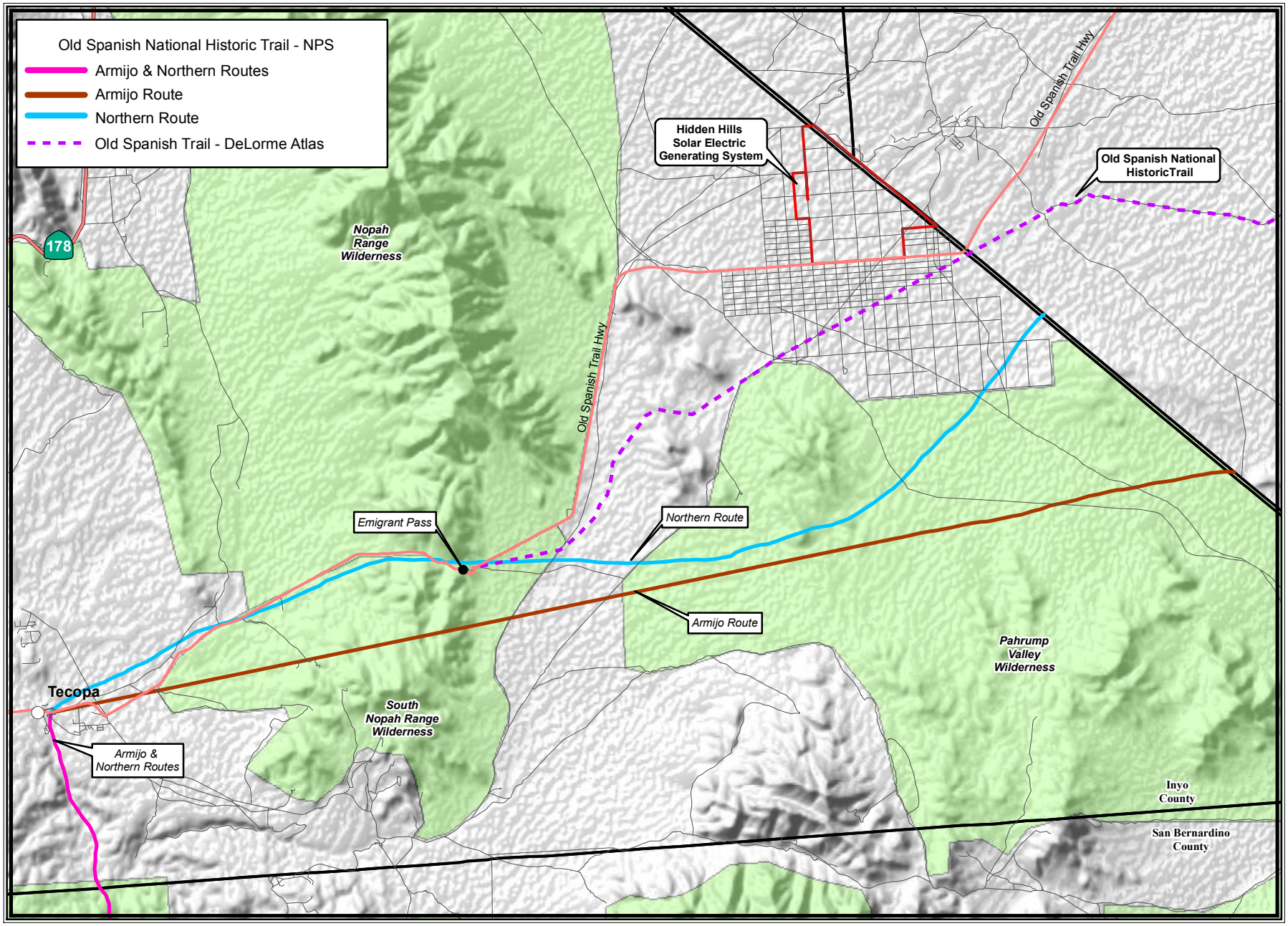

VISUAL RESOURCES

**CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: BLM Visual Resource Management

**VISUAL RESOURCES - FIGURE 2**

Hidden Hills Solar Electric Generating System (HHSEGS) - HistoricTrails in the Project Vicinity




VISUAL RESOURCES

**CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: CH2MHILL, MultiNet, DeLorme Atlas, National Park Service

**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 9**

Hidden Hills Solar Electric Generating System (HHSEGS) - Landscape Character Photo

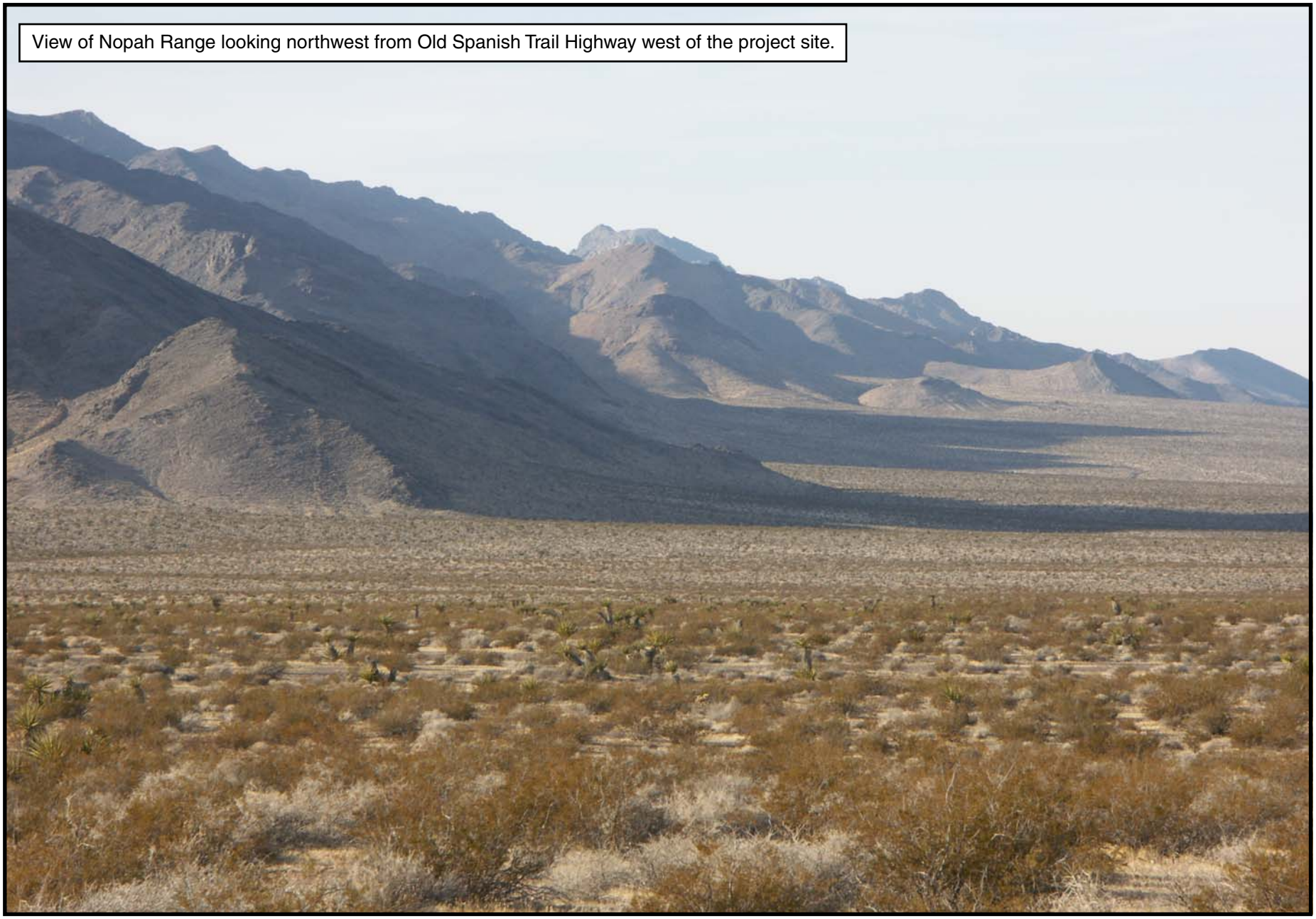



**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: Staff Photo

**VISUAL RESOURCES - FIGURE 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 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 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 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 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 13**

Hidden Hills Solar Electric Generating System (HHSEGS) - Landscape Character Photo



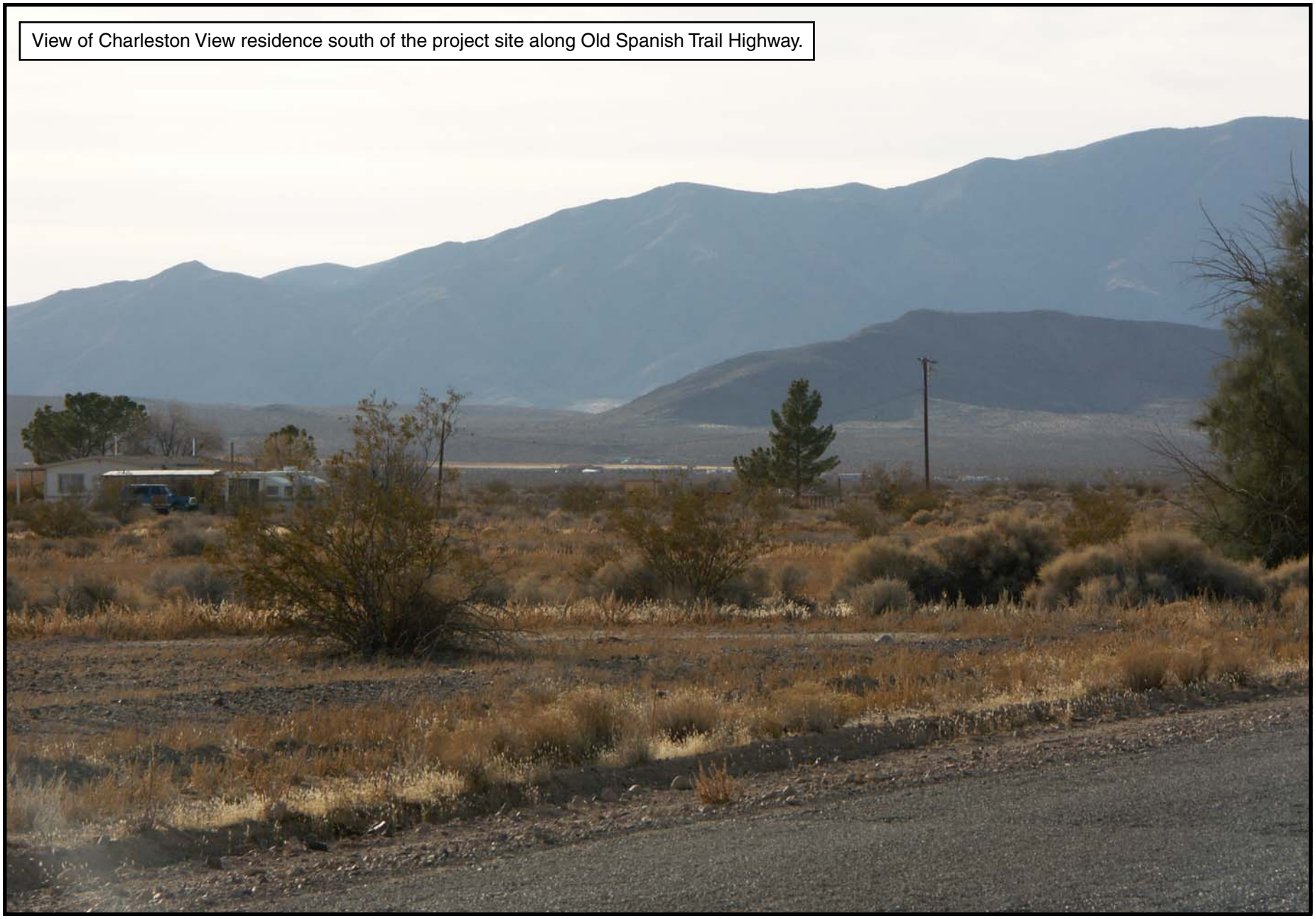



**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: Staff Photo

**VISUAL RESOURCES - FIGURE 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 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 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 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 19a**

Hidden Hills Solar Electric Generating System (HHSEGS) - KOP 2. Existing view toward the project site from Stump Springs ACEC.







SOURCE: AFC Figure 5.13-3A

**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 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.



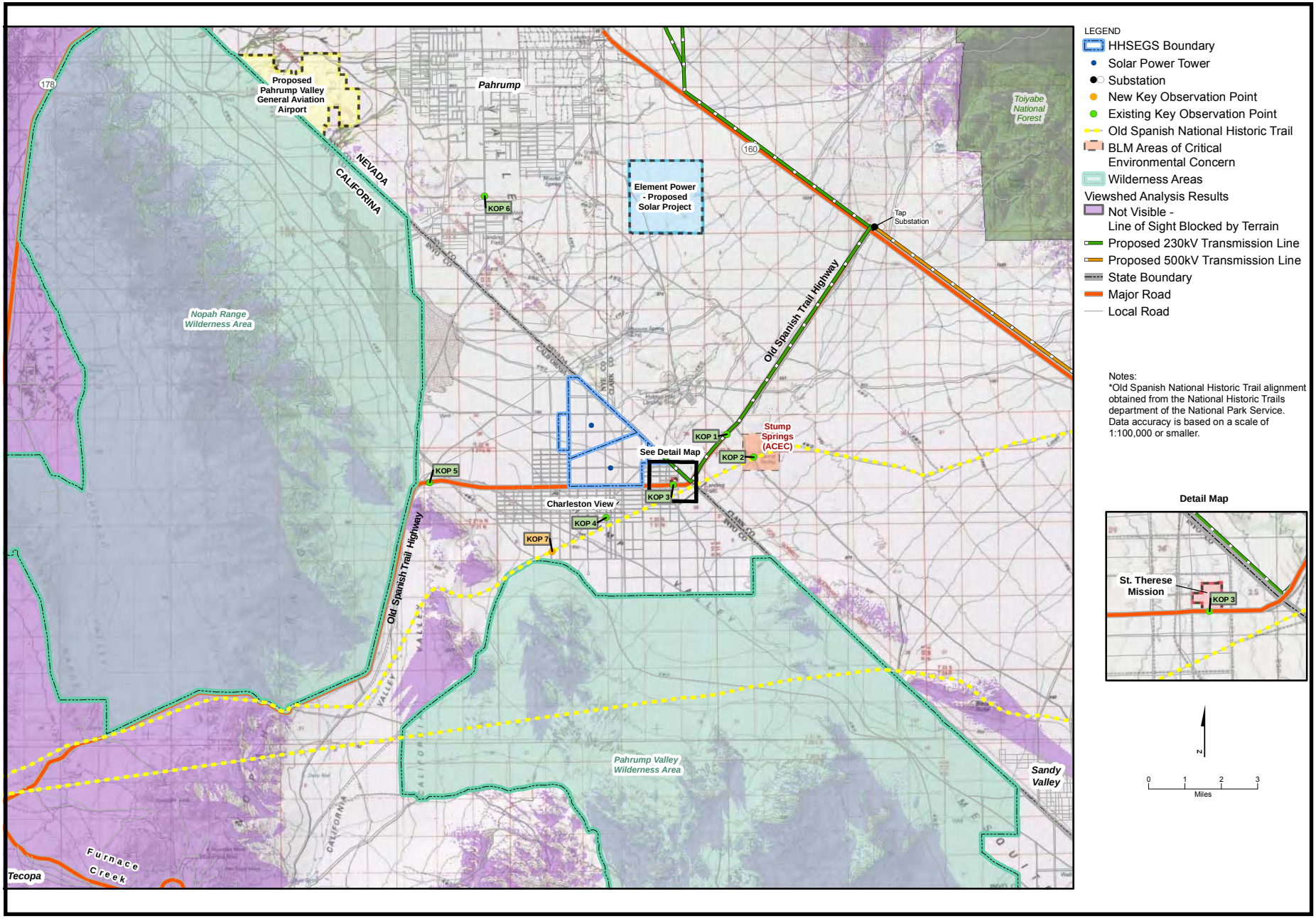
VISUAL RESOURCES

**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: AFC Figure 5.13-2A

# VISUAL RESOURCES - FIGURE 18

Hidden Hills Solar Electric Generating System (HHSEGS) - Location of Key Obervation Points

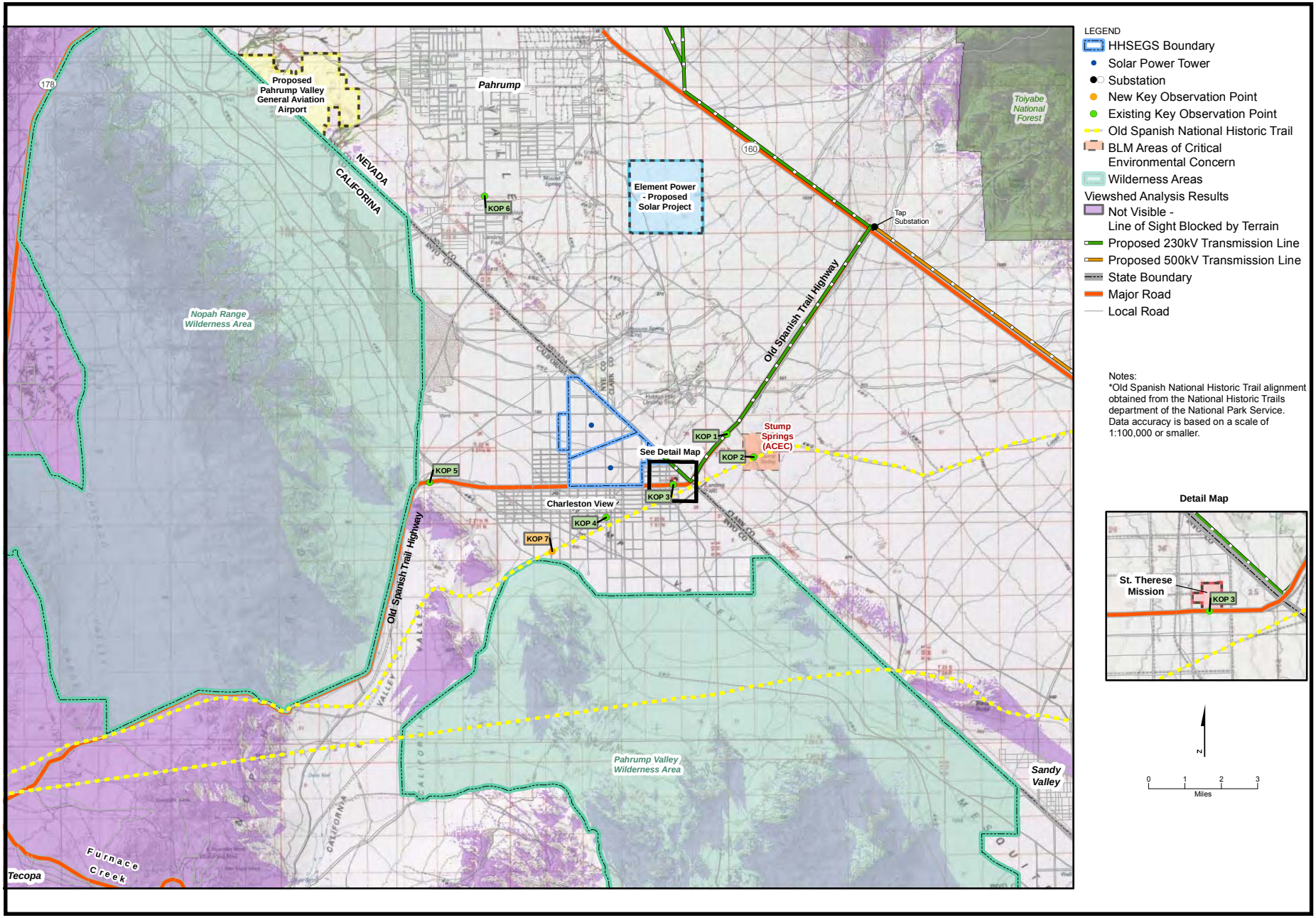



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: DR 32-1

**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 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 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 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.







SOURCE: Supplemental Data Response Set Two, Figure 5.13-6B 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.





**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: AFC Figure 5.13-6A

**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 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).







SOURCE: AFC Figure 5.13-5A

**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







SOURCE: Figure DR155-1

**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 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.



VISUAL RESOURCES

**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: AFC Figure 5.13-7A

**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 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 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.



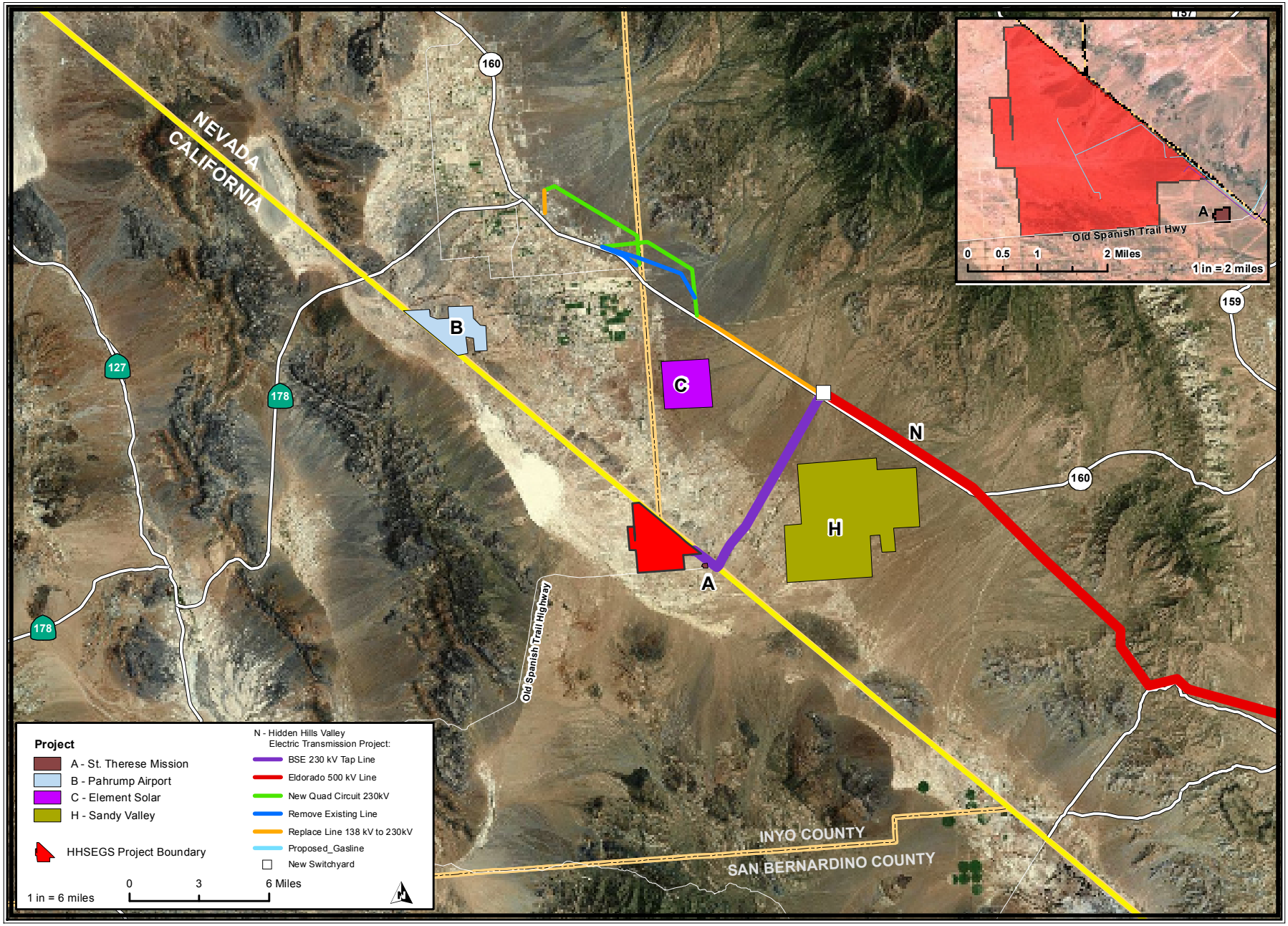


**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: Supplemental Data Response Set Two, Figure 5.13-7B R1

**VISUAL RESOURCES - FIGURE 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.

# WASTE MANAGEMENT

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 Preliminary Staff Assessment (PSA) 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 PSA.

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.<br><br>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.<br><br>RCRA Subtitle C establishes provisions for the generation, storage, treatment, and disposal of hazardous waste, including requirements addressing:<br>• generator record keeping practices that identify quantities of hazardous wastes generated and their disposition;<br>• waste labeling practices and use of appropriate containers;<br>• use of a manifest when transporting wastes;<br>• submission of periodic reports to the United States Environmental Protection Agency (U.S. EPA) or other authorized agency; and<br>• corrective action to remediate releases of hazardous waste and contamination associated with RCRA-regulated facilities.<br><br>RCRA Subtitle D establishes provisions for the design and operation of solid waste landfills.<br><br>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.<br><br>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:<br>• reporting requirements for releases of hazardous substances;<br>• requirements for remedial action at closed or abandoned hazardous waste sites and brownfields;<br>• liability of persons responsible for releases of hazardous substances or waste; and<br>• 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 |

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| 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.<br>• Part 246 addresses source separation for materials recovery guidelines.<br>• Part 257 addresses the criteria for classification of solid waste disposal facilities and practices.<br>• Part 258 addresses the criteria for municipal solid waste landfills.<br>• Parts 260 through 279 address management of hazardous wastes, used oil, and universal wastes (i.e., batteries, mercury-containing equipment, and lamps).<br><br>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<br><br>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.<br><br>Hazardous Waste Control Act of 1972, as amended | This California 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.<br><br>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<br><br>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.<br><br>The standards addressed by Title 22, CCR include:<br>• Identification and Listing of Hazardous Waste (Chapter 11, §§ |

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| | 66261.1, et seq.)<br>• Standards Applicable to Generators of Hazardous Waste (Chapter 12, §§ 66262.10, et seq.)<br>• Standards Applicable to Transporters of Hazardous Waste (Chapter 13, §§ 66263.10, et seq.)<br>• Standards for Universal Waste Management (Chapter 23, §§ 66273.1, et seq.)<br>• Standards for the Management of Used Oil (Chapter 29, §§ 66279.1, et seq.)<br>• Requirements for Units and Facilities Deemed to Have a Permit by Rule (Chapter 45, §§ 67450.1, et seq.)<br><br>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<br><br>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.<br>• Aboveground Storage Tank Program<br>• Business Plan Program<br>• California Accidental Release Prevention (CalARP) Program<br>• Hazardous Material Management Plan / Hazardous Material Inventory Statement Program<br>• Hazardous Waste Generator / Tiered Permitting Program<br>• Underground Storage Tank Program<br><br>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.<br><br>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.<br><br>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.<br><br>• Article 9 – Unified Program Standardized Forms and Formats (§§ 15400–15410).<br>• Article 10 – Business Reporting to CUPAs (§§ 15600–15620). |
| Public Resources Code, Division 30, §§ 40000, et seq. | The California Integrated Waste Management Act of 1989 (as amended) establishes mandates and standards for management of solid waste. |

| | |
|---|---|
| California Integrated Waste Management Act of 1989. | Among other things, the law includes provisions addressing solid waste source reduction and recycling, standards for design and construction of municipal landfills, and 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 passed by the California State Assembly and Senate on September 8, 2011 and is now in the hands of Governor Brown. 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.<br><br>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 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.<br><br>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.<br>• Chapter 3 – Minimum Standards for Solid Waste Handling and Disposal.<br>• Chapter 3.5 – Standards for Handling and Disposal of Asbestos Containing Waste.<br>• Chapter 7 – Special Waste Standards.<br>• Chapter 8 – Used Oil Recycling Program.<br>• Chapter 8.2 – Electronic Waste Recovery and Recycling. |
| California Health and Safety Code, Division 20, | 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 |

| | |
|---|---|
| Chapter 6.5, Article 11.9, §25244.12, et seq.<br><br>Hazardous Waste Source Reduction and Management Review Act of 1989 (also known as SB 14). | 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 a summary progress report due to DTSC every fourth year. |
| Title 22, CCR, § 67100.1 et seq.<br><br>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 8, CCR §1529 and §5208 | These regulations require the proper removal of asbestos containing materials in all construction work and are enforced by California Occupational Safety and Health Administration (Cal-OSHA). |
| 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<br>NAC 444.5705 "Class I site" defined. (NRS 444.560**)** Class I site" means a disposal site which:<br>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<br>2. Is not a Class II or Class III site.<br>NAC 444.571 "Class II site" defined. **(**NRS 444.560**)** "Class II site" means a disposal site:<br>1. Which is comprised of at least one municipal solid waste landfill unit;<br>2. Which accepts less than 20 tons of solid waste per day on an |

| | |
|---|---|
| | annual average;<br>3. For which there is no evidence of contamination of groundwater originating from the site;<br>4. Which serves a community that has no other practicable alternatives for waste management; and<br>5. Which is located in an area which annually receives no more than 25 inches of precipitation,<br>Ê The term includes all contiguous land and structures, other appurtenances and improvements on the land used for the disposal of solid waste.<br>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 1,483 acres. Solar Plant II will occupy 1,510 acres. A 103-acre common area will consist of an administration building, warehouse, and maintenance complex and onsite switchyard. The construction laydown area and parking will occupy 180 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 35.3 mile natural gas pipeline alignments, most of which are in Nevada (HHSG 2011a, page5.14-1).

The 3,900-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. The hazardous waste generated during this phase of the project would consist of used oils, universal wastes, solvents, and empty hazardous waste materials (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 as appropriate. 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 PSA).

## 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.

[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.

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 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. The project consists of 172 parcels of undeveloped land, with the exception of a small orchard. The project site is located along 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 the 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 FIGURE 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).

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 (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

[2] http://ndep.nv.gov/bwm/swmp/swp01.htm

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 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-3** 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 Conditions of Certification **WASTE-2** and **3** 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 using 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, CCR, 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-4.** 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-5**. 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, §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 Hydrology** 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-4**, 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-6**, 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 PSA.

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-7** to notify the 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. Nonhazardous waste will not be

[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

disposed in California. The solid waste landfill closest to the project site is the Tecopa Landfill. The Tecopa Landfill is currently unmanned 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, 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, § 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, §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 (Public Resources Code §41825).

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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

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 §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 believes 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 and 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

4. http://www.calrecycle.ca.gov

hazardous wastes would also have a less than significant impact on the remaining capacity at Class I landfills.

**WASTE MANAGEMENT Table 2**
**Local and Regional Landfills**

| Landfill | Location | Permitted Capacity | Remaining Capacity | Estimated Closure Date |
|---|---|---|---|---|
| Nonhazardous | County | Cubic yards | Cubic yards | 2032 |
| Pahrump Valley | Nye, NV | 2.5 million | N/A | 2175 |
| Republic Apex Regional | Clark, NV | 6.0 million | 4.8 | |
| 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

## CUMULATIVE IMPACTS AND MITIGATION

The CEQA Guidelines (Section 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 PSA). The waste 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.

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 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.

There is one project, the St. Therese Mission that 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 and the Pahrump Airport (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 **7**; 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, Cal Recycle 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 compliance project manager (CPM) and review by Inyo County. The project owner should also submit a plan to the CPM and 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 is 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;

[5] Phone conversation between staff and Mr. Coyle on March 14, 2012

keep detailed records; and appropriately train employees, in accordance with state and federal hazardous waste management requirements.

## RESPONSE TO AGENCY AND PUBLIC 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 unmanned 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 dialogue with the applicant regarding the potential impacts of incoming construction workers on a number of county services., and the issue was the primary focus of a May 9, 2012 Issues Resolution Workshop in Sacramento. Energy Commission staff will continue dialogue with all parties on anticipated impacts to Inyo County and will further discuss and seek resolution of the issues at the upcoming PSA Workshop planned for June 14-15, 2012 in Pahrump, Nevada.

CalRecycle has provided information concerning Inyo County and their compliance with state regulations. CalRecycle provided substantial information on pertinent information on state LORS and requirements that would be associated with the HHSEGS project. Conditions of Certification **WASTE-2**, **WASTE-3** and **WASTE-4** 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, 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 **7**. 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** and **WASTE-3**))
- Obtain a hazardous waste generator identification number (**WASTE-4**).
- 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-6)**
- 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-3** and **WASTE-5**).
- Report any waste management-related LORS enforcement actions and how violations would be corrected (**WASTE-7)**.

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 are no **Waste Management** environmental justice issues related to this project and no minority or low-income populations would be significantly or adversely impacted.

5) There is also one unresolved issue related to the potential cost to Inyo County for increased municipal waste generation and removal during construction from the influx of HHSEGS workers temporarily commuting to and from, or living in, Inyo County. The Inyo County Waste Management Department has been talking to the applicant and Energy Commission staff regarding the potential impacts of the incoming construction worker waste and will further discuss the issue during an upcoming PSA Workshop to be held in Pahrump, Nevada, on June 14-15, 2012.

## PROPOSED FINDINGS OF FACT

Based on the evidence, we propose the following findings of fact and reach the following conclusions:

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 PSA, 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.

9. 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 help off-set expected impacts to county services, including municipal solid waste disposal.

## 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 Demolition and Construction Waste Management Plan, in accordance with Inyo County Code Chapter 7.11, for all wastes generated during demolition of existing structures or 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 demolition and construction waste streams, including projections of frequency, amounts generated, and hazard classifications; and
- 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.
- Provide reporting demonstrating that they have met the construction waste diversion requirements of 50 percent pursuant to the CalGreen Code

**Verification:** The project owner shall submit the Demolition and Construction Waste Management Plan to the CPM for approval no less than 30 days prior to the initiation of construction activities at the site. The project owner shall submit to the County and CPM documentation showing they met the construction and demolition waste diversion requirements of 50 percent diversion pursuant to the CalGreen Codes.

**WASTE-3** 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; and
- 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.
- procedures for providing reports from contract haulers that transport waste from the project out of state pursuant to CCR 18808.9.

**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 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. The Monthly Compliance Report will also include reports submitted by contract haulers pursuant to CCR 18808.9.

**WASTE-4** 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 Monthly Compliance Report 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-5** 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.
- an explanation to the CPM and Inyo County demonstrating how they will divert operation material to the maximum extent feasible; and
- procedures for providing reports from contract haulers that transport waste from the project out of state pursuant to CCR 18808.9.

**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 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. The Annual Compliance Report will also include reports submitted by contract haulers pursuant to CCR 18808.9.

**WASTE-6** 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-7** 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.

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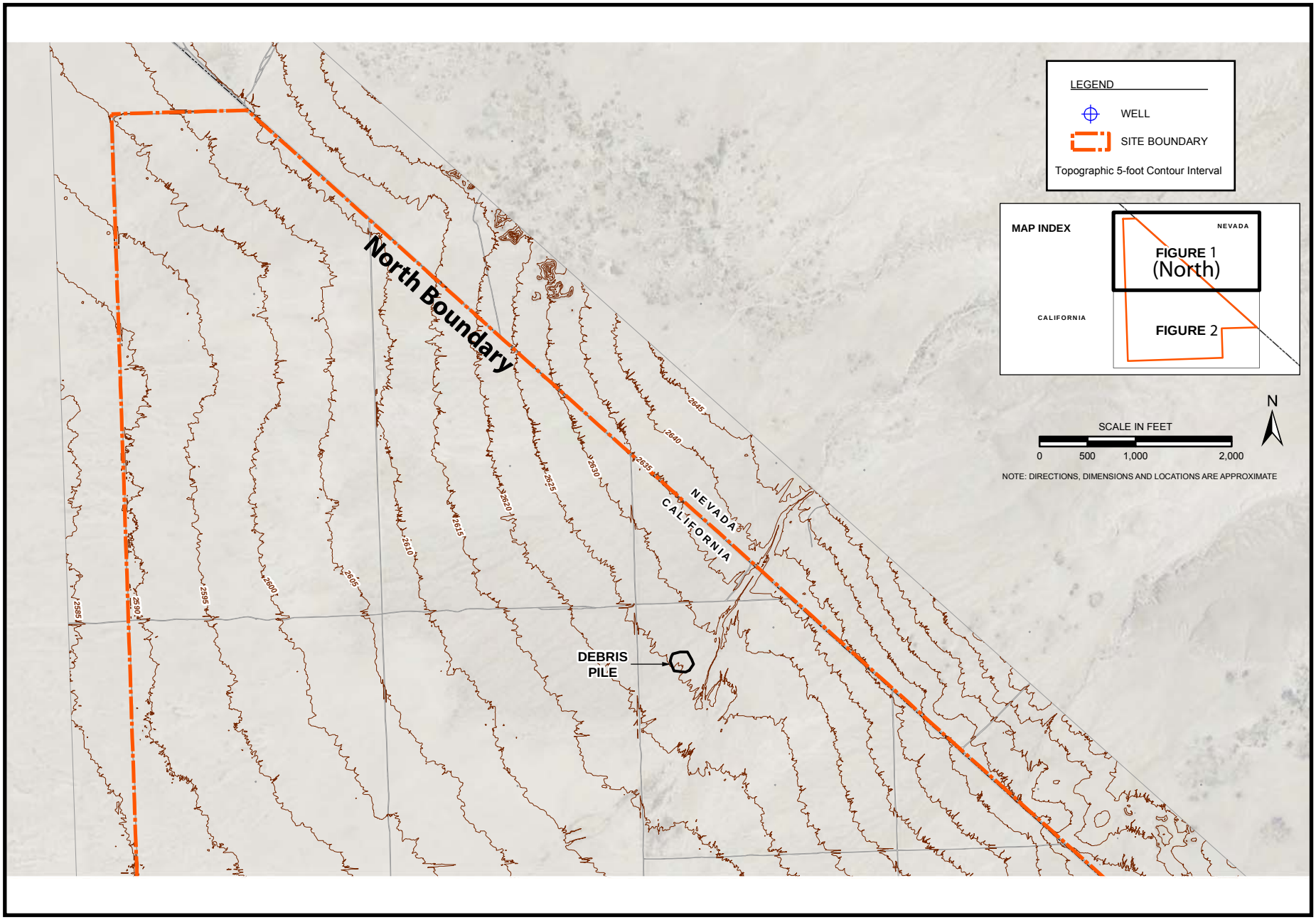
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**WASTE MANAGEMENT - FIGURE 1**

Hidden Hills Solar Electric Generating System (HHSEGS) -Site Plan (North)



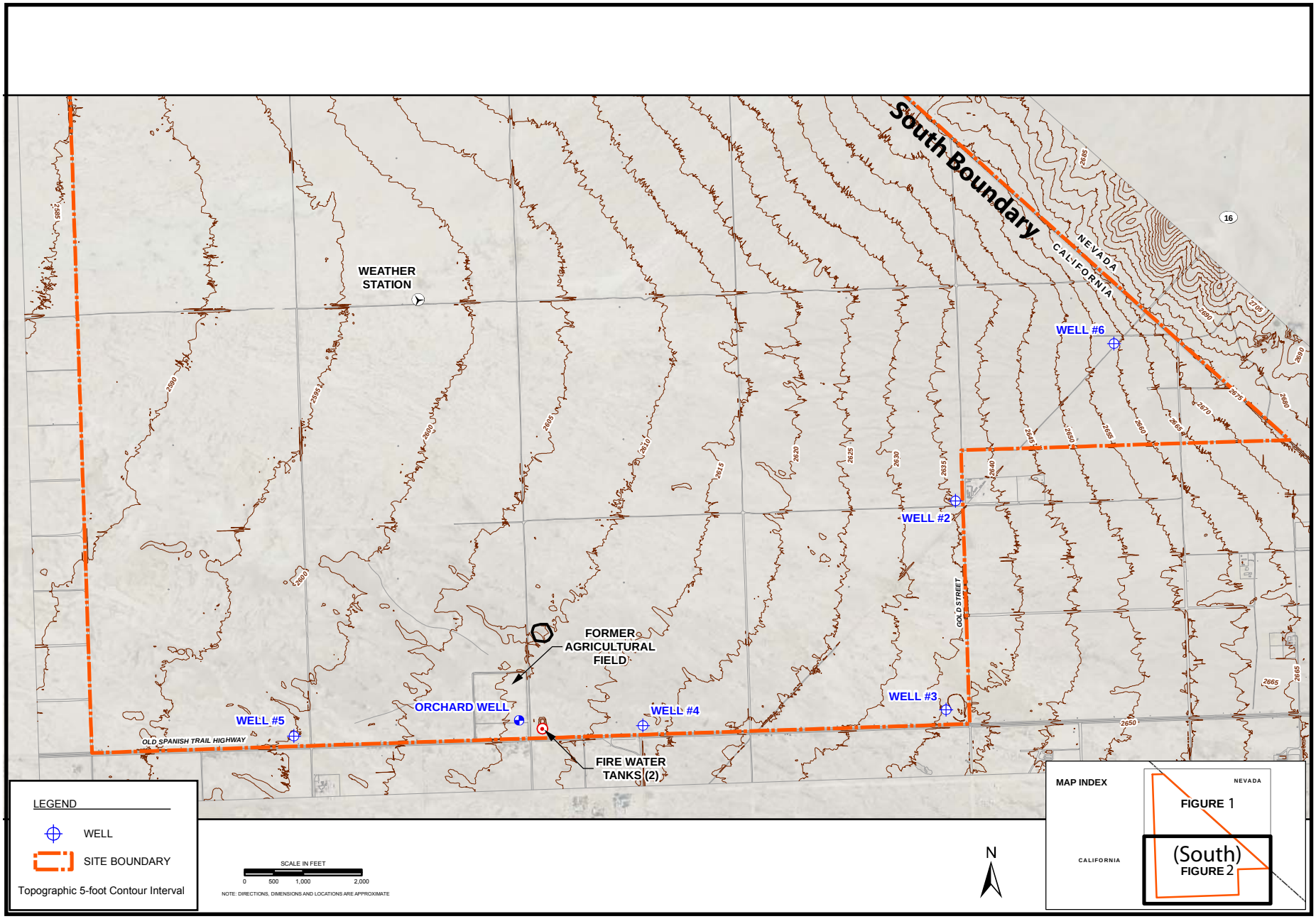

**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: AFC Volume II, Phase I, Environmental Site Assessment, Appendix 5.14A, Fig. 3, July 5, 2011 by Ninyo & Moore.

WASTE MANAGEMENT

# 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.

# WATER SUPPLY

Mike Conway

## 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.

California Energy Commission (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 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 and staff's proposed conditions of certification are implemented.

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. Staff proposes Condition of Certification **WATER SUPPLY-1**, which would require the proposed project to mitigate for its groundwater use and cumulative overdraft impact.

2. 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 (ACEC). Staff proposes a monitoring plan in Condition of Certification **WATER SUPPLY-8** that compliments conditions suggested by Biological Resources staff that together with **WATER SUPPLY-8** would monitor and mitigate potential impacts to groundwater dependent vegetation.

3. If not mitigated, the proposed project could substantially lower the water level in neighboring domestic wells. Staff proposes a monitoring program in Condition of Certification **WATER SUPPLY-6**. Staff also proposes **WATER SUPPLY-7** to mitigate potential impacts on domestic wells.

4. The proposed HHSEGS project would not be expected to have a measurable impact to the Amargosa River or its tributaries.

## INTRODUCTION

This analysis contains a review of the Application For Certification (AFC) submitted by Bright Source Energy and an independent assessment of potential impacts to **WATER**

**SUPPLY** resources resulting from the construction and operation of the proposed Hidden Hills Solar Energy Generating Station (HHSEGS).

The HHSEGS project would be located in southern Inyo County along the California/Nevada border. The project would include two dry-cooled solar plants, expected to generate 250 megawatts (MW) net each, and a total net 500 MW. Each solar plant will include circular arrays of heliostats that reflect the sun's energy to a central solar receiver steam generator. Solar Plant 1 will utilize about 1,483 acres and Solar Plant 2 will utilize about 1,510 acres. A 180 acre temporary laydown area will also be disturbed during construction (HHSG 2011a).

Dry-cooled condensers and partially-dry-cooled auxiliary equipment will cool the two solar plants. Each plant will pump groundwater for boiler make-up, heliostat washing, and potable uses. Water consumption for the entire project would be about 140 acre-feet per year (AFY) during operation. The project would require a total of 697 acre-feet during the 29 month construction period (HHSG 2011a).

## LAWS, ORDINANCES, REGULATION, AND STANDARDS (LORS)

The following federal, state, and local environmental LORS in **WATER SUPPLY Table 1** have been established for the HHSEGS project and similar facilities to ensure the best and appropriate use and management of groundwater resources. Additionally, the requirements of these LORS are specifically intended to protect human health and the environment. The potential for 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. |
| 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, 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. |
| **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 will 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 will be consistent with maximum benefit to the people of the State, will not unreasonable 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. |
| 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 use of 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 are 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. |

# SETTING

## Regional setting

Pahrump Valley is located in the southern Amargosa Desert region of the Mojave Desert, east of Death Valley and about 45 miles west of Las Vegas. The valley lies within the southern extent of the Great Basin, a large topographically closed drainage basin that extends primarily throughout Nevada and western Utah. The Great Basin is characterized by interior drainage with lakes and playas, and the typical horst and graben structures (subparallel, fault-bounded ranges separated by down-dropped basins) (**WATER SUPPLY Figure 1**). The down dropped basins are typically filled with alluvium and playa deposits shed from the adjacent mountain ranges.

## Pahrump Valley

Pahrump Valley is a topographically closed basin that straddles the California/Nevada border. The valley is approximately about 30 miles wide between the Nopah Range and

the Spring Mountains and about 40 miles long along the basin axis from the northwest to the southeast (**WATER SUPPLY Figure 2**).

The basin boundaries are formed by the Spring Mountains to the east and northeast, the Kingston Range to the south, the Nopah Range to the west, and the Resting Spring Range to the northwest. The lowest point in the valley is Stewart Dry Lake, located at about 2,457 feet above mean sea level (amsl). The highest point surrounding the basin is Mt. Charleston in the Spring Mountains standing at about 11,915 feet amsl.

Faulting in the Pahrump Valley may have also resulted in a low-lying, dropped fault block in the vicinity of the proposed project. This fault block is now overlain by as much as 2,500 meters of interbedded silts and clays (Blakely et al., 1998) (**WATER SUPPLY Figure 3**).

# HYROGEOLOGIC SETTING

## Regional Hydrogeology

Significant units of Paleozoic carbonate rock are present throughout the southwestern portion of the Basin and Range Geomorphic Province including Pahrump Valley (**WATER SUPPLY Figure 4**). These carbonate units are typically folded, faulted, and fractured thus creating the potential for a relatively high permeability bedrock aquifer that could be extensive and transmit a significant volume of water throughout the region. Many basins throughout the Basin and Range province therefore have the potential to transmit water beyond the basin-fill aquifers through the fractured carbonate rock unit beneath them. Hydrologic budgeting and subsurface exploration strongly suggests the groundwater flow potential from central Nevada towards its terminus within Death Valley and the Colorado River region (Bedinger and Harrill, 2004).

## Pahrump Valley Basin Hydrogeology

The Pahrump Valley is generally underlain by two primary aquifers, the upper basin-fill aquifer and the lower carbonate aquifer (see **WATER SUPPLY Figure 4**). Most wells penetrate the basin-fill units. These wells indicate that groundwater in the basin-fill may flow towards the southwest (**WATER SUPPLY Figure 5** and **6**). No wells in this area are known to penetrate the carbonate aquifer.

### Water Levels

The Pahrump Valley was the subject of many hydrogeolgic reports in the last 100 years, but very few of these reports focus on the southern part of the valley where the project is located. Well data suggest a general decline in water levels in the northern part of the basin between 1950 and 2000. Average decline in these wells of record is about one foot per year. Well data from the southern half of the basin is scarce and not the subject of many analyses.

The HHSEGS site is located in the Pahrump Valley, which historically had abundant groundwater reserves. Pumping throughout the 1900s caused a steady rate of water table decline in the aquifer, which was on average about one foot per year between the 1950s and 2000 (Buqo, 2004). **WATER SUPPLY - Figure 7** shows the available long-term water levels records in Pahrump Valley. The figure lacks data from the south

where the HHSEGS project would be located. Unfortunately there are not many water levels with long-term trends in the south.

### Basin Balance

The Pahrump Valley receives approximately 22,000 AFY of recharge from precipitation falling in the Spring Mountains. Estimated outflows are split between evapotranspiration (10,000 AFY), underflow through the Nopah Range along the western basin margin, and groundwater pumping. The underflow is thought to vary with basin pumping stresses (Comartin, 2010). The Nye County Water Resources Plan describes the safe yield of the Pahrump basin to be between 12,000 and 19,000 AFY (Buqo, 2004).

Existing water rights on the Nevada side of the Pahrump basin are reported to be 69,000 AFY. Exercised water right extractions were as high as 47,100 acre-feet in 1968, but have been as low as 23,000 acre-feet in 2000. The exercised water rights do not represent all of the groundwater extractions in Pahrump; domestic pumpers do not require a water right. As stated above, the extractions in the Pahrump basin resulted in water level declines of about one foot per year between the 1950s and 2000.

There are approximately 68 residents and 34 residential structures within six miles of the proposed project in California. This could translate into about 10 AFY of domestic groundwater use in the southern portion of PVGB. This relatively small volume is primarily used for domestic purposes in the Charleston View development.

### Wells

Most wells in the Pahrump Valley penetrate the basin-fill aquifer. Historic water levels were close to the ground surface and sometimes created the opportunity for a prolific water supply without the need for a pump. Many wells installed in Pahrump in the early 1900s were known to flow under artesian conditions (Malmburg, 1967).

The proposed HHSEGS site is bordered by some domestic wells, primarily to the south in the Charleston View community. Most of these wells were drilled between 1950 and today. The details of well construction for some of these wells are contained in Well Completion Reports maintained by the California Department of Water Resources. Specific well information including location and owner will not be revealed in this report due the confidentiality of these records. The analysis contained within this report will however take into account available specific well location and constructed conditions for estimating impacts to well operation and yield.

### Subsidence

Northern Pahrump Valley has experienced significant subsidence, which may be due to excessive groundwater pumping during the last 100 years (Buqo, 2004; Malmburg, 1986). The land in the Pahrump is particularly susceptible to subsidence towards the valley center due to high clay content within the valley-fill aquifer throughout its saturated thickness. **WATER SUPPLY Figure 8** shows a map of estimated land subsidence in northern Pahrump. Most subsidence is thought to have occurred where groundwater withdrawals from the basin-fill aquifer were most significant.

See the **Geology and Paleontology** section of this PSA for an analysis and further description of threats posed by subsidence.

### Groundwater-Dependent Vegetation

Plants in arid regions often rely on groundwater for survival. Pumping groundwater in areas populated by groundwater dependent vegetation threatens plants by lowering water levels beneath the root zone. Groundwater pumping in northern Pahrump was associated with significant declines in mean annual discharge at Bennetts and Manse Springs (Belcher et al., 2004). **WATER SUPPLY Figure 9** shows the trends in spring discharge from these two springs between 1870 and 1980.

Mesquite trees exist in the immediate vicinity of the project, but primarily on the Nevada side of the state line. **WATER SUPPLY Figure 10** shows mesquite stands identified by Malmburg in a 1967 report (Malmburg, 1967). The US Bureau of Land Management (BLM) conducted surveys of the region in the 1990s, which resulted in mapping of the mesquite-acacia habitat, and identification of the groundwater-dependent species. **WATER SUPPLY Figure 11** shows the mapped areas (BLM, 2006).

A significant portion of the mapped groundwater-dependent vegetation in the figures listed above, is within BLM-designated Stump Springs Area of Critical Environmental Concern (ACEC). This area is protected for it biological and cultural resources. Declining water levels in the Pahrump Valley basin has made this area a priority protection area (BLM, 2006). **WATER SUPPLY Figure 12** shows the proposed site relative to the mapped ACEC boundary and a monitoring well that has been installed to measure water levels at Stump Springs.

### Faults

Numerous fault structures are inferred in the immediate vicinity of the proposed project area. Some structures are inferred from topographical evidence of fault scarps and some are inferred from geophysical studies. All of the faulting in the region is part of the regional Amargosa-Pahrump fault system, which trends northwest - southeast. **WATER SUPPLY Figure 13** show the inferred faults in the vicinity of the project (Workman et al., 2002). For a discussion of the regional faul system, see the **GEOLOGY AND PALEONTOLOGY** section of this PSA.

### Water Quality

The California Department of Water Resources (DWR) describes the water quality in the Pahrump Valley Groundwater Basin (PVGB) as suitable for all beneficial uses. The groundwater is described as having magnesium to magnesium-bicarbonate character, with total dissolved solid (TDS) concentrations ranging from 145 to 540 mg/L (DWR, 2004).

The Nye County Water Resources Plan describes the groundwater quality in Pahrump as good. The Plan also notes however that northern Pahrump contains a very high density of septic systems and could benefit from community sewage treatment infrastructure. There are 33 land sections containing a total of more than 100 septic systems, which increase the risk of domestic well contamination (Buqo, 2004).

There is very limited data on water quality in the southern portion of the PVGB. The local community just south of the project site has 12 documented wells that appear to be used primarily for domestic use suggesting the groundwater is of acceptable quality for most uses. Recent water quality analyses from wells on the project site show the groundwater is relatively low in Total Dissolved Solids (361 ppm) 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 are also using underground septic systems.

## PROJECT DESCRIPTION

### Water Use

Six 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 will supply make-up water, mirror wash water, and water for domestic uses.

Each power block will require between 30 to 50 gallons per minute (gpm) for operation and about 3.5 gpm for domestic use. The plant will operate for about 3,651 hours per year and therefore average about 90 gpm. This equates to an annual average use of about 140 acre-feet per year (AFY). The HHSEGS facility would operate for up to 16 hours per day except during the annual maintenance period in December.

Construction water use could be as high as 288 AFY for up to three years. If permitted, construction would take place from the third quarter of 2012 to the second quarter of 2015 (29 months).

Each solar unit will have a 250,000 gallon raw water tank. Of that capacity, 100,000 gallons will be used in power plant operation and the other 150,000 gallons will be stored for emergency fire water.

## ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

## METHOD FOR DETERMINING SIGNIFICANCE

This section provides an evaluation of the expected direct, indirect, and cumulative impacts to groundwater resources that would be caused by construction, operation, and maintenance of the project. 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.

Impacts leading to depletion or degradation of water resources, including beneficial uses, are among those staff believes could be most potentially significant groundwater resource issues 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's and State Water Resources Control Board's policy 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 PSA 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 such that protected species or habitats are affected.

Where a potentially significant impact was identified, staff or the applicant proposed mitigation to ensure the impacts would be less than significant.

# DIRECT IMPACTS

## Pahrump Valley Groundwater Basin

This section of the analysis discusses potential impacts from project groundwater pumping in the PVGB. The project would use a total of 696 acre-feet during the 29 month construction period and up to 140 AFY during the 30 year life of the project for a combined total of 4,200 acre-feet.

### Basin Water Levels and Storage

The volume of groundwater stored in a basin can vary over time because of changes in water inflow and outflow. 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 conditions are in a state of perpetual decline, causing increased

extraction costs, costs of well deepening or replacement, land subsidence, water quality degradation, and environmental impacts.

The Pahrump Valley has experienced significant declines in groundwater levels and spring discharge during the last 100 years. The northern half of Pahrump has experienced average water level declines of approximately one foot per year since the 1950s (USGS; Nevada Division of Water Resources; Buqo, 2004).

Staff researched all available water level data from the southern half of the Pahrump Valley. Limited data are available to assess the long-term trends of water level changes in the southern half of the Pahrump basin. A couple wells on record with the United States Geological Survey help support the conclusion that the southern half of the Pahrump basin has experienced a long-term decline comparable to that observed in the northern portion of the PVGB.

The Hidden Hills irrigation well has experienced a steady decline in water levels since 1959. 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 0.25 feet per year. **WATER SUPPLY Figure 14** shows the water level record for the Hidden Hills irrigation well.

The Orchard well has also experienced a steady decline in water levels since 1959. A significant decline was observed in the 1980s, but no recovery has occurred. 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 feet per year. **WATER SUPPLY Figure 15** shows the water level record for the Orchard well.

Staff was able to assemble data from several wells in the southern portion of the PVGB with continuous water-level measurements between November 2005 and November 2011 from the Nye County Nuclear Waste Repository Project Office (NWRPO). Data was obtained through the NWRPO data webpage at:

(http://www.nyecounty.com/LSN/index/EWDP/water_data.htm).

These wells were used to approximate the average change in water levels in the southern PVGB and establish baseline conditions for assessment of impacts.

Staff used a simple USGS program (Helsel, 2006) to compute the Mann-Kendall (Mann, 1945; Kendall and Kendall, 1980) test for trend and the Sen's test (Sen, 1968) for slope to evaluate whether there was a distinguishable trend in the water level data. This test is considered an acceptable test for trend in the environmental industry because it is not heavily influenced by outliers and missing data.

Water levels on record between 2005 and 2011 were tested for trend and for slope of the trend. The water level record for all the wells have a statistically significant trend, at the 95-percent confidence level (significance level, $\alpha = 0.05$). 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). Staff chose the median trend because it is influenced less by the outlier trends (Beyond Sherrys Well,

NDOT) and is more representative of trends closest to the proposed project site. The trends for each well are listed in **WATER SUPPLY Table 2** below. **WATER SUPPLY Figure 16** through **WATER SUPPLY Figure 19** show the locations of wells listed in the table.

**WATER SUPPLY Table 2**
**Groundwater Level Trends in Southern Pahrump**

| Well Name | Years | Number of Records | Median, ft/yr |
|---|---|---|---|
| Beyond Sherrys | 2005-2011 | 46 | -1.909 |
| Dry Lakebed | 2005-2011 | 46 | 0.000 |
| Old Orchard | 2005-2011 | 44 | -0.227 |
| Quail | 2005-2011 | 45 | -0.309 |
| NDOT | 2005-2011 | 32 | -7.005 |
| Hidden Hills Irrigation | 2005-2011 | 45 | -0.393 |
| Jeep Trail | 2005-2011 | 44 | 0.600 |
| Stateline | 2005-2011 | 45 | -0.237 |
| | | Arithmetic Mean | **-1.185** |
| | | Median | **-0.273** |

The Pahrump Valley is relatively large and it has been suggested by the applicant and from previous studies (HHSEGS 2011a) it is possible the southern part of the southern portion of the PVGB encompassing the site is separable from the north based on geologic controls or other unique aquifer characteristics. The applicant believes the water level data reported by Nye Co. suggests that the PVGB basin water level declines are not significant and overdraft would not occur in the vicinity of the project.

Using the water level trend analysis above and evaluation of available geomorphic and geologic data staff evaluated whether documented overdraft impacts in the north were separate from or insignificant from those occurring in the south. Staff utilized contiguous surface water hydrologic units, which are mapped based on topography, and the approximate contact between the alluvial material and the Spring Mountains to define the southern half of the PVGB. The basin is bound on the southwest by the ridge of the Nopah Range. This reflects staff's understanding that there is potential for flow to exit the PVGB through underflow, beneath the Nopah Range. Local gradients suggest that the basin-fill in Pahrump discharges through most of the Nopah Range (**WATER SUPPLY Figure 5**). Using this subbasin concept staff is able to evaluate water level trends closest to the project, using all the wells with a continuous record in the region. 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. Given this project's distance from northern Pahrump and the regional southwesterly gradients throughout the basin, it is possible that the northern and southern portions of the groundwater basin function somewhat independently. **WATER SUPPLY Figure 20** shows the delineated basin across which the basin balance was calculated. Staff believes it is possible to use a subbasin in southern half of the Pahrump Valley to analyze changes in storage and estimate future water level changes.

Using this subbasin characterization staff estimated changes in groundwater storage to evaluate the relative magnitude of project pumping effects on basin storage. Staff used the following relationship:

$S = (dV/dh) * (1/A)$

which can be transformed to,

$dV = S * A * dh$ (Equation 1)

where;

d = change
S = storativity (1/ft)
V = volume of water ($ft^3$)
h = head (ft)
A = area (ac)

Staff calculated the surface area of the southern Pahrump basin to be 154,240 acres. The average estimate of storativity is 0.005/ft. Staff used the median slope (- 0.273 ft/yr) from all the eight estimated slopes within the basin because this value gives less weight to the outliers, which appear less representative of conditions near the site. The calculated loss in storage (*d*V) for the southern Pahrump basin, as defined in **WATER SUPPLY Figure 20** during the period of record (2005-2011) is about 211 acre-feet per year (- 211 ac-ft/yr). As a result of the proposed project, the average loss in storage is expected to be 374 (211+163) ac-ft/yr. This loss of storage would translate to an additional drop of water levels in the southern area of the PVGB of about 0.21 ft/yr, with a total decline equal to approximately 0.48 ft/yr.

Groundwater overdraft occurs when groundwater basin outflows exceed inflows. Overdraft can be characterized by groundwater levels that decline over a period of years and never fully recover, even in wet years. The southern portion of the PVGB exhibits these characteristics of overdraft. Historical water levels suggest a continuous decline over the long term (past 60 years) and the recent six year period of continuous monitoring. Staff believes that these water level trends in the southern portion of the PVGB indicate overdraft conditions and that project pumping could exacerbate basin wide overdraft. To mitigate for the proposed project's contribution to the overdraft condition staff proposes Condition of Certification **WATER SUPPLY-1**. This condition requires the project owner to provide a water use offset within the PVGB that is equal to project pumping.

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. Staff also proposes Conditions of Certification **WATER SUPPLY-3**, **WATER SUPPLY-4**, and **WATER SUPPLY-5** to ensure that project wells are constructed to state standards and water use is metered and reported consistent with state law.

### Well Interference

All operating wells within a groundwater basin contribute toward a lowering of water levels at other well locations. The overlap of drawdown among two or more wells is “well interference”, and is significant when 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 specific yield, 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.

## Increased Cost of Pumping

The maximum theoretical well yield is the pumping rate supplied by a well without lowering the water level in the well below the pump intake (Freeze & Cherry, 1979). Typically, pump intakes are located near the top of the screened interval because it is desirable to keep the screen submerged under water; submerging the well screen can minimize chemical clogging and physical deterioration of the well screen (Driscoll, 1995).

Assuming confined groundwater conditions, the theoretical relationship between change in head, aquifer transmissivity, storativity, radial distance of observation, and discharge at a steady rate Q is described by Equation (2):

$s = (Q / 4\pi T) \ln(2.2459\ Tt/r^2S)$ (Equation 2)

where

s = drawdown (ft)
Q = pumping rate ($ft^3$/day)
T = transmissivity ($ft^2$/day)
T = time (day)
r = radial distance (ft)
S = storativity (1/ft)
π is a constant and equal to the ratio of a circle’s circumference to diameter (approximately 3.1416).

Equation (2) assumes (a) the aquifer is confined; (b) the aquifer is horizontal, infinite and of constant thickness; (c) the water bearing materials are homogeneous and isotropic; (d) the groundwater elevation is uniform everywhere prior to pumping and doesn’t change with respect to time; (e) the changes in the potentiometric surface are due to pumping alone; (f) groundwater flow is horizontal and radial toward the well; (g) the pumping well fully penetrates the aquifer; and (h) the well is one-hundred percent efficient (Driscoll, 1995).

If the total hydraulic head in neighboring domestic wells is lowered, 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 = cost per hour
Q = pump rate (gpm)
h = total head (ft)
c = cost per kWh
$e_p$ = pump efficiency
$e_m$ = motor efficiency

The following example shows potential increases in pump cost incurred by owner experiencing a 10-foot decline in water levels. We will assume for these examples that both the pump ($e_p$) and motor ($e_m$) efficiency are 90-percent (0.90) and the cost for energy is $0.10 per kWh.

Static water level is 100 feet below ground surface (bgs). If the water level in the well declines 10 feet, to 110 feet bgs, and total head would increase 10 feet, the cost to pump would increase from $0.023 to $0.026 per hour. This would equate to an 11.5-percent increase in pump cost, or up to $26 of increased cost if the well is pumped every hour of the year.

## 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 static water levels (when the pump is off) at wells to fall below the average depth to the top of the well screen. The average top-of-screen depth may be an appropriate benchmark because it would be unreasonable for the shallowest well in a basin to constrain the use of basin storage by all users. In practice, some wells may have static water levels that are already below the top of the screen. In this case, a 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 (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, the impact of additional drawdown is considered significant only if static water levels above the screen are caused to fall below the top of the screen because of project pumping.

Staff analyzed the potential drawdown effects from project pumping on nearby local wells. The California Department of Water Resources (DWR) maintains the state's record of well completion reports. A search of the records returned 12 wells within a 7-mile radius of the project site, within California. **WATER SUPPLY Table 3** contains a list of wells found in the DWR database.

**WATER SUPPLY Table 3**
**Wells of Record Southern Pahrump, California**

| Well Number | Total Depth (ft) | Screen (ft) | Approx Elevation (ft) |
|---|---|---|---|
| 1 | 280 | 60-280 | 2,586 |
| 2 | 1,106 | NA | 2,644 |
| 3 | 220 | 160-220 | 2,628 |
| 4 | 200 | 160-200 | 2,651 |
| 5 | 1,351 | NA | 2,725 |
| 6 | 300 | 110-300 | 2,612 |
| 7 | 600 | 180-400, 420-600 | 2,596 |
| 8 | 310 | 90-110, 150-190, 230-250, 270-310 | 2,682 |
| 9 | 175 | 140-175 | 2,593 |
| 10 | 212 | 112-212 | 2,633 |
| 11 | 260 | 220-260 | 2,621 |
| 12 | 220 | 160-220 | 2,666 |

The median range for the screened intervals is approximately between 160 and 250 feet below ground surface. The median depth of all the wells is 280 feet.

## Thresholds to Determine Significant Impact

Equation (2) indicates a 10 feet decrease in average depth to water could occur at neighboring domestic wells and could result in an 11.5-percent increase pump cost. One threshold therefore could be limiting drawdown to 10 feet below existing conditions. Drawdown of static water levels greater than 10 feet may also expose the well screens, making them susceptible to potential corrosion and damage. All of the wells listed could therefore show a significant decline in water level during the life of the project.

### Groundwater Impacts

## Aquifer Parameters

Staff reviewed available data for the southern portion of the Pahrump Valley groundwater system. Staff was only able to find a couple estimates of transmissivity and storativity within the vicinity of the proposed HHSEGS project. Staff utilized transmissivity estimates from a local 1966 pump test (HHSG 2011a) as well as the applicant-conducted test from February 2012 (CH2 2012l) to estimate aquifer parameters for impact analysis. Staff also made its own estimates of transmissivity using the applicant provided data from the February 2012 pump test. A review of the applicant's pump test is included in **Appendix A** of this analysis.

Transmissivity estimates from the February 2012 aquifer pump test rely heavily on a subjective curve matching procedure, in which the analyst attempts to match a curve of certain attributes with water level data from the pumping or observation wells in the test. Given the potential error associated with curve matching, staff compiled a range of

transmissivity estimates for the site. These include some Energy Commission staff estimates based on curve matching of the applicant's MW-4 data (a couple are shown in **WATER SUPPLY Figure 21**), the applicant's high (17,000 gpd/ft) and low estimate (700 gpd/ft) of transmissivity from the February pump test, and the value derived from the successful 1966 pump test (7,225 gpd/ft). The estimates of transmissivity are shown in **WATER SUPPLY Table 4** below.

**WATER SUPPLY Table 4**
**Estimates of Transmissivity**

| T (gpd/ft) | Well | Source of est. |
|---|---|---|
| 6,208 | mw-4 | Energy Commission |
| 14,279 | mw-4 | Energy Commission |
| 12,761 | mw-4 | Energy Commission |
| 4,668 | mw-4 | Energy Commission |
| 700 | unk | applicant |
| 17,000 | unk | applicant |
| 7,225 | unk | applicant |
| 9,269 | avg | |
| **6,305** | **geomean** | |

Hydraulic conductivity (and therefore transmissivity) is understood to be log-normally distributed in aquifers (Freeze and Cherry, 1979). Staff used the average of the logged data (geometric mean) in this analysis to represent the average aquifer properties and to predict potential impacts to local receptors. Staff and applicant similarly determined the aquifer storativity of the aquifer to be approximately no greater than 0.005/ft.

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. Some declines would not be expected to significantly affect the cost of pumping or maintenance. Those wells that are threatened by a decline of up to 15 feet of decline as a result of the proposed project could face significant increases in pumping costs and maintenance. Based on staff's analysis all wells within a 1.5-mile radius of the center of the project could experience such decline during the life of the project and should be protected.

Staff is suggesting conditions of certification that would require the applicant to conduct an inventory of neighboring domestic wells if 10-feet of drawdown from the proposed project is observed at the southern site boundary. The suggested conditions would require the applicant to take responsibility for increased pumping costs and maintenance that may be experienced in the Charleston View community. Staff proposes Condition of Certification **WATER SUPPLY-6** and **WATER SUPPLY-7** to monitor and mitigate the potential impacts to neighboring domestic wells. If **WATER SUPPLY-6** and **WATER SUPPLY-7** are implemented as proposed, the impact of project groundwater pumping on a neighboring well would be reduced to a level less than significant.

## Groundwater-Dependent Vegetation and Stump Springs

Staff analyzed whether the project proposed pumping would result in drawdown at the groundwater dependent vegetation at the eastern property boundary and at Stump Springs ACEC. Stump Springs is an intermittent spring with no good record of flow. The spring was described as flowing in 1845 by John C. Fremont (BLM, 2006) and also by the USGS in 1919 (Grover, 1919). The Energy Commission staff were also informed by BLM that Stump Springs still produces water at the surface intermittently.

The mechanism controlling discharge at Stump Springs is not well understood. Stump Springs is located along an inferred fault structure, assumed to be part of the greater Stateline Fault System (Guest et al., 2007). The opportunity may exist for confined water to be pushed to the surface along these fault structures. This faulting has also resulted in terracing along the eastern alluvial slope of Pahrump Valley. These terraces provide the opportunity for the water table to intersect the land surface and result in spring discharge. Another feature that could be sustaining the Stump Springs is a 50 foot thick layer of clay, presumably deposited in an ancient lacustrine environment (Grover, 1919). This clay layer could be very effective at holding onto water despite regional trend and could also create the opportunity to isolate infiltrating water from the water table. **WATER SUPPLY Figure 22** contains an illustration of the areal extent of clay exposure in the vicinity of Stump Springs (Grover, 1919).

Any or all of the conditions listed above could influence the hydraulic connectivity between Stump Springs and the aquifer that would be pumped for the HHSEGS project. The degree of connectivity is not well known because of the limited water level record in this portion of the basin. Due to the close proximity of the Stump Springs to the proposed site and high resource value, staff utilized a conservative approach to estimate the magnitude of potential water level decline at Stump Springs. Staff picked the Stump Springs monitoring well as the distance for determining an impact.

Staff utilized the modified non-equilibrium equation (Cooper-Jacob) approximation for drawdown at a given time. The equation assumes that the pumped aquifer is confined and that there is no source of recharge to the aquifer (Fetter, 1994). This assessment also utilizes the principle of superposition, which states that systems that behave linearly can be added together to produce a composite solution (Reilly et al., 1987). The change in head observed during the pumping of a confined aquifer for instance, is linear with respect to time and additive to the pre-pumping scenario (flat water table). This approach is particularly useful when trying to model an aquifer system with complex or unknown boundary conditions and the influence of a pumping well on hydraulic heads. The effect of a pumping well can be isolated from other changes in the system that may occur, but are difficult to define.

**WATER SUPPLY Table 5** lists a range of impacts that could be seen at the Stump Springs ACEC depending on the aquifer properties. Median values of transmissivity and storativity calculated by staff were used in the estimates. To account for a range of reasonable estimates, staff doubled and halved these values to test the level of impact associated with different combinations of properties and the sensitivity of a given parameter to the assigned value.

**WATER SUPPLY Table 5**
**Potential Water Level Decline at Stump Springs Monitoring Well by HHSEGS**

| | Scenario | Q (gpm) | T (gpd/ft) | t (days) | r (ft) | S (1/ft) | s (ft) |
|---|---|---|---|---|---|---|---|
| 1 | Construction+Operation (163 AFY) | 101 | 6,305 | 10,950 | 24,341 | 0.005 | 3.57 |
| 2 | Construction+Operation (163 AFY) | 101 | 6,305 | 10,950 | 24,341 | 0.01 | 2.29 |
| 3 | Construction+Operation (163 AFY) | 101 | 6,305 | 10,950 | 24,341 | 0.0025 | 4.84 |
| 4 | Construction+Operation (163 AFY) | 101 | 12,610 | 10,950 | 24,341 | 0.005 | 2.42 |
| 5 | Construction+Operation (163 AFY) | 101 | 12,610 | 10,950 | 24,341 | 0.01 | **1.78** |
| 6 | Construction+Operation (163 AFY) | 101 | 12,610 | 10,950 | 24,341 | 0.0025 | 3.05 |
| 7 | Construction+Operation (163 AFY) | 101 | 3,153 | 10,950 | 24,341 | 0.005 | 4.59 |
| 8 | Construction+Operation (163 AFY) | 101 | 3,153 | 10,950 | 24,341 | 0.01 | 2.05 |
| 9 | Construction+Operation (163 AFY) | 101 | 3,153 | 10,950 | 24,341 | 0.0025 | **7.14** |

A graphical representation of the worst-case scenario shown in **WATER SUPPLY Table 6** above (Row 9) is included as **WATER SUPPLY Figure 23**. This figure depicts the principle of superpostion, which is a reasonable representation of project induced effects, given the semi-confined to confined nature of the aquifer at the tested depth. This approach is also supported by the applicant in the AFC. A similar figure was included as an appendix to the AFC and is also included in this analysis as **WATER SUPPLY Figure 24**. **WATER SUPPLY Figure 24** correctly represents the principle of superposition and also shows how a regional gradient has little to no influence on the symmetry of the projected cone of depression. **WATER SUPPLY Figure 24** shows the applicant-predicted drawdown that could result from 25 years of pumping about 87 gpm. This depiction of the cone of depression takes into account a 0.01 southwest regional groundwater gradient and aquifer parameters for transmissivity equal to 3,612 gpd/ft and storativity equal to 0.01 (HHSG 2011a).

BLM identifies Stump Springs as an Area of Critical Environmental Concern (ACEC) for its cultural resources. The ACEC area is surrounded by additional mesquite that may also be dependent on groundwater for survival. These vegetated areas are collectively referred to as the Stump Springs area, which supports a range of plant and animal species and is also a valuable cultural resource. See the **BIOLOGICAL** and **CULTURAL RESOURCES** sections of this PSA for more information about the Stump Springs area.

The Stump Springs region supports approximately 1,915 acres of mesquite and associated habitat, which encompasses habitat beyond the boundary of the ACEC area and may extend to the proposed project's eastern boundary. Any incremental decline in water levels in this region could result in adverse impacts to groundwater dependent vegetation. Staff proposes Condition of Certification **WATER SUPPLY-8**, which is

complimentary to and reliant on Certification **BIO-23**, to ensure that all groundwater, or possibly groundwater dependent species and habitats are protected. Combined, these conditions require monitoring and mitigation for the potential effects of drawdown due to project pumping.

## Amargosa River

The Amargosa River is a 185 mile long system that begins in Nye County, Nevada and flows south through Tecopa, California before bending northwards and eventually terminating in Death Valley. The Amargosa River is a federally designated Wild and Scenic river and is also designated as an Area of Critical Environmental Concern (ACEC).

The river is thought to get most of its water from baseflow rather than from surface drainage (Stonestrom et al., 2007). This means that the river's primary source of water could be groundwater. Recent models of the Death Valley regional flow system suggest that the Amargosa River may receive water its water from the regional groundwater system (Belcher et al., 2004).

Although a map of the potentiometric surface constructed from available water level data suggests that groundwater in Pahrump has a southwesterly flow direction, limited data is available to suggest that groundwater flow in the southern portion of 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.

A letter submitted to the CEC from the Amargosa Conservancy supports the conclusion 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.

Staff's simple superposition analysis does not indicate that project pumping would influence hydraulic heads as far away as the Amargosa River. Staff also acknowledges that the applied approach does not account for heterogeneity or faults or other barriers to flow, which may change the project pumping area of influence. This methodology also does not explain changes in the regional hydrologic budgets, or propose regional boundary conditions. Depending on the employed boundary conditions and the opportunity for direct flow, 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.

If a direct flowpath were available for groundwater flow from Pahrump to the Amargosa River, the time for impacts to be felt would likely be on the order of hundreds of years. Staff's review of hydraulic conductivities from the applicant's February pump test and from the Death Valley Regional Flow System Model (DVRFSM) revealed that a reasonable estimate for average hydraulic conductivity could be one foot per day (ft/d). Staff assumed an average gradient between the Trout Canyon well at the foot of the Spring Mountains and a surface water monitoring station on the Amargosa River in

Tecopa. Assuming an effective porosity of 0.2, the travel time for water to move 20 miles through the system would be 3,215 years. Even if the highest reported conductivity of 15 ft/d were applied throughout the entire system between the proposed site and the Amargosa River, this travel time would still be 214 years.

This potential impact is 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. But given the sensitivity of water in the region and both the Wild and Scenic and ACEC designations, staff recommends that the applicant be required to install a down-gradient monitoring well to monitor project-induced water level declines in the direction of the Amargosa River. Staff proposes Condition of Certification **WATER SUPPLY-8**, which would require the installation of a monitoring network capable of recording project-induced water level declines in PVGB. This monitoring program is designed to define the proposed project's impacts within the Pahrump Valley, but it may indirectly provide useful data for receptors outside of Pahrump Valley. For instance, concerns about the cumulative impact of pumping on the Amargosa River was expressed by multiple interested agencies and parties including but not limited to the State of Nevada BLM, State of California BLM, Nye County, Inyo County, and the Amargosa Conservancy. The suggested conditions of certification for the proposed HHSEGS project agree with the requests by the above-listed parties asking for monitoring in the direction of the Amargosa River.

### Water Quality

Water quality can be impacted by migration of low quality or contaminated water towards pumping wells and by sustained pumping of the groundwater basin. By providing a measure of water salinity, total dissolved solids (TDS) is a primary indicator of the natural quality of groundwater and is a measure of acceptance for the use of groundwater as a drinking water source. Water with TDS concentrations greater than 3,000 mg/l is generally considered undrinkable. 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.

During the applicant's initial site investigation a water quality sample was taken from an on-site well, the Orchard Well (**WATER SUPPLY Figure 5**). The constituents reported are listed 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 |

No poor quality water is known to exist in the area of the proposed site. Staff notes however, that the site is partially underlain by playa deposits which can contain high concentrations of salts. The presence of salts is often a function of the geologic provenance and history of the basin deposits, depth to groundwater, and whether the playa discharges shallow groundwater through evaporation. In some desert groundwater basins of the southwest an increase in salinity concentrations has been observed with an increase in depth in basin fill sediments. Staff could find no data from wells in the playa deposits to the west and north of the project site so it is unknown whether any of these conditions exist in the PVGB.

The Orchard Well has an approximate depth of 350 feet bgs. USGS well (355821115535901) data suggests this well could be as deep as 800 feet bgs. Most domestic wells are completed at depths between 200 and 300 feet. The water quality measured in the Orchard well shown above shows it is likely suitable for all domestic

uses. The ongoing use of domestic wells in Charleston View suggests water quality has been consistently sufficient for domestic use. Also, given the relatively shallow depth of the existing domestic wells it is likely there is acceptable water quality to depths greater than the typical well. Staff does not anticipate the pumping of groundwater from beneath the proposed site would degrade the public aquifer. However, because very few water quality samples are available to verify this assumption and because the proposed project could draw water from such a large radial extent, staff proposes Condition of Certification **WATER SUPPLY-9** to ensure no impacts to the basin water quality. This condition requires that the project monitor water quality in the on-site extraction wells and the monitoring wells and to collect water samples semi-annually and report the results annually to the Energy Commission and to Inyo County.

Staff also believes the applicant should also be required to conduct water quality analysis to evaluate the relationship between water quality at the springs and the basin fill aquifer at the site. There is some question about the degree of hydraulic connectivity between the site and the springs. Using this data coupled with groundwater level monitoring analysis recommended in Condition of Certification **WATER SUPPLY-8** would be useful in establishing or disproving a significant relationship between the two and thus a potential impact from project pumping.

### 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 100 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 nontransient noncommunity water system, serving at least 25 persons for over 6 months per year.

Senate Bill 1307 passed in 1997, which 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-10**, 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 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 a Well Completion Report to DWR prior to approval.

## 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 to the southern PVGB. **WATER SUPPLY: Figure 25** lists the reasonable foreseeable projects that may be developed in the southern PVGB.

**WATER SUPPLY Table 7** shows potential water level declines that could result from pumping at the center of the proposed Sandy Valley project. Aquifer values used for this estimate are the same as those used in Row 9 of **WATER SUPPLY Table 5**. The predicted declines at the given distances are a reasonable estimate of the worst-case scenario.

**WATER SUPPLY Table 7**
**Potential Water Level Declines Resulting from Sandy Valley Project Pumping**

| | Scenario | Q (gpm) | T (gpd/ft) | t (days) | r (ft) | S (1/ft) | s (ft) |
|---|---|---|---|---|---|---|---|
| 1 | Construction+Operation (170 AFY) | 105 | 3,215 | 10,950 | 4,498 | 0.0025 | **20** |
| 2 | Construction+Operation (170 AFY) | 105 | 3,215 | 10,950 | 8,770 | 0.0025 | **15** |
| 3 | Construction+Operation (170 AFY) | 105 | 3,215 | 10,950 | 17,090 | 0.0025 | **10** |
| 4 | Construction+Operation (170 AFY) | 105 | 3,215 | 10,950 | 33,335 | 0.0025 | **5** |
| 5 | Construction+Operation (170 AFY) | 105 | 3,215 | 10,950 | 56,850 | 0.0025 | **1** |
| 6 | Construction+Operation (170 AFY) | 105 | 3,215 | 10,950 | 64,126 | 0.0025 | **0.1** |

**WATER SUPPLY Figure 26** shows a depiction of the projected drawdown data listed in **WATER SUPPLY Table 7** above. The other projects listed in **WATER SUPPLY Figure 25** are not represented in **WATER SUPPLY Figure 26** because they would not substantially change this figure, but would be cumulatively considerable.

**WATER SUPPLY Figure 26** shows where the influence of cumulative project pumping could be most significant. Where the two represented cones of depression overlap, the individual declines should be added together to estimate a potential cumulative impact. The Stump Springs area is therefore in threat of experiencing up to 15 feet of water level decline due to changes in aquifer pressure.

Any incremental decline in water levels in this region could result in adverse impacts to groundwater dependent vegetation. Staff proposes Condition of Certification **WATER SUPPLY-6**, which is complimentary to and reliant on Certification **BIO-23**, to ensure that all groundwater, or possibly groundwater dependent species and habitats are protected.

Together these conditions would require monitoring and mitigation for the potential effects of drawdown due to project pumping.

### Basin Balance

The predicted loss in storage that could result from the proposed HHSEGS project would be 374 AFY as described above. If the proposed Sandy Valley project pumped 170 AFY, and the proposed Element Power project pumped 7 acre-feet per year, and both pumped at the same time as the proposed HHSEGS project, the cumulative loss in storage from the southern Pahrump Valley basin would be 551 AFY.

The Nye County Water Resources Plan identifies the safe yield of the Pahrump Basin as between 12,000 and 19,000 AFY. This number is an estimate of what the basin could sustain, without being in overdraft (Buqo, 2004). The 2011 estimate of water use in Pahrump Valley is 13,352 acre-feet. This estimate assumes that each domestic well on the Nevada side of Pahrump pumps 0.5 AFY (NDWR, 2011). Staff notes that a water right is not required of domestic pumpers in Nevada and that the amount of water pumped by domestic well owners cannot be known. Staff also notes that water rights in Pahrump totaled 69,000 acre-feet in 2004 (Buqo, 2004).

Assuming the lower estimate of safe yield is 12,000 AFY, the combined impact of the proposed HHSEGS project and the other potential project would be cumulatively considerable. Their combined use of up to 551 AFY would represent about 4.6% of the basin's safe yield.

If conditions similar to those proposed for the HHSEGS project (Conditions of Certification **WATER SUPPLY-1** and **-2**) were proposed for the Sandy Valley project or any other significant users of water, the adverse impact to the southern PVGB balance would be mitigated to a level that is less than significant.

## 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.

## WATER USE LORS AND STATE POLICY AND GUIDANCE

The Energy Commission has at least five sources for statements of policy relating to water use in California applicable to power plants. They are the California Constitution, the Warren-Alquist Act, the Commission's restatement of the State's water policy in the 2003 Integrated Energy Policy Report ("IEPR"), the State Water Resources Control Board ("SWRCB" or "Board") resolutions (in particular Resolutions 75-58 and 88-63), and the Genesis Solar Project Committee's water-issues order as guidance for interpreting all of the above.

## California Constitution

Article X, section 2 prohibits the waste or unreasonable use, including unreasonable method of use, of water, and it requires all water users to conserve and reuse available water supplies to the maximum extent possible (Cal. Const., art. X, § 2). Groundwater is subject to reasonable use (*Katz v. Walkinshaw* (1903) 141 Cal. 116).

## Warren-Alquist Act

Section 25008 of the Energy Commission's enabling statutes echoes the Constitutional concern, by promoting "all feasible means" of water conservation and "all feasible uses" of alternative water supply sources (Pub. Resources Code § 25008).

## Integrated Energy Policy Report

In the 2003 Integrated Energy Policy Report (IEPR or Report), the Energy Commission reiterated certain principles from SWRCB's Resolution 75-58, discussed below, and clarified how they would be used to discourage use of fresh water for cooling power plants under the Commission's jurisdiction. The Report states that the Commission will approve the use of fresh water for cooling purposes only where alternative water supply sources or alternative cooling technologies are shown to be ''environmentally undesirable" or "economically unsound" (IEPR (2003), p. 41). In the Report, the Commission interpreted "environmentally undesirable" as equivalent to a "significant adverse environmental impact" under CEQA, and "economically unsound" as meaning "economically or otherwise infeasible," also under CEQA (IEPR, p. 41). CEQA and the Commission's siting regulations define feasible as "capable of being accomplished in a successful manner within a reasonable amount of time," taking into account economic and other factors (Cal. Code Regs., tit. 14, § 15364; tit. 20, § 1702, subd. (f)). At the time of publication in 2003, dry cooling was already feasible for three projects—two in operation and one just permitted (IEPR, p. 39).

The Report also notes California's exploding population, estimated to reach more than 47 million by 2020, a population that will continue to use "increasing quantities of fresh water at rates that cannot be sustained" (IEPR, p. 39).

## State Water Resources Control Board Resolutions

The SWRCB not only considers quantity of water in its resolutions, but also the quality of water. In 1975, the Board adopted the *Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Power Plant Cooling* (Resolution 75-58). In it, the Board encourages the use of wastewater for power plant cooling. It also determined that water with a TDS concentration of 1,000 mg/L or less should be considered fresh water (Resolution 75-58). One express purpose of that Resolution was to "keep the consumptive use of fresh water for power plant cooling to that *minimally essential*" for the welfare of the state (*Ibid*; emphasis added).

In 1988, the Board determined that water with TDS concentrations of 3,000 mg/L or less should be protected for and considered as potential supplies for municipal or domestic use unless otherwise designated by one of the Regional Water Quality Control Boards (Resolution 88-63).

## Order from the Genesis Solar Project Committee

The Genesis Solar Project Committee considered all these sources of policy to arrive at a simple yet flexible determination for water use by power plants under Commission jurisdiction. The Order states:

The Committee reads [the policies] as requiring projects seeking to use groundwater for power plant cooling to use the least amount of the worst available water, considering all applicable technical, legal, economic, and environmental factors (Genesis Solar Energy Project Committee, Decision and Scoping Order, Feb. 2, 2010).

Staff carefully considers all relevant factors when conducting analysis and arriving at recommendations for the Commission. Thus, staff must determine what is the least but nevertheless feasible amount of water available for use, and also the worst, feasible available water that applicant could use for particular purposes on a project.

In several cases, the Commission has accepted conservation programs that conserve water in the region as means of accepting compliance with the water policies. Staff takes this to mean that such conservation programs are an acceptable method to ensure compliance for current projects.

Staff believes the applicant has incorporated significant water efficient technology into their design the project propose to use an air-cooled heat exchanger to cool the steam cycle which result in a significant reduction in water use over the more efficient and cheaper wet cooling designs. The applicant proposes some nominal water use for wet cooling of lube oil and mirror washing. Staff believes that if the applicant is required to comply with Condition of Certification **WATER SUPPLY-2** and offset there project water use in the PVGB the HHSEGS project would comply with the LORS and policies discussed above.

## RESPONSE TO AGENCY AND PUBLIC COMMENTS

Agency comments received during the PSA 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 unlikely that pumping from this project is likely to result in a measureable impact to water-dependent ecological resources in the lower Amargosa. However, staff is a requiring that the applicant offset project pumping with mitigation equal to the project's pumping, which represents a true offset. 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 also invested in 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 reveals the direct influence of pumping regardless of water table and boundary conditions. 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:** Staff strongly considered requiring the use of the USGS, DVRFS model as described to assess local and regional impacts. Unfortunately staff's review of available water level data in the immediate vicinity of the proposed project and beyond the Pahrump Valley towards the Amargosa River yielded very little data. Calibrating a model to provide a defensible prediction of impacts would be overly burdensome given the lack of data and the low pump rate. As was determined in the FEIR for Amargosa Farm Road Solar Project (NVN-084359), the effect of pumping 400 ac-ft per year on water levels at Devil's Hole was a decline of 0.05 feet after 200 years. Devil's Hole is approximately 15 miles from the modeled well. Furthermore the analysis concluded that the model was not accurate to the nearest 0.05 feet, but to the scale of meters.

Given that the proposed HHSEGS project is expected to be a comparable distance from sensitive receptors and is proposing to pump at a rate that is less than half of that described in the example above, it does not seem that a new modeling exercise is worth pursuing.

**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 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-8**, which would require the applicant to do project water quality analysis for comparison with spring water quality.

**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:** Though staff disagrees that "*pumping will propagate into and adversely affect the Amargosa Wild and Scenic River,"* the mitigation suggested by staff to offset project pumping would also help maintain out-of-basin flow.

**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-2** 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 as of pumping in northern Pahrump. This concept also agrees with staff's analysis which shows an average water level decline of about one-quarter of a foot per year in southern Pahrump, instead of the average one foot per year decline seen in northern Pahrump.

**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-6** and **-7**.

**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 Conditions of Certification **WATER SUPPLY-8**.

**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:** Staff agrees that the project has the potential to affect downstream users including China Ranch. However staff did not identify any measurable direct impact to these populations. Staff is suggesting water use retirement within the Pahrump Valley basin to offset any long-term influence of project pumping. Given the distance of the receptors identified, the proposed mitigation is sufficient to address the potential indirect impact.

**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.

**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 suggested a similar condition.

**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.

**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 Pahrump Basin 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 the basin groundwater levels.

## 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 within 3 miles of the project site.
3. The proposed project is bordered by sensitive groundwater-dependent vegetation which is habitat for rare endemic species.
4. The proposed project is located within five miles of the Stump Spring Area of Critical Environmental Concern (ACEC).
5. The Stump Springs ACEC is designated for protection by the United States Bureau of Land Management (BLM) because of its cultural and biological resources.
6. Historic water level data show the PVGB is currently in a state of overdraft.
7. There is limited data available for site specific analysis of potential effects due to project use of groundwater from the PVGB.
8. Monitoring project groundwater pumping would provide data that could be used to evaluate effects on the domestic well owners and groundwater dependent vegetation.

## 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. Staff proposes Condition of Certification **WATER SUPPLY-1**, which would require the proposed project to mitigate for its groundwater use and cumulative overdraft impact.
2. 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 (ACEC). Staff proposes a monitoring plan in Condition of Certification **WATER SUPPLY-8** that compliments conditions suggested by Biological Resources staff that together with **WATER SUPPLY-8** would monitor and mitigate potential impacts to groundwater dependent vegetation.
3. If not mitigated, the proposed project could substantially lower the water level in neighboring domestic wells. Staff proposes a monitoring program in Condition of Certification **WATER SUPPLY-6**. Staff also proposes **WATER SUPPLY-7** to mitigate potential impacts on domestic wells.
4. The proposed HHSEGS project would not be expected to have a measurable impact to the Amargosa River or its tributaries.

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 showing that it will replace 4,900 acre-feet or 163 AFY and the shall undertake one or more of the activities identified below to mitigate project overdraft impacts to PVGB. These activities shall result in replacement of 4,900 acre-feet or 163 AFY over the 30-year life of the project. The activities proposed for mitigation will be outlined in a Water Supply Plan that will be provided to the CPM for review and approval.

**Verification:** The Project Owner shall submit a Water Supply Plan to the CPM for review and approval 30 days before the start of extraction of groundwater for construction or operation. The Water Supply Plan shall include the following at a minimum:

a. Identification of the activity and water source that will replace 4,900 acre feet or 163 acre-feet per year for water pumped from the PVGB; and

b. Demonstration of the project owner's legal entitlement to the water or ability to conduct the activity; and

c. Include a discussion of any needed governmental approval of the identified activities, including a discussion of the discussion of the conditions of approval; and

d. Discuss whether any governmental approval of the identified activities will be needed, and, if so, whether that approval will require compliance with CEQA or NEPA; and

e. Demonstration of how water pumped from the PVGB will be replaced for each of the activities; and

f. An estimated schedule for completion of the activities; and

g. Performance measures that would be used to evaluate the amount of water replaced by the activities; and

h. 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.

## 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. Water quality used for project construction and operation will be reported in accordance with Condition of Certification **WATER SUPPLY- 6** and **WATER SUPPLY- 7** to ensure compliance with this condition. 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 operational for the life of the project.

**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 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. 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.

## 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.

**Verification**: The Project owner shall do all of the following:

**A.** 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.

**B.** 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.

**C.** 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.

**D.** 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 within ten (10) days of submittal to or receipt from the Inyo County Environmental Health Services.

**E.** 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).

## WATER METERING

**WATER SUPPLY-4:** Prior to the use of water for construction and operation of the HHSEGS, the project owner shall install and maintain metering devices as part of the water supply and distribution system to monitor and record the volume of water used by the project. The metering devices shall be operational for the life of the project.

A semi-annual summary of the HHSEGS construction daily maximum, monthly average, monthly total, and annual total water use, shall be submitted to the CPM in the annual compliance report. An annual summary of the HHSEGS operation daily maximum, monthly average, monthly total, and annual total water use, shall also be submitted to the CPM in the annual compliance report.

The daily and monthly water use shall be reported in gallons per day, and the semi-annual and annual water use shall be reported in acre-feet per year. For calculating the total water use, the term “year” would correspond to the date established for the annual compliance report submittal.

1. At least sixty (60) days prior to use of any water source for HHSEGS construction and operation, the HHSEGS owner shall submit to the CPM evidence that metering devices have been installed and are operational for HHSEGS construction and operation. The HHSEGS owner shall provide a report on the servicing, testing, and calibration of the metering devices in the annual compliance report.
2. Beginning six (6) months after the start of construction, the HHSEGS owner shall prepare a semi-annual summary of the daily maximum, monthly average, monthly total, and annual total amount of water used for construction purposes.
3. Annually, the HHSEGS owner shall prepare a summary of the daily maximum, monthly average, monthly total, and annual total water use.

## GROUNDWATER PRODUCTION REPORTING

**WATER SUPPLY-5:** The Project is subject to the requirement of Water Code Sections 4999 et. seq. for reporting of groundwater production in excess of 25 acre feet per year.

**Verification:** The project owner shall file an annual "Notice of Extraction and Diversion of Water" with the SWRCB in accordance with Water Code Sections 4999 et. seq. The Project Owner shall include a copy of the filing in the annual compliance report.

## WATER LEVEL MONITORING FOR NEIGHBORING WELLS, MITIGATION AND REPORTING

**WATER SUPPLY–6:** The project owner shall submit a Groundwater Level Monitoring, Mitigation, and Reporting Plan to the CPM 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.

### 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, 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.
2. Monitor to establish preconstruction conditions. 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, centrally located at each power block. A plan for design and construction of the monitoring wells and how they will be effective in evaluating project pumping impacts on domestic well owners shall be submitted to the CPM for review and approval prior to installation and monitoring. The monitoring network will include the following wells at a minimum:

   One well at the northern end of the site.

   The monitoring network protects areas that maybe 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 because of this condition.
3. As access allows, measure groundwater levels from the off-site and on-site wells within the network and background wells to provide initial groundwater levels for pre project trend analysis. Assess the significance of an apparent trend and estimate the magnitude of that trend using the Kendall test for trend (Kendall and Kendall, 1980) and the Sen’s slope estimator (Sen, 1968).

4. Construct updated water level maps within the Pahrump Valley basin, within 5 miles of the site from the groundwater data collected prior to construction. Update trend plots and statistical analyses, as data is available.

**B. During Construction:**

1. Collect water levels from wells within the monitoring network on a monthly basis throughout the construction period and at the end of the construction period. Perform statistical trend analysis for water levels. Assess the significance of an apparent trend and estimate the magnitude of that trend using the Kendall test for trend (Kendall and Kendall, 1980) and the Sen's slope estimator (Sen, 1968).

**C. During Operation:**

1. On a monthly basis for the first year of operation and quarterly thereafter for the life of the project, collect water level measurements from wells identified in the groundwater monitoring program to evaluate operational influence from the Project. Operational parameters (i.e., pumping rate) of the water supply wells shall be monitored. Additionally, quarterly groundwater-use in the southern Pahrump Valley shall be estimated based on available data.
2. On an annual basis, perform statistical trend analysis of water level data and compare to predicted water level declines due to project pumping. Analysis of the significance of an apparent trend shall be determined and the magnitude of that trend estimated. Assess the significance of an apparent trend and estimate the magnitude of that trend using the Kendall test for trend (Kendall and Kendall, 1980) and the Sen's slope estimator (Sen, 1968).
3. If water levels have been lowered more than 10 feet below preconstruction levels at the southern site boundary, and monitoring data provided by the project owner show these water level changes are different from background trends and are caused by Project pumping, 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-induced drawdown if the CPM's inspection of the well monitoring data confirms changes to water levels and water level trends relative to measured pre-project water levels, and the well (private owners well in question) yield or performance has been significantly affected by Project pumping. 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 documentation of the 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 basis. In the absence of specific electrical use data supplied by the well owner, the project owner shall use **WATER SUPPLY-7** to calculate increased energy costs.

b. If groundwater monitoring data indicate Project pumping has lowered water levels below the top of the well screen, and the well yield is shown to have decreased by 10% or more of the pre-Project average seasonal yield, compensation shall be provided for the diagnosis and maintenance to treat and remove encrustation from the well screen. 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% 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 as described under Condition 3.c.

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% 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 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 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.

4. 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.

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. At the end of every subsequent five-year monitoring period, the collected data shall be evaluated by the CPM and they shall determine if the sampling frequency should be revised or eliminated.

7. 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:
At least 60 days prior to operation of the site groundwater supply wells, the project owner shall submit to the CPM, a comprehensive report presenting all the data and information required in item A. 1. above. The project owner shall submit to the CPM a report showing the results of the well reconnaissance, conditions of existing wells that will be used to evaluate potential project pumping impacts, and all calculations, assumptions, well logs, and reports made in development of the report data and interpretations.

At least 180 days prior to project construction the project owner shall submit a plan showing the proposed design and construction of the new monitoring well network and existing wells that will be used to evaluate potential impacts to groundwater dependent ecosystems and domestic well owners. The plan will include well design and installation methods. The plan will include all necessary information for compliance with the Inyo County well construction ordinance and will be submitted to Inyo County for review and comment. The owner will provide the plan with Inyo County comments to the CPM for review and approval prior to well installation.

During Project construction, the project owner shall submit to the CPM quarterly reports presenting all the data and information required in item B above. The quarterly reports shall be provided 30 days following the end of the quarter. The project owner shall also

submit to the CPM all calculations and assumptions made in development of the report data and interpretations.

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.

During Project operation, the project owner shall submit to the CPM, applicable quarterly, semi-annual and annual reports presenting all the data and information required in item C above. Quarterly reports shall be submitted to the CPM 30 days following the end of the quarter. 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 5 year monitoring report to the CPM that includes all monitoring data collected and a summary of the findings. The CPM will determine if the water level measurements and sampling frequencies should be revised or eliminated.

## GROUNDWATER PUMPING COST CALCULATION

**WATER SUPPLY-7:** 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-6,** 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<br>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.

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.

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.

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 140 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:

- 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;
- An annual inflation factor for energy cost of 3 percent; and
- 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.

## WATER LEVEL MONITORING FOR GROUNDWATER-DEPENDENT VEGETATION, MITIGATION AND REPORTING

**WATER SUPPLY–8:** The project owner shall submit a Groundwater Level Monitoring, Mitigation, and Reporting Plan to the CPM 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.

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.

### A. Prior to Project Construction

1. Monitor to establish preconstruction conditions. 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, centrally located at each power block. A plan for design and construction of the monitoring wells and how they will be effective in evaluating project pumping impacts on groundwater dependent ecosystems and domestic well owners shall be submitted to the CPM for review and approval prior to installation and monitoring. The monitoring network will include the following wells at a minimum:

    - Three wells directly up-gradient (gradient hereafter refers to inferred groundwater potentiometric surface included as part of staff analysis) from the Power Block 1 production well, in a linear array, within the property boundary. Wells shall be installed within one mile of the Power Block 1 production well.

    - One well directly up-gradient from the Power Block 1production 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 directly up-gradient from Power Block 2, in a linear array, within the property boundary. Wells shall be installed within one mile of the Power Block 2 production well.

    - One 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 at the southern end of the site.

- One well between 2.0 and 3.0 miles from the southwest corner of the site, located between a bearing of southwest (225°) and west (270°).

The monitoring network protects areas that maybe 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 because of this condition.

2. As access allows, measure groundwater levels from the off-site and on-site wells within the network and background wells to provide initial groundwater levels for pre project trend analysis. Assess the significance of an apparent trend and estimate the magnitude of that trend using the Kendall test for trend (Kendall and Kendall, 1980) and the Sen's slope estimator (Sen, 1968).

3. Construct updated water level maps within the Pahrump Valley basin, within 5 miles of the site from the groundwater data collected prior to construction. Update trend plots and statistical analyses, as data is available.

**B. During Construction:**

1. Collect water levels from wells within the monitoring network on a monthly basis throughout the construction period and at the end of the construction period. Perform statistical trend analysis for water levels. Assess the significance of an apparent trend and estimate the magnitude of that trend using the Kendall test for trend (Kendall and Kendall, 1980) and the Sen's slope estimator (Sen, 1968).

**C. During Operation:**

1. On a monthly basis for the first year of operation and quarterly thereafter for the life of the project, collect water level measurements from wells identified in the groundwater monitoring program to evaluate operational influence from the Project. Operational parameters (i.e., pumping rate) of the water supply wells shall be monitored. Additionally, quarterly groundwater-use in the southern Pahrump Valley shall be estimated based on available data.
2. On an annual basis, perform statistical trend analysis of water level data and compare to predicted water level declines due to project pumping. Analysis of the significance of an apparent trend shall be determined and the magnitude of that trend estimated. Assess the significance of an apparent trend and estimate the magnitude of that trend using the Kendall test for trend (Kendall and Kendall, 1980) and the Sen's slope estimator (Sen, 1968).
3. If either of the linear arrays of monitoring wells (three onsite wells) show there is a 0.5 ft decline beyond the documented pre-project decline at the eastern project boundary due to project pumping, and the significance threshold for decline in plant vigor is reached as identified in **BIO-23** the Project owner shall substantially reduce, modify, or stop project pumping.
4. If either of the linear arrays of monitoring wells (three onsite wells) and the BLM Mesquite Bosque well (1 or 2) show there is a 0.5 ft decline beyond the pre-project decline due to project pumping and the significance threshold for decline in plant

vigor is reached as identified in **BIO-23**, the Project owner shall substantially reduce, modify, or stop project pumping.

5. 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.
6. 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.
7. At the end of every subsequent five-year monitoring period, the collected data shall be evaluated by the CPM and they shall determine if the sampling frequency should be revised or eliminated.
8. 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:
At least 60 days prior to operation of the site groundwater supply wells, the project owner shall submit to the CPM, a comprehensive report presenting all the data and information required in item A. 1. above. The project owner shall submit to the CPM a report showing the results of the well reconnaissance, conditions of existing wells that will be used to evaluate potential project pumping impacts, and all calculations, assumptions, well logs, and reports made in development of the report data and interpretations.

At least 180 days prior to project construction the project owner shall submit a plan showing the proposed design and construction of the new monitoring well network and existing wells that will be used to evaluate potential impacts to groundwater dependent ecosystems and domestic well owners. The plan will include well design and installation methods. The plan will include all necessary information for compliance with the Inyo County well construction ordinance and will be submitted to Inyo County for review and comment. The owner will provide the plan with Inyo County comments to the CPM for review and approval prior to well installation.

During Project construction, the project owner shall submit to the CPM quarterly reports presenting all the data and information required in item B above. The quarterly reports shall be provided 30 days following the end of the quarter. The project owner shall also submit to the CPM all calculations and assumptions made in development of the report data and interpretations.

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.

During Project operation, the project owner shall submit to the CPM, applicable quarterly, semi-annual and annual reports presenting all the data and information required in item C above. Quarterly reports shall be submitted to the CPM 30 days following the end of the quarter. 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 5 year monitoring report to the CPM that includes all monitoring data collected and a summary of the findings. The CPM will determine if the water level measurements and sampling frequencies should be revised or eliminated.

## GROUNDWATER QUALITY REPORTING

**WATER SUPPLY-9:** The project owner shall submit a Groundwater Quality Monitoring and Reporting Plan to Inyo County for review and comment and to the CPM for review and approval. The Groundwater Quality Monitoring and Reporting Plan shall provide a description of the methodology for monitoring background and site groundwater quality. Prior to project construction, monitoring shall commence to establish pre-construction base-line groundwater quality conditions. The primary objective for monitoring is to ensure the project's water use is consistent with that predicted by in this project's analysis and to establish pre-construction groundwater quality trends that can be quantitatively compared against those acquired during operation, and to avoid, minimize, or mitigate impacts to the PVGB.

**Verification:** The project owner shall complete the following:

1. At least six (6) weeks prior to construction, a Groundwater Quality Monitoring and Reporting Plan shall be submitted to the CPM for review and approval. The Plan shall include a scaled map showing the site and vicinity, existing well locations, and proposed monitoring locations (both existing wells and new monitoring wells proposed for construction). The map shall also include relevant natural and anthropogenic features (existing and proposed as part of this project). The plan also shall provide: (1) well construction information and borehole lithology for each existing well proposed for use as a monitoring well; (2) description of proposed drilling and well installation methods; (3) proposed monitoring well design; and, (4) schedule for completion of the work.
2. At least four (4) weeks prior to construction, a Well Monitoring Installation and Report shall be submitted to the CPM for review and approval. The report shall include a scaled map showing the final monitoring well network. If applicable, it shall document the drilling methods employed, provide individual well construction as-

builds, borehole lithology recorded from the drill cuttings, well development, and well survey results. 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. Additionally, the report shall describe the water level monitoring equipment employed in the wells and document their deployment and use.

3. As part of the monitoring well network development, all newly constructed monitoring wells shall be constructed consistent with State and Inyo County specifications.
4. At least four (4) weeks prior to beginning groundwater pumping for project construction, baseline groundwater quality and groundwater level monitoring data shall be reported to the CPM. The report shall include the following:

   - 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.
   - 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. The data shall also be analyzed using the Mann-Kendall test for trend to assess whether pre-project water quality trends, if any, are statistically significant.

5. During project construction and during project operations, the project owner shall semi-annually monitor the quality of groundwater and submit data semi-annually to the CPM. The summary report shall document water level monitoring methods, the water level data, water level plots, and a comparison between pre- and post-project start-up water level trends as itemized below. The report shall also include a summary of actual water use conditions, monthly climatic information (temperature and rainfall), and a comparison and assessment of water level data relative to the assumptions and simulated spatial trends predicted by the applicant's groundwater model.

   - Groundwater samples from all wells in the monitoring well network, which shall include production wells, shall be analyzed and reported semi-annually for TDS, chloride, nitrates, 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. It can also be used to differentiate between sources or indicate relationships between sources of water such as that found at the springs and the project site.
     - Water quality and level trends shall be analyzed using the Mann-Kendall test for trend. Trends in the compliance data shall be compared and contrasted to pre-project trends, if any.
     - If no significant trends exist in the compliance data, or the data set is insufficient to assess trends, all water-supply well compliance data shall be pooled and contrast to the pre-project data set. If significant pre-project

trends are identified, the compliance data can first be corrected to remove pre-project trends and then contrast to the pre-project data.

- The contrast between pre-project and compliance mean or median concentrations shall be compared using an Analysis of Variance (ANOVA). 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 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.

If compliance data indicate the quality of the production water has changed by a statistically significant amount for three consecutive years and the constituent concentrations exceed Water Quality Objectives, the applicant shall supply the CPM and RWQCB with a report describing the exceedances.

## NON-TRANSIENT, NON-COMMUNITY WATER SYSTEM

**WATER SUPPLY-10:** 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 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 will 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 will 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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## APPENDIX A: FEBRUARY 2012 PUMP TEST REVIEW

Recognizing the lack of aquifer data (HHSEGS AFC, Appendix 5.15: Water Resources, Hidden Hills Interim Assessment Report, dated May 2011) and acknowledging staff's concern about the lack of information for analysis of project pumping effects, the applicant performed an aquifer performance test at the HHSEGS site between February 17 and 21, 2012. The test was intended to supplement the data and analysis originally submitted as part of the AFC in August 2011. Staff reviewed the results of the test to determine whether the test produced data suitable for estimation of aquifer parameters for the staff analysis included in this PSA. The use of this data for the analysis is provided in the PSA. Staff also reviewed how the applicant estimated aquifer parameters and project pumping effects using the pump test data. Staff has analyzed the results of the applicant's aquifer performance test and has different interpretations of the results than the applicant. Staff's analysis of the applicant's pump test report is provided below.

Two wells were pumped as part of the February test, the Orchard Well and Well 3. Both were pumped for approximately 4.5 days at a rate of approximately 45 gpm. Two, 200 foot, 2-inch diameter monitoring wells were installed at distances of 200 feet (MW-1) and 50 (MW-2) from the Orchard well. Three, 200 foot, 2-inch diameter monitoring wells were installed at 200 feet (MW-3), 50 feet (MW-4), and 25 feet (MW-5) from Well 3. The general layout of the test is shown in **WATER SUPPLY Figure 27**.

Type-Curve Fits

The applicant used Aqtesolv to match drawdown data to various type curves. The primary purpose of this exercise is to help determine aquifer properties such as transmissivity and storativity. Data was matched to Walton, Hantush, and Neuman type curves.

The Walton type curves can be used to characterize semi-confined aquifers with no storage in the aquitard. The Hantush type curves are appropriate for characterizing semi-confined aquifers with storage in the aquitard (Fetter, 1994). Two aquifer systems with a leaky confining unit can also be fitted with Neuman type curves (Neuman and Witherspoon, 1969).

Though the applicant attempted to fit various semi-confined type curves to the observed data, none of the fits are exceptional. Furthermore, the representativeness of the observation well data is subject to a high degree of error where the solution being applied can't account for the delayed or lessened response created by partial penetration. For instance, Neuman and Witherspoon (1969) solutions do not account for partial penetration (Sheets and Bossenbroek, 2005). If a correction was applied, such as in Weeks (1969), the values calculated would be more representative.

Given the abundance of fine-grained deposits observed in the drilling logs of monitoring wells in the vicinity of the proposed project and given that these sediments are likely to be playa deposits, it would not be unusual for significant vertical anisotropy to be

present in the aquifer system. All of the applicant type-curve fits account for vertical anisotropy of 0.1 (Kv/Kh), but if the observation wells are separated from the pumped zone by significant lenses of clay and silt, the anisotropy could be much higher. Higher anisotropy would account for a greater delay in aquifer response at the observation wells.

The Neuman and Witherspoon (1969) type-curves explain the response to pumping felt at various depths in a two aquifer system separated by an aquitard. To assume for instance, that response felt in the upper aquifer represent the response in the entire system would be incorrect, unless the pump time is long. In the long term the response in all vertical components of the system will tend to become similar. It is unlikely that this equilibrium between aquitard and aquifers was seen during the 4.5 day test, especially given the fact that the horizontal hydraulic conductivities are on the order of one foot per day and the vertical conductivity would be much less. The bottom of Well 3 is at least 975 feet deep, the well is screened for its entire length, while the observation wells were no more than 200 feet deep. This testing condition, where there is significant separation between the pumping depth and observation depth, could lead to a significant delay in aquifer response seen at the observation wells.

Applicant Projected Impacts

In Data Response Set 2A-2 (3/12/12) the applicant built conclusions based on the curve matching described above. The applicant used a semi-log plot to predict a point of zero drawdown. The result of this analysis was that no noticeable drawdown would be felt at a distance greater than 1,500 feet from the well. The applicant used the three observation wells (MW-3, MW-4, and MW-5) from around Well 3 to produce a straight-line that intercepts the x-axis (or point of zero drawdown) at a distance of 1,500 feet.

This theory is flawed in that it misrepresents the water needed by the project. Even in the case that the aquifer is leaky, the leakage comes from somewhere else in the aquifer other than the pumped unit. That location is dismissed erroneously by the applicant and not identified. The source of leakage accounts for the rest of the volume lost in the aquifer.

This conclusion is also problematic because the applicant has not identified any significant sources of recharge that would allow a cone of depression to reach the identified quasi-steady-state so quickly. The applicant claims that the regional gradient stabilized the cone of depression during the pump test. Staff believes that the cone of depression did not stabilize at the Orchard well due to the regional gradient, but likely stabilized due to leakage. The data collected at Well 3 does not show stabilization. Furthermore, the regional gradient is not a new source of recharge that offsets the pumped volume of water. It is possible for the cone to propagate slightly less up-gradient due to the regional gradient in a semi or unconfined system, but it would also propagate further down-gradient. Storativity values reported by the applicant are no higher than 0.005, therefore staff would expect the aquifer system to behave very much like a confined system, in which heads and drawdowns respond linearly to pumping.

The applicant's calculation of the cone of depression neglects to account for most of the water supplied to the well. Consider the following example. The volume of a perfect

cone is equal to (1/3 * pi * radius squared * height). If the cone of depression was 14 feet deep as proposed and the radius was 1,500 feet, this cone could contain 757 acre-feet of water. A symmetrical cone of depression has the shape of a parabolic spandrel rotated around a vertical axis, which would amount to a much lower volume than 757 acre-feet. If this cone was filled with coarse sand, it could have a drainable porosity of 0.25, or a total volume equal to 189 acre-feet. Considering this volume is higher than would be contained in a parabolic spandrel, it makes sense that the applicant's estimate of drawdown for 25 years is unlikely to satisfy one year of project pumping.

Pump Rate During February 2012 Pump Test

Data from measured pump rates in both test wells show there was a steady decline during the February 2012 pump test. Though the pump rates of 45 gpm were targeted, the tolerance about the 45 gpm rate allowed for a steady pump rate decline of as much as 3.2 gpm during the last day of pumping at Well 3. At the end of the test, Well 3 sustained 13.45 feet of drawdown while producing 43.44 gpm. This is a specific capacity of about 3.2 gpm/ft. Given this specific capacity, Well 3 could have shown up to another foot of drawdown in the pump well, had the pump rate been maintained.
The Orchard well showed a steady decline of up to 1.4 gpm during the last two-thirds of the test. The Orchard well exhibited a specific capacity of about 0.55 gpm/ft at the end of the test. Had pump rates been maintained, this may have led to up to 2.5 additional feet of drawdown in the pumped well. **WATER SUPPLY Figure 28** shows the pump rates and associated drawdowns in each pump well during the February 2012 pump test.

Though the additional drawdown that may have resulted from a maintained pump rate could be small, it could be cumulatively significant in the analysis of the test and conclusions drawn from it. **WATER SUPPLY Figure 29** shows how MW-1 shows some recovery of water levels during the pump drawdown test. These data, if not considered could give the perception that water level declines are leveling off faster than they really are. In other words, a decline in pump rate could be at least partially attributable to the recovery in the observation wells in the latter part of the test.

Summary of Pump Test and Applicant Analysis Issues

- Pump test lasted 4.5 days instead of 7 to 14 days or when stabilization occurred.
- Pump Well 3 does not stabilize during the 4.5 day test.
- Pump rates during pump test decrease in both test wells.
- MW-1 shows recovery during pump test
- Monitoring wells were not installed to same depth a pumped wells. This is particularly an issue when the solution applied to curve fits cannot account for the effects of partial penetration.
- Leaky curves portrayed as accounting for all water lost from aquifer storage, however this is untrue.
- Though drawdown was only observed up to 200 feet from either pump well, the applicant infers the Stateline Fault System is an impermeable boundary.

**WATER SUPPLY - FIGURE 1**

Hidden Hills Solar Electric Generating System (HHSEGS)

The Great Basin is a large-scale, topgraphically 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.

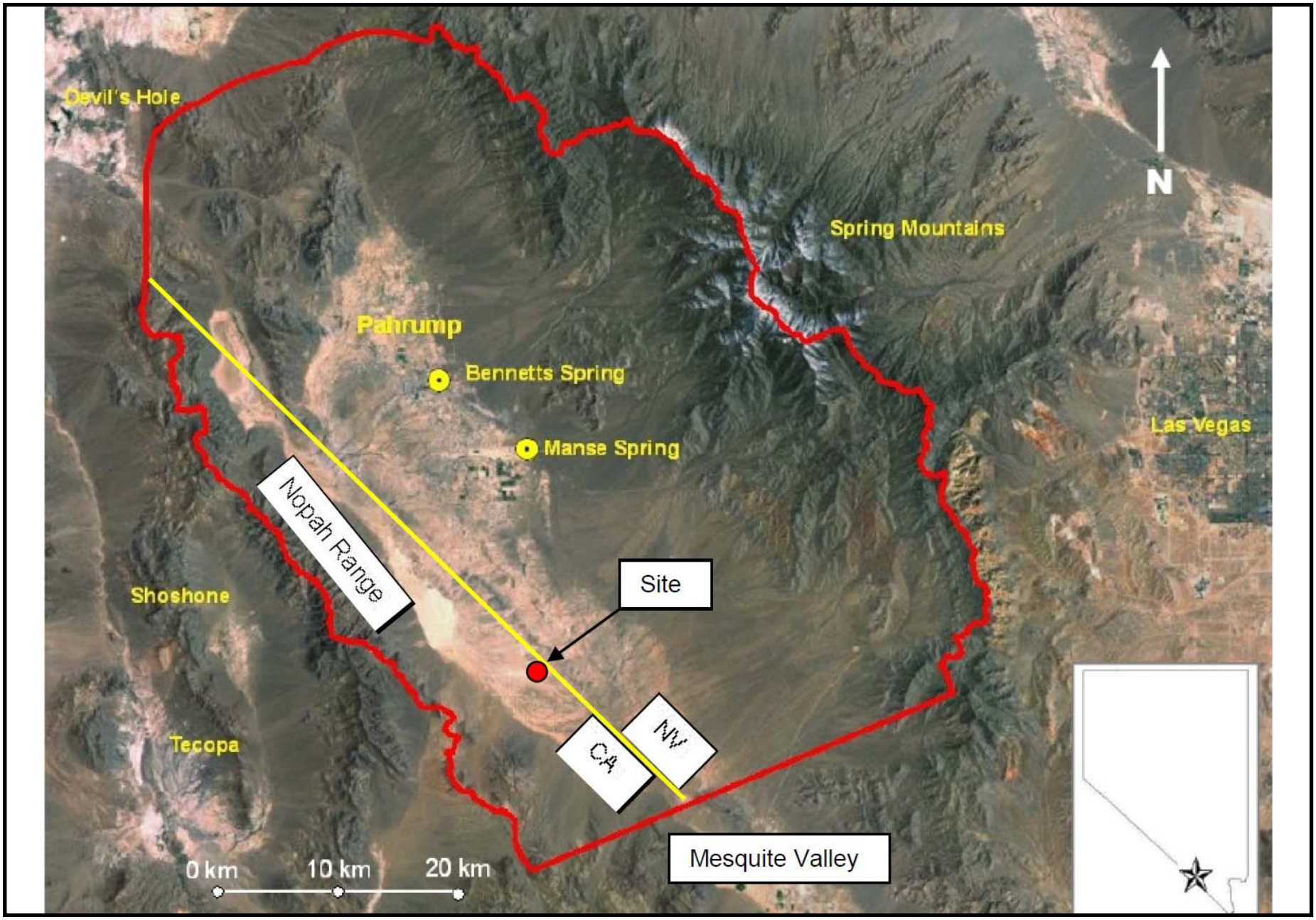



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SOURCE:USGS, 2011

**WATER SUPPLY - FIGURE 2**

Hidden Hills Solar Electric Generating System (HHSEGS) - The Pahrump Valley and vicinity



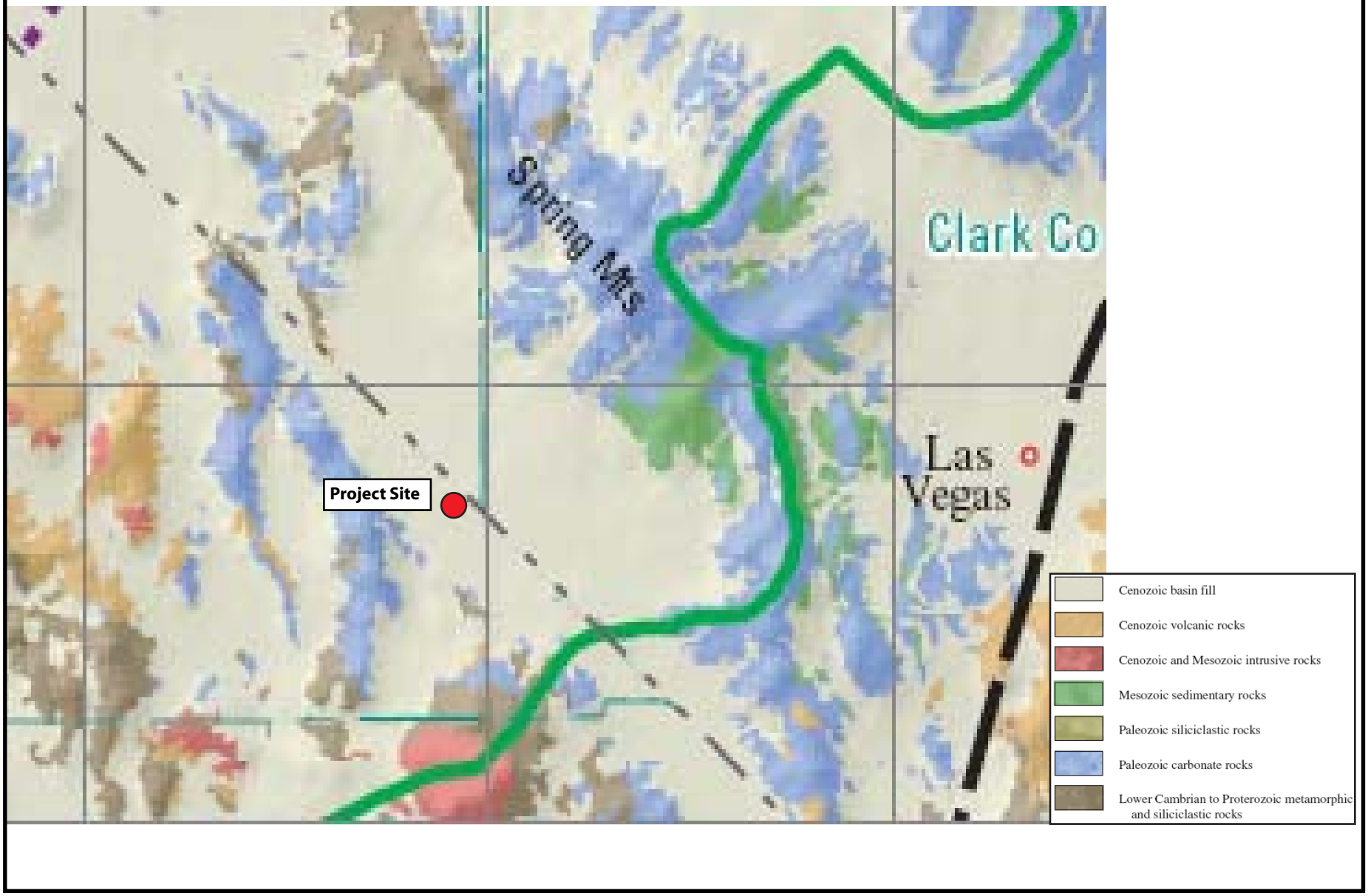



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SOURCE: Comartin, 2010

**WATER SUPPLY - FIGURE 3**

Hidden Hills Solar Electric Generating System (HHSEGS) - Geology of the project vicinity



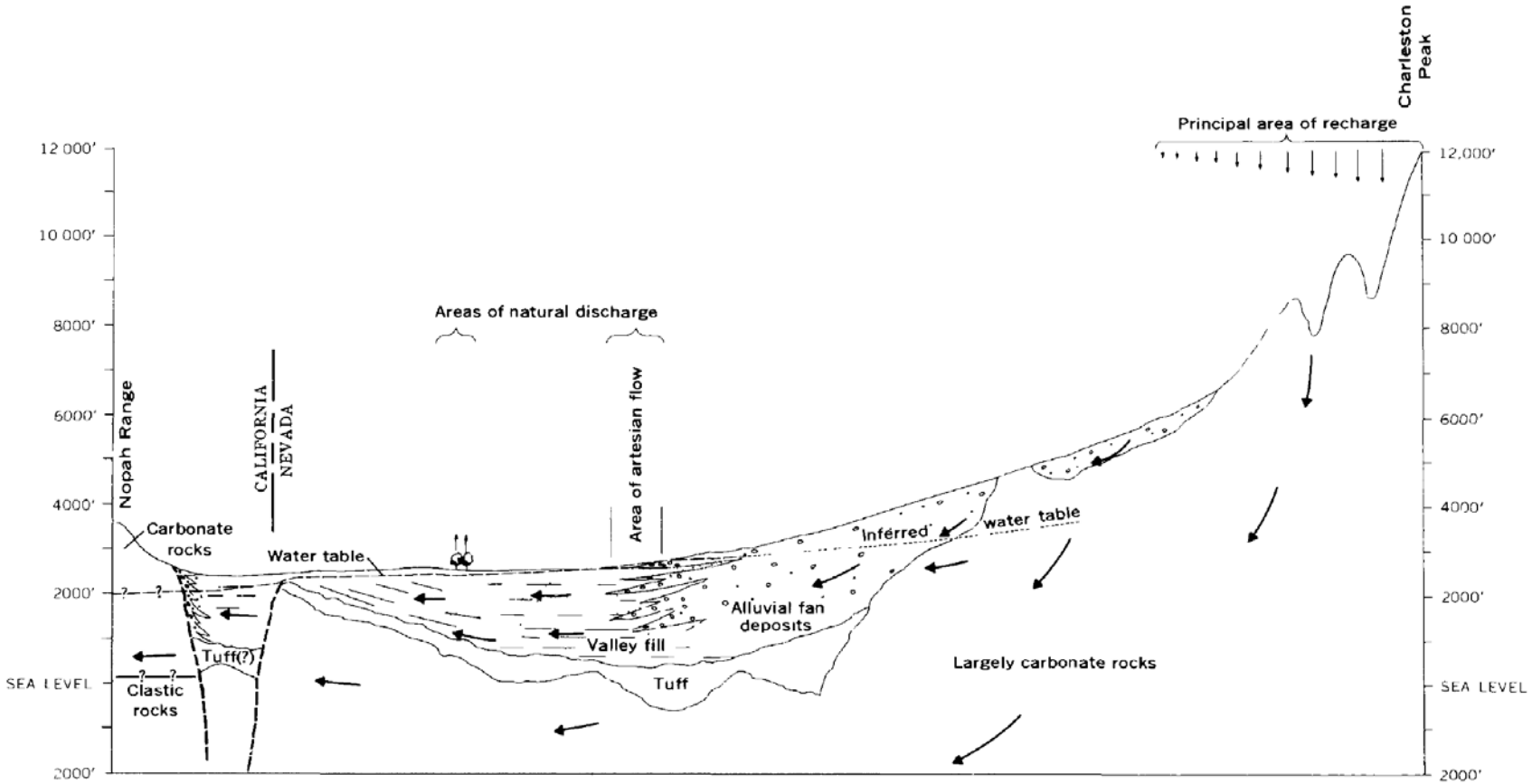



**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: (Sweetkind et al., 2004).

**WATER SUPPLY - FIGURE 4**

Hidden Hills Solar Electric Generating System (HHSEGS) - Cross-section of the Pahrump Valley between Charleston Peak and the Nopah Range



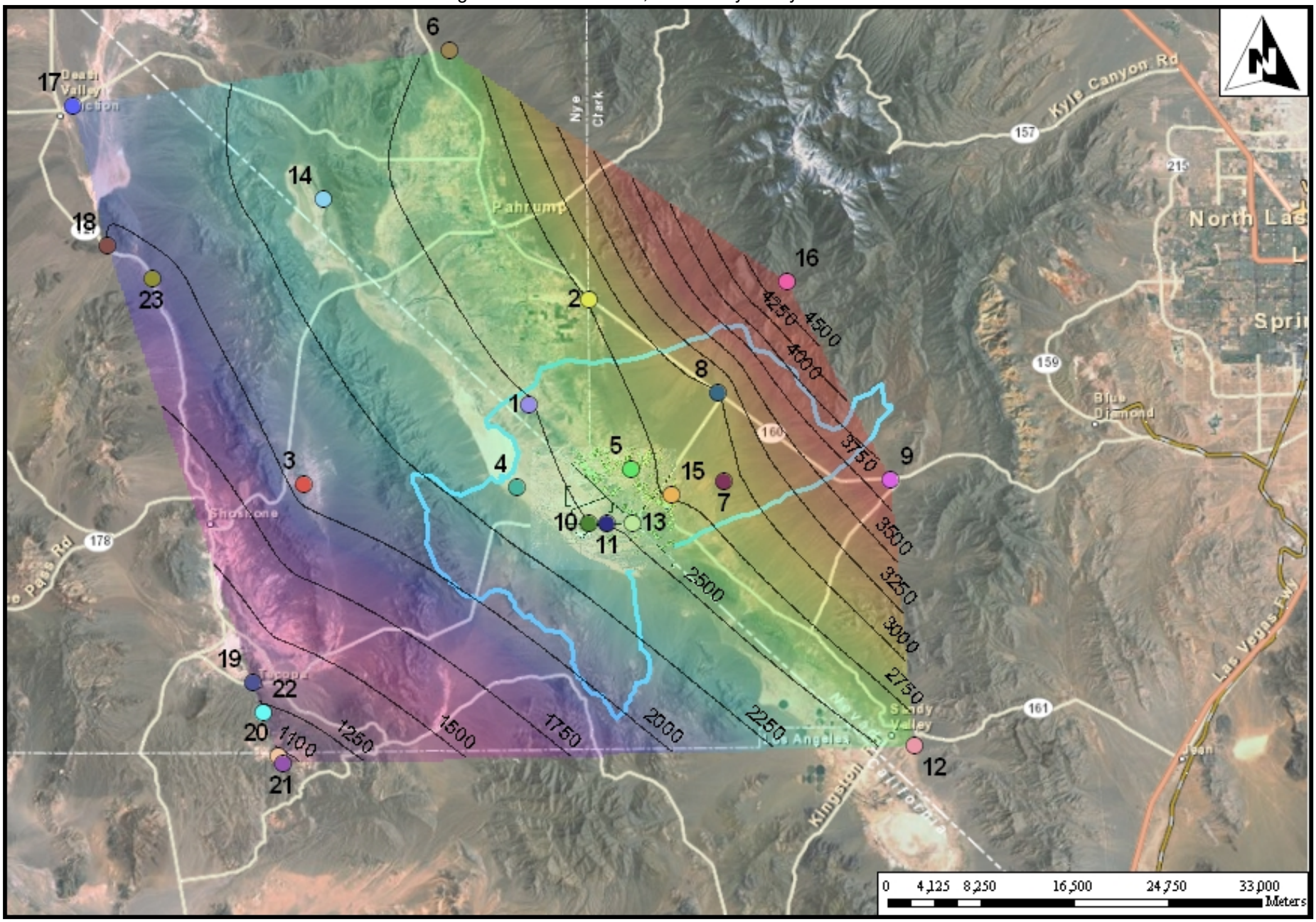

WATER SUPPLY

**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: (Malmburg, 1967).

**WATER SUPPLY - FIGURE 5**

Hidden Hills Solar Electric Generating System (HHSEGS) - Inferred potentiometric surface for southern Pahrump Valley, extrapolated a little north, to the Amargosa River in the west, and Sandy Valley to the south



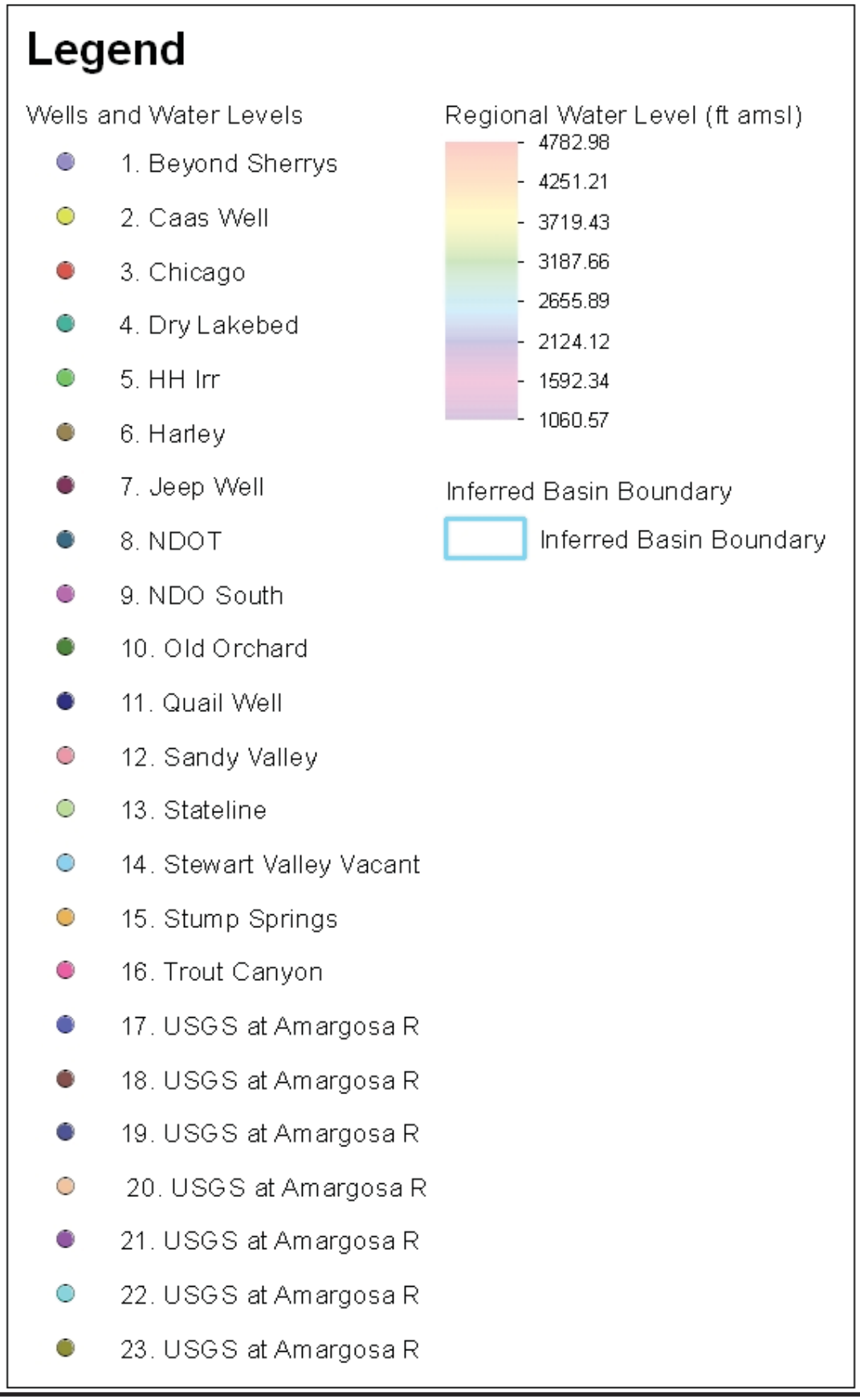

WATER SUPPLY

**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: Energy Commission Staff

**WATER SUPPLY - FIGURE 6**

Hidden Hills Solar Electric Generating System (HHSEGS) - Legend for Water Supply Figure 5

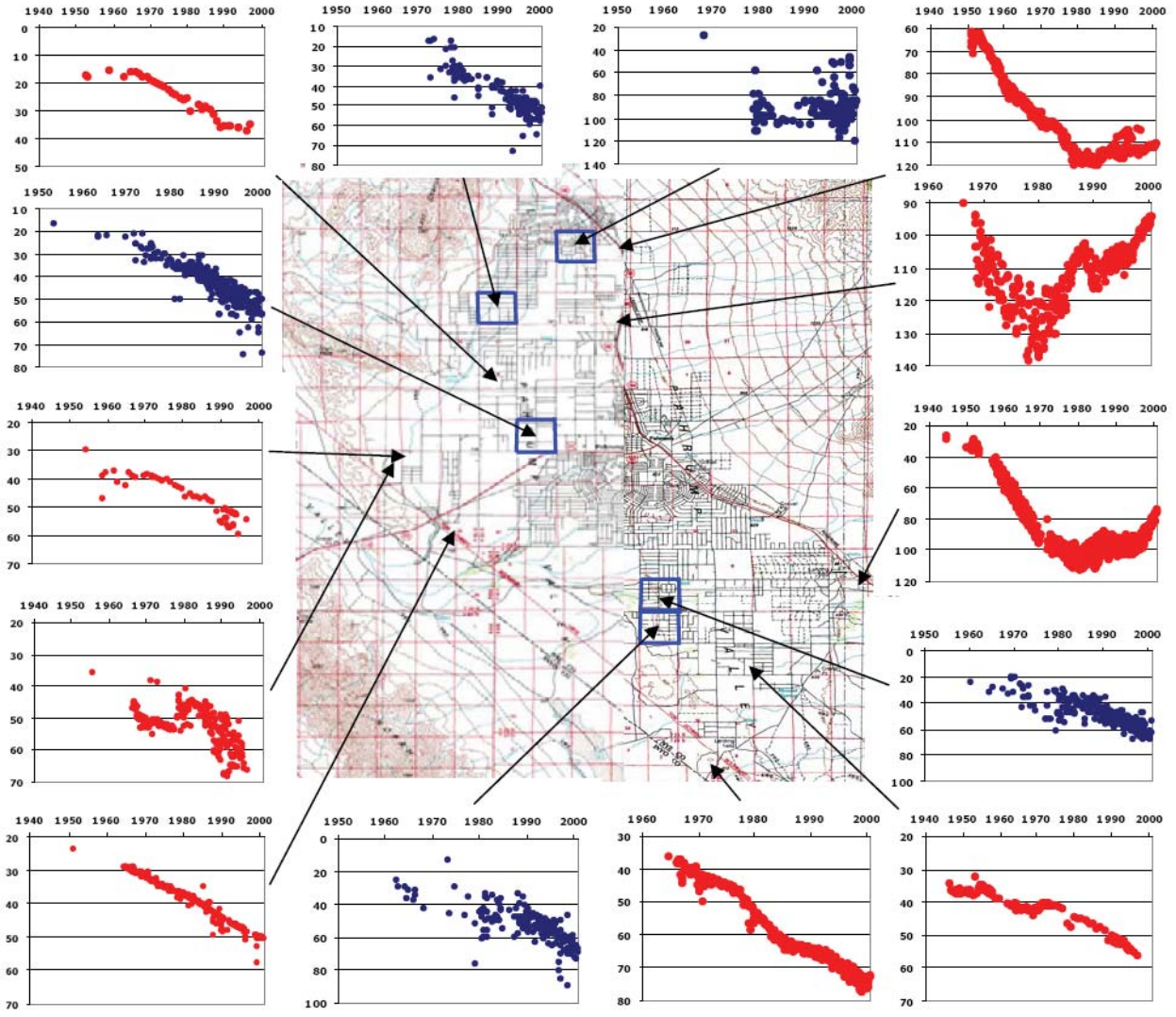



**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: Energy Commission Staff

**WATER SUPPLY - FIGURE 7**

Hidden Hills Solar Electric Generating System (HHSEGS) - Water levels in northern Pahrump Valley between 1940 and 2000.

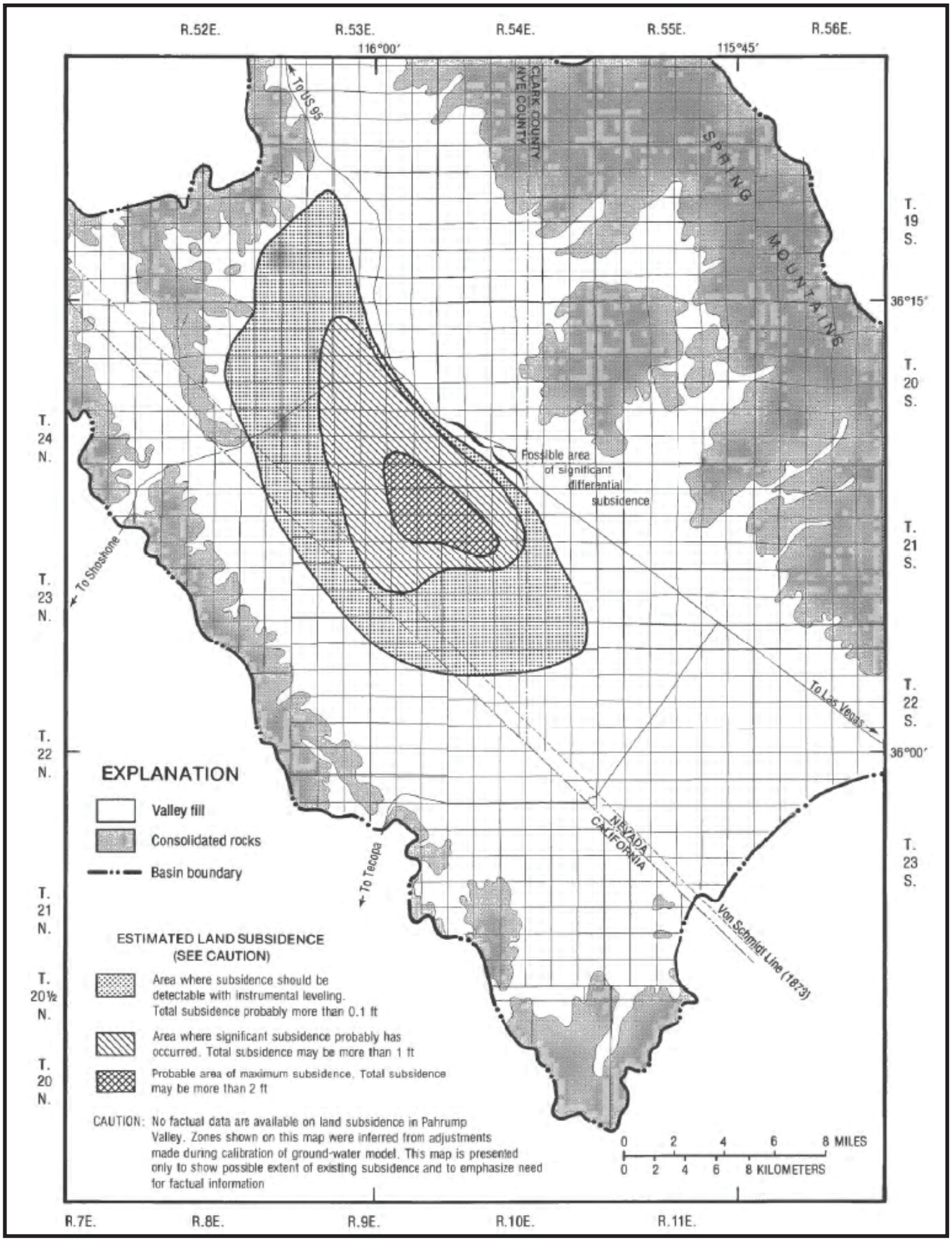


**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: (USGS; Nevada Division of Water Resources; Buqo, 2004).

**WATER SUPPLY - FIGURE 8**

Hidden Hills Solar Electric Generating System (HHSEGS) - Estimated land subsidence in Pahrump Valley

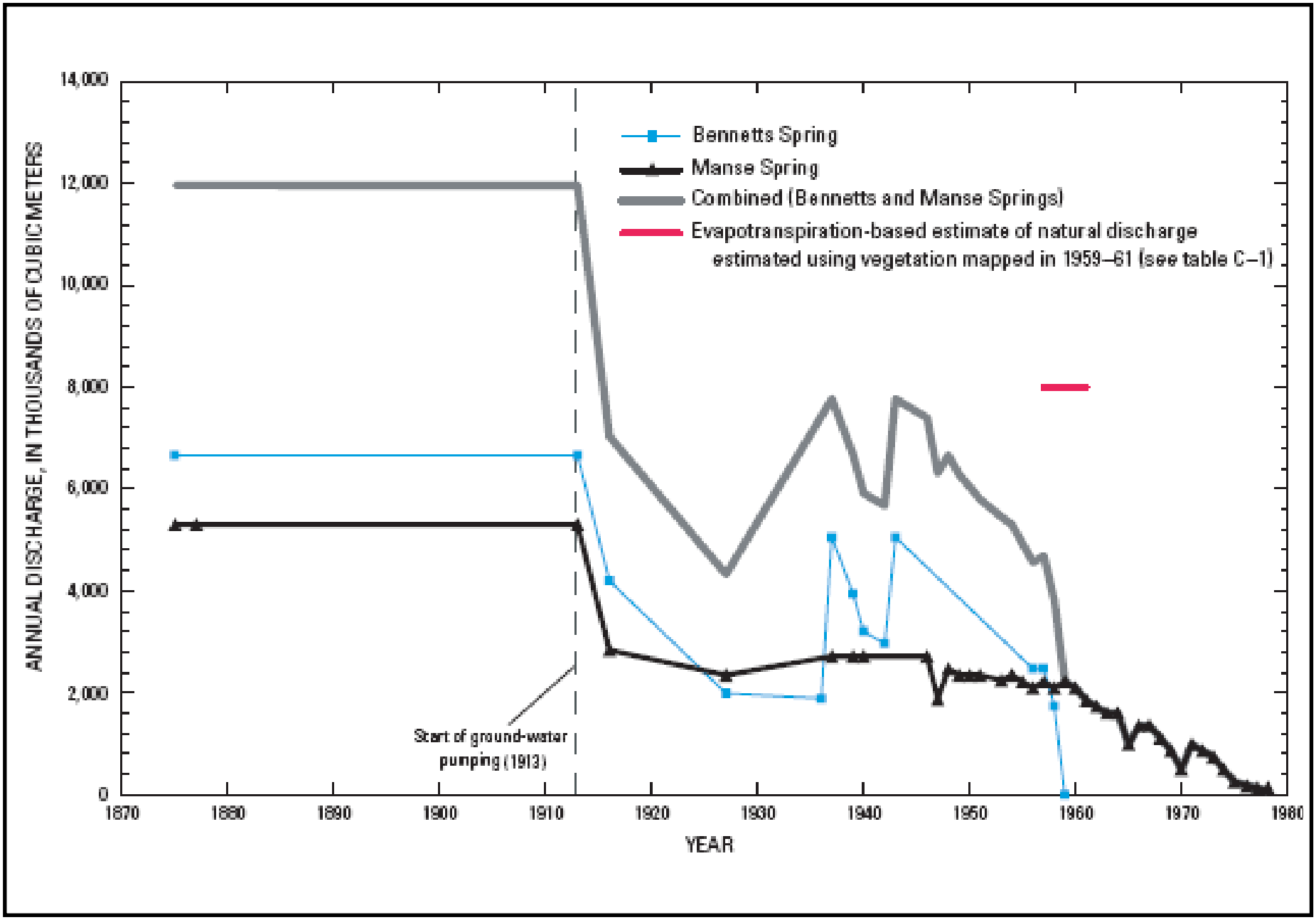



**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: Malmburg, 1967

**WATER SUPPLY - FIGURE 9**

Hidden Hills Solar Electric Generating System (HHSEGS) - Annual discharge estimates for Bennetts and Manse Spring, for years 1870 through 1980.



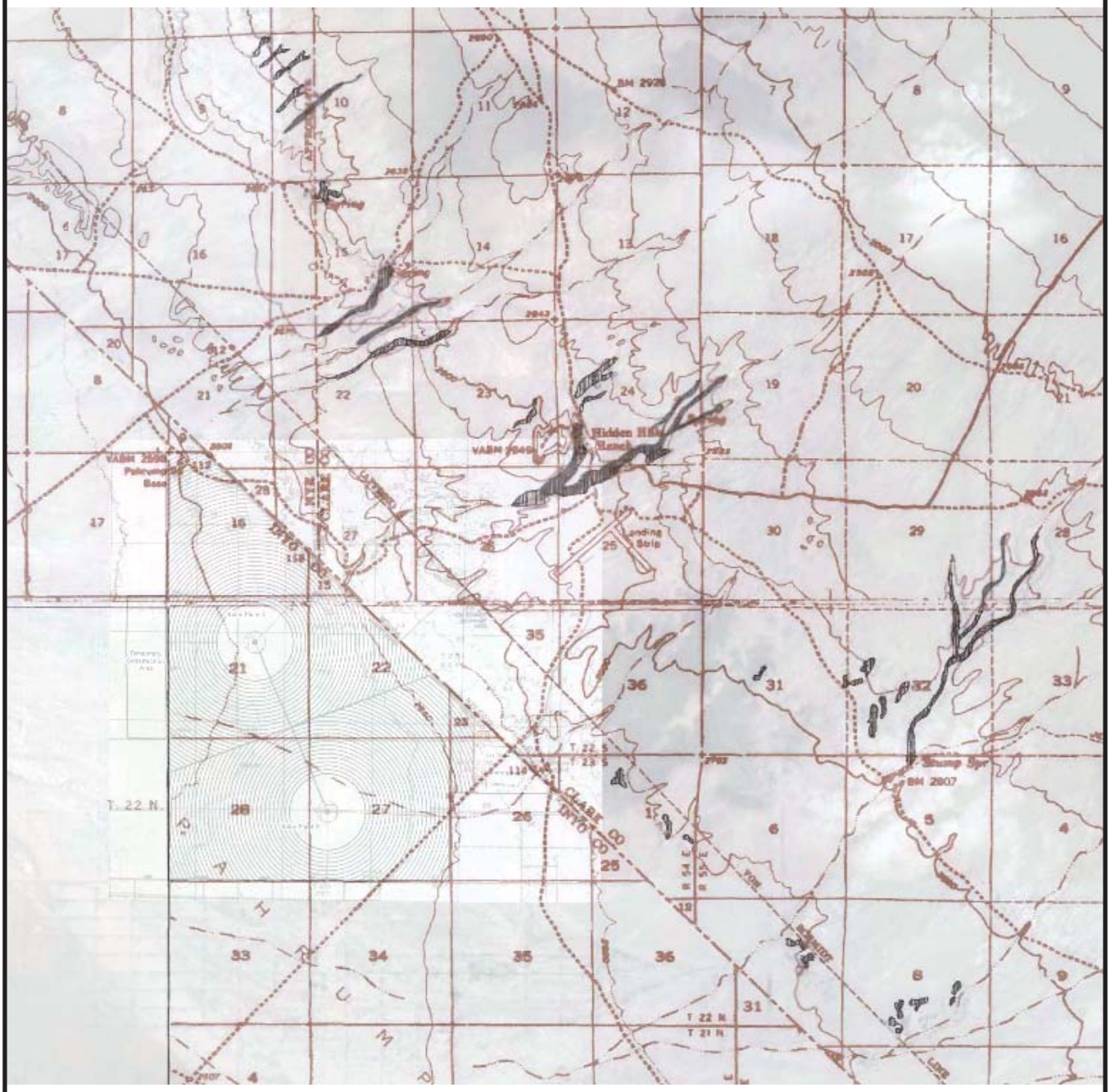

WATER SUPPLY

**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: (Belcher et al., 2004).

**WATER SUPPLY - FIGURE 10**

Hidden Hills Solar Electric Generating System (HHSEGS) - Mesquite stands in the vicinity of the project.
A lightened image of the project footprint is shown for reference.

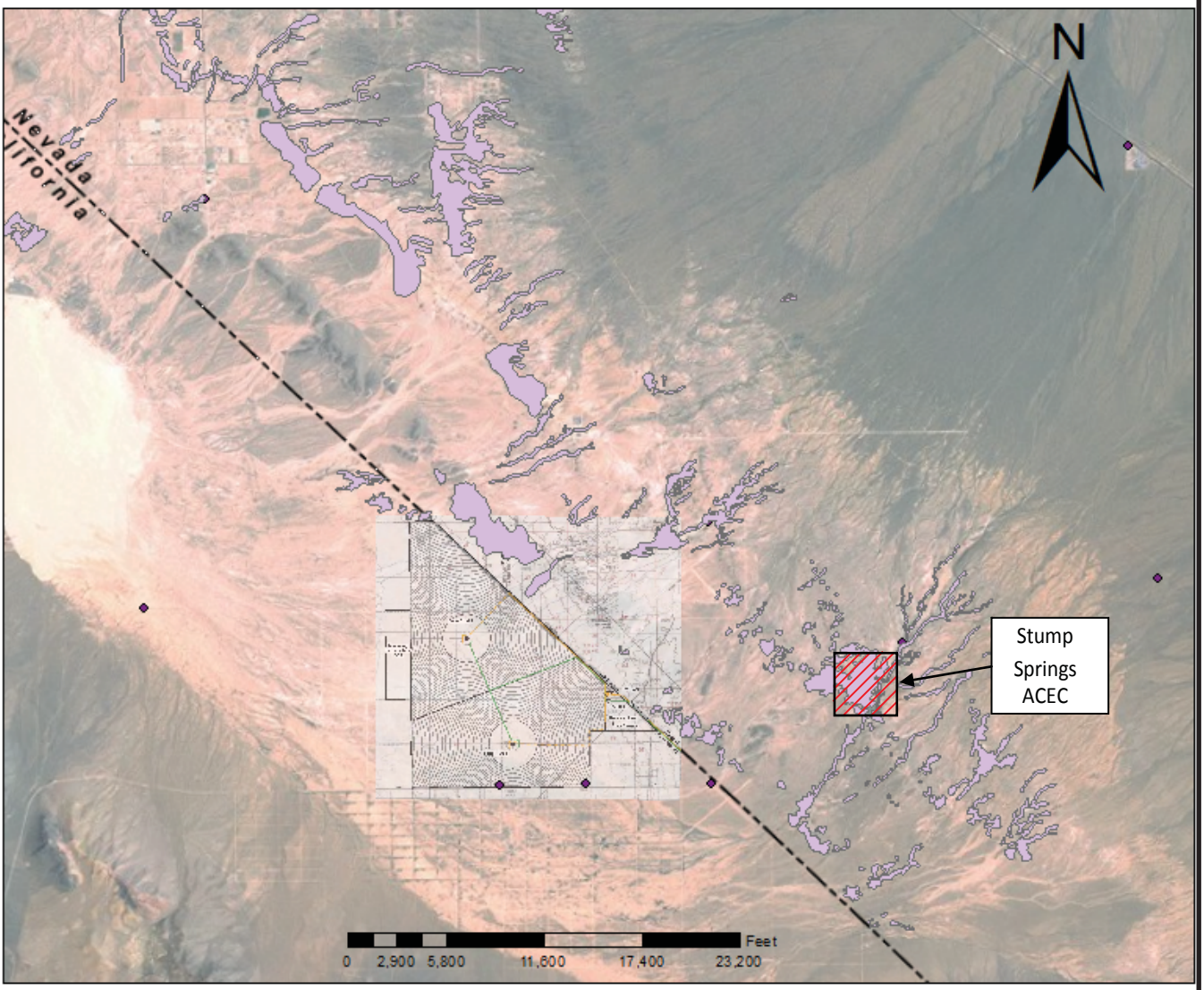



**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: (Belcher et al., 2004).

**WATER SUPPLY - FIGURE 11**

Hidden Hills Solar Electric Generating System (HHSEGS) - Mesquite-acacia habit mapped by BLM staff in the 1990s.




**Legend**

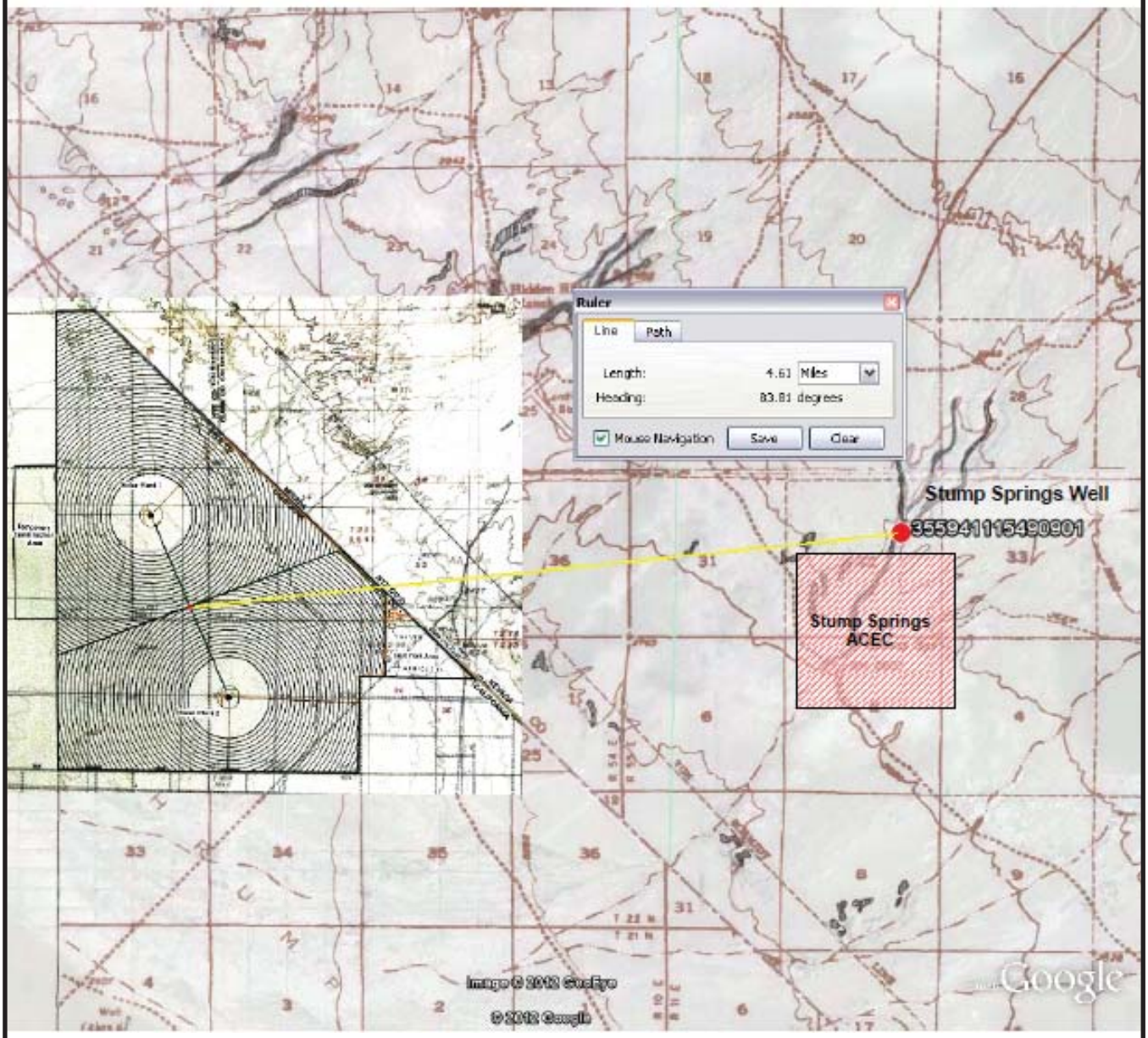
SNDO_mesquite_acacia_habitat

**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: (BLM, 2006).

**WATER SUPPLY - FIGURE 12**
Hidden Hills Solar Electric Generating System (HHSEGS)

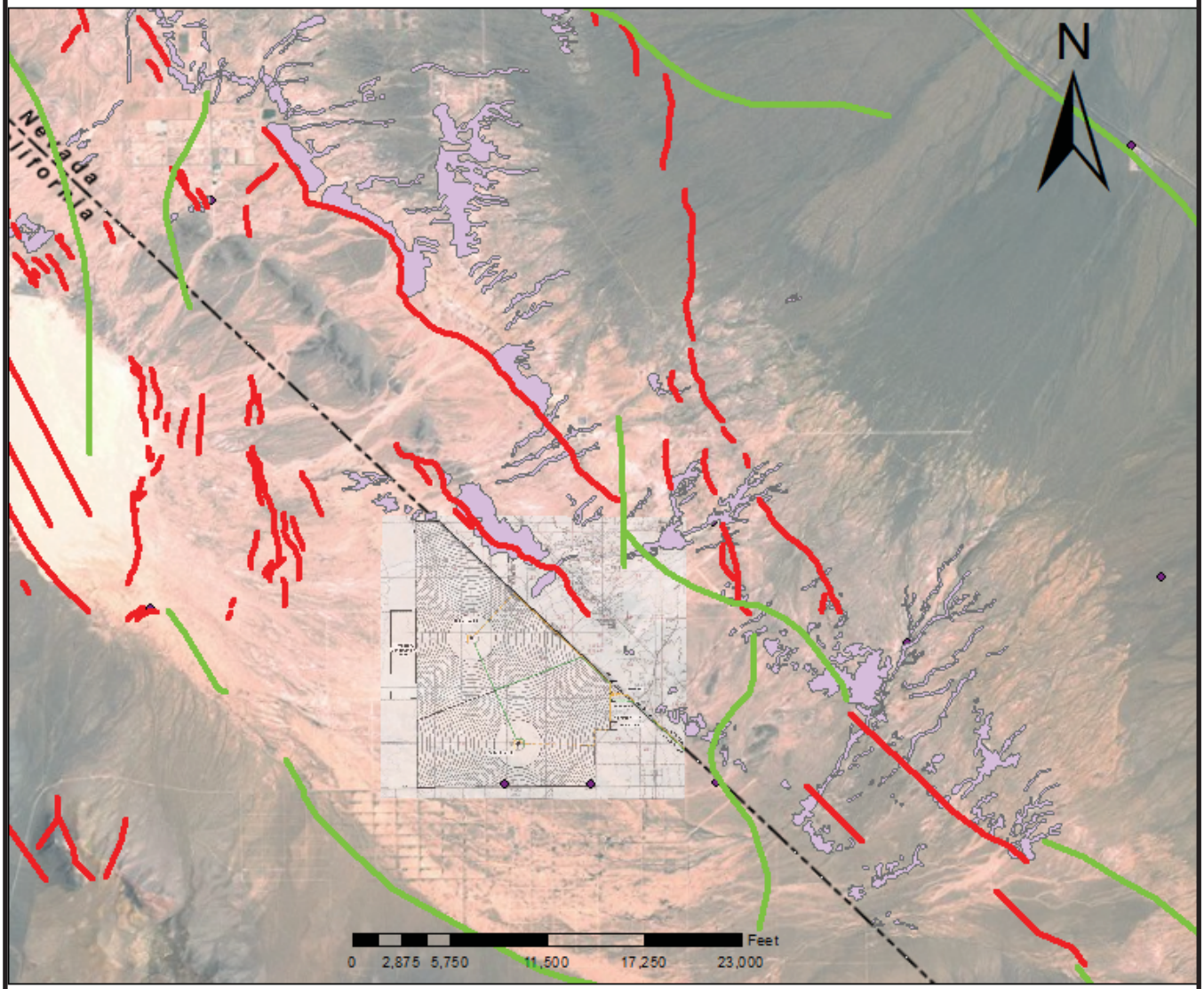
The Stump Springs Area of Critical Environmental Concern is about 4 miles from the center of the project.
The Stump Springs monitoring well is about 4.6 miles from the center of the project.




**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**
SOURCE: Energy Commission Staff

**WATER SUPPLY - FIGURE 13**

Hidden Hills Solar Electric Generating System (HHSEGS) - The figure shows a mixture of inferred faults in the proposed HHSEGS project vicinity.

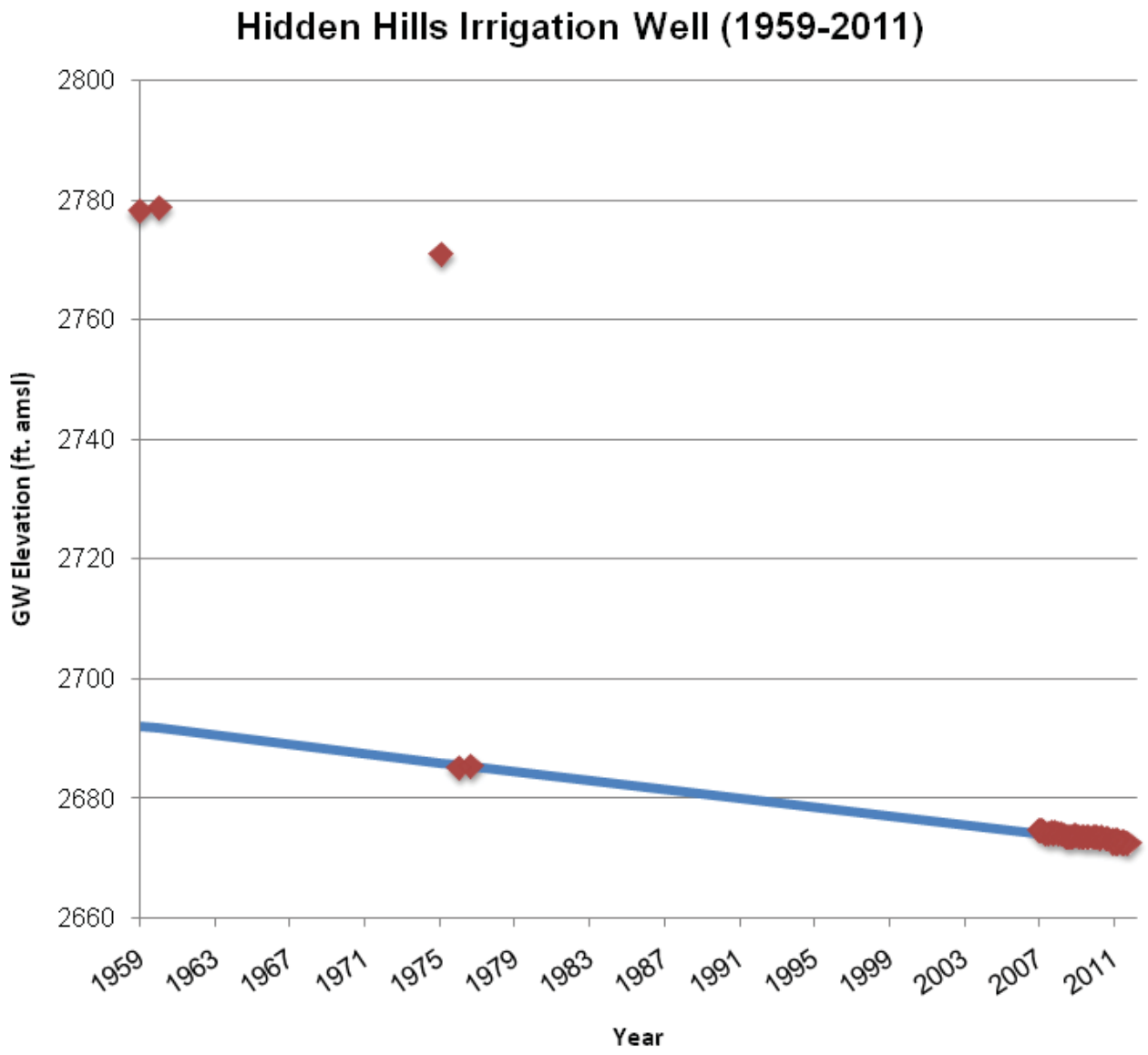



**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: (Workman et al., 2002)

**WATER SUPPLY - FIGURE 14**
Hidden Hills Solar Electric Generating System (HHSEGS)

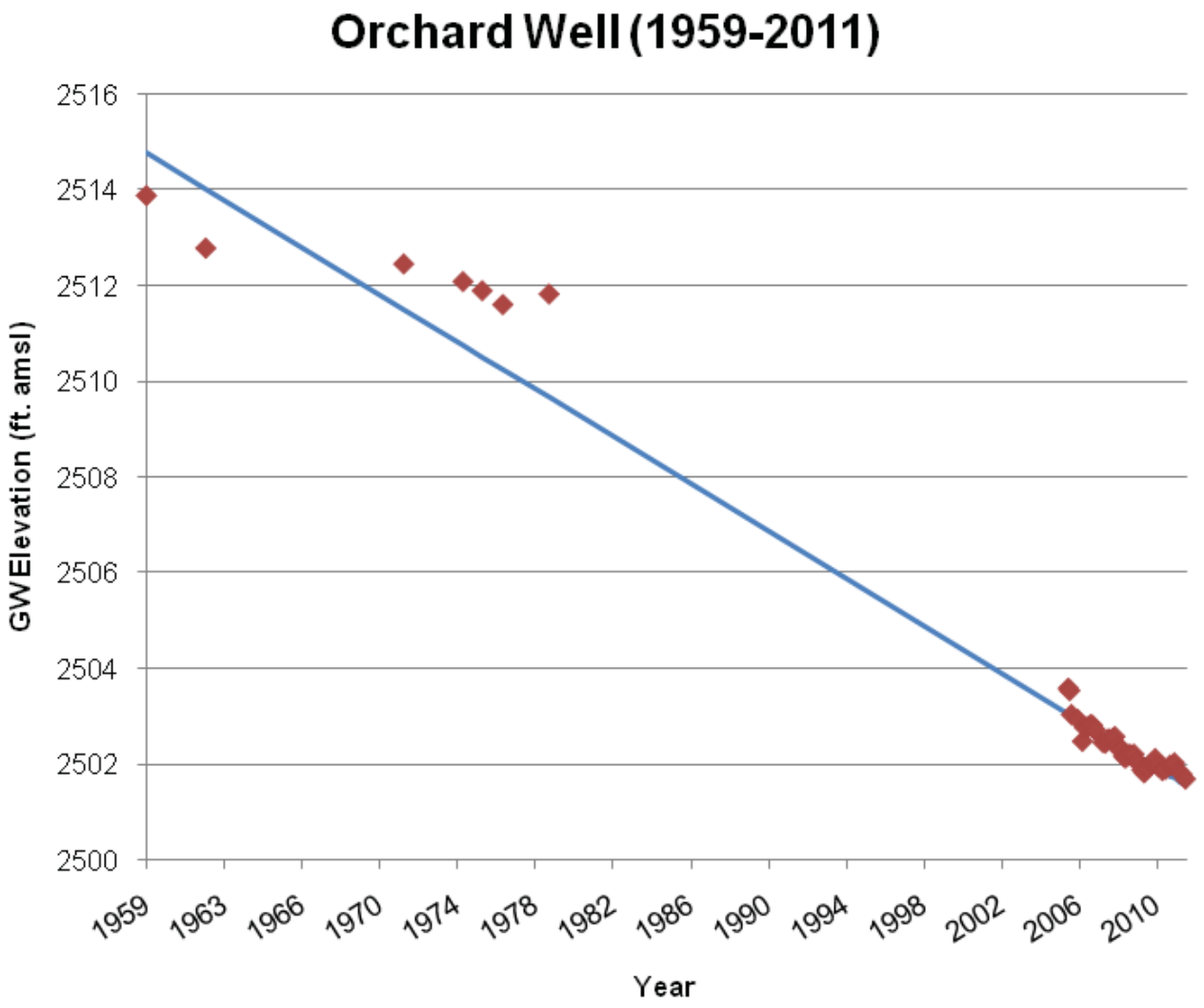
Water levels at the Hidden Hills Irrigation well between 1959 and 2011. The blue line represents the Sen's slope estimator. The slope of trendline indicates that the decline in the well is equal to 0.25 feet per year.




**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**
SOURCE: Energy Commission Staff

**WATER SUPPLY - FIGURE 15**
Hidden Hills Solar Electric Generating System (HHSEGS)

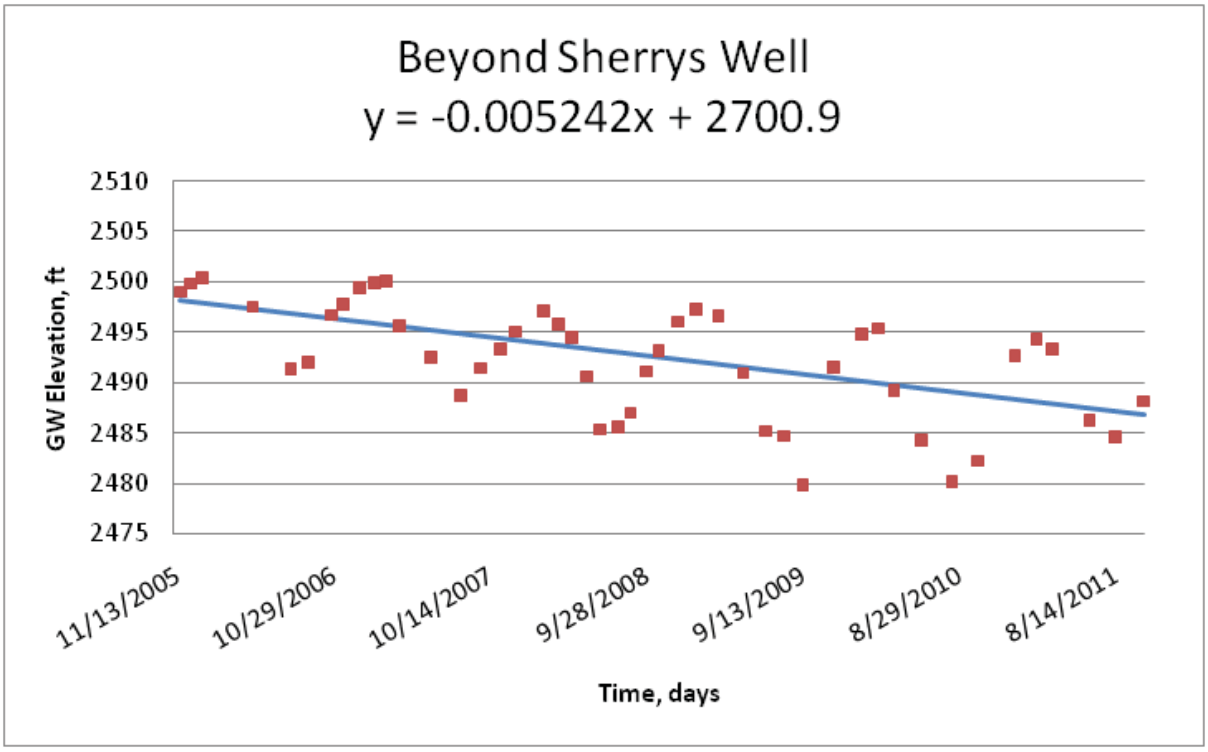
Water levels at the Old Orchard well between 1959 and 2011. The blue line represents the Sen's slope estimator. The slope of trendline indicates that the decline in the well is equal to 0.37 feet per year.

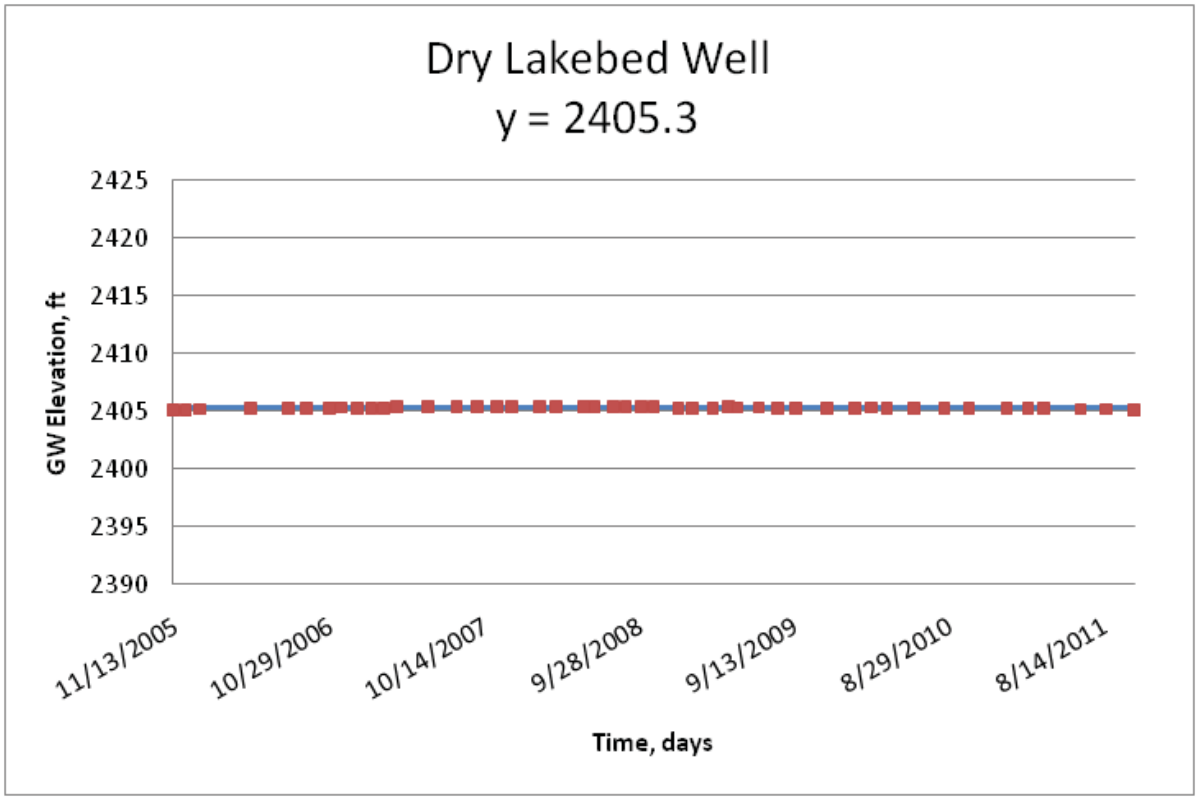



**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**
SOURCE: Energy Commission Staff

**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 Beyond Sherrys and Dry Lakebed wells.

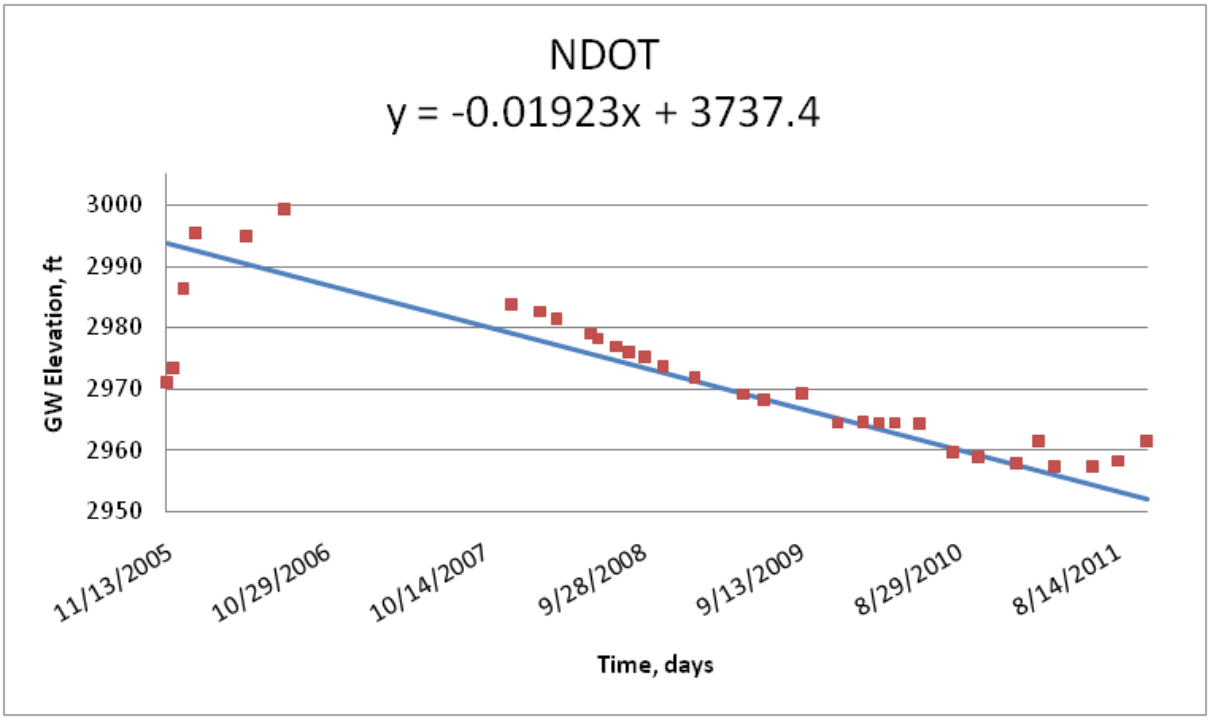


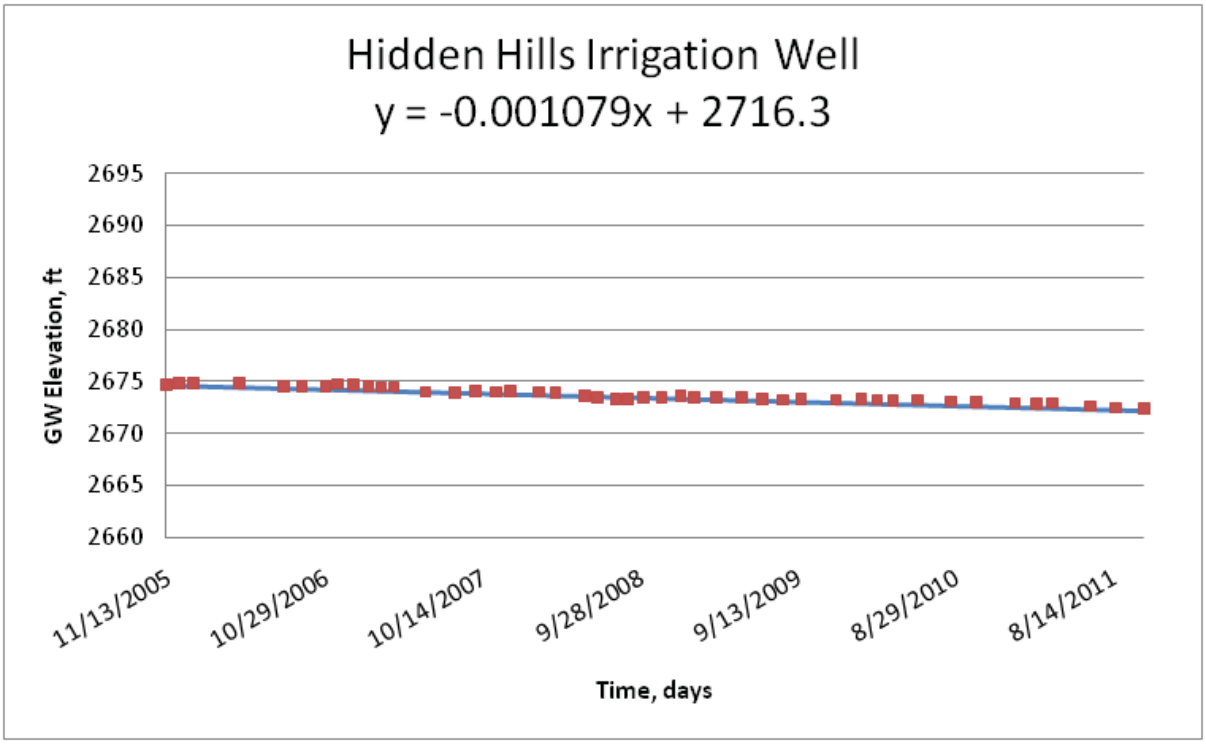




**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**
SOURCE: Energy Commission Staff

**WATER SUPPLY - FIGURE 17**
Hidden Hills Solar Electric Generating System (HHSEGS)

Water level trends in feet per day, between November 2005 and November 2011, for the NDOT and Hidden Hills irrigation wells.

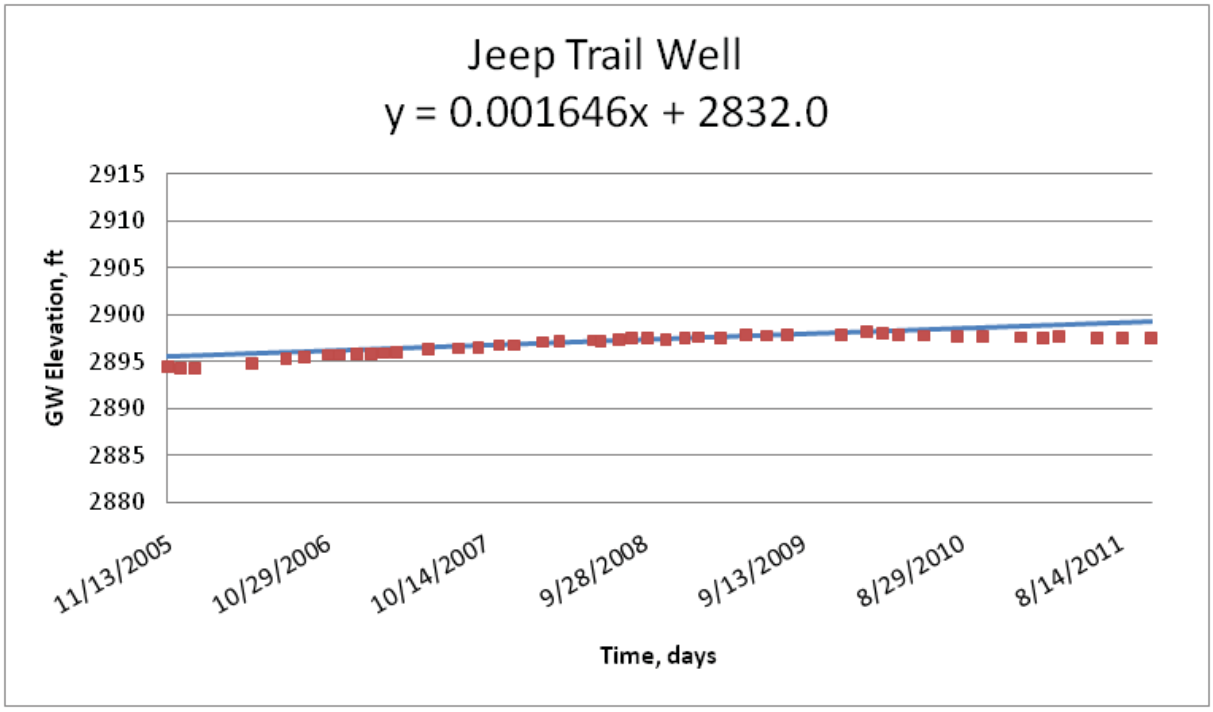


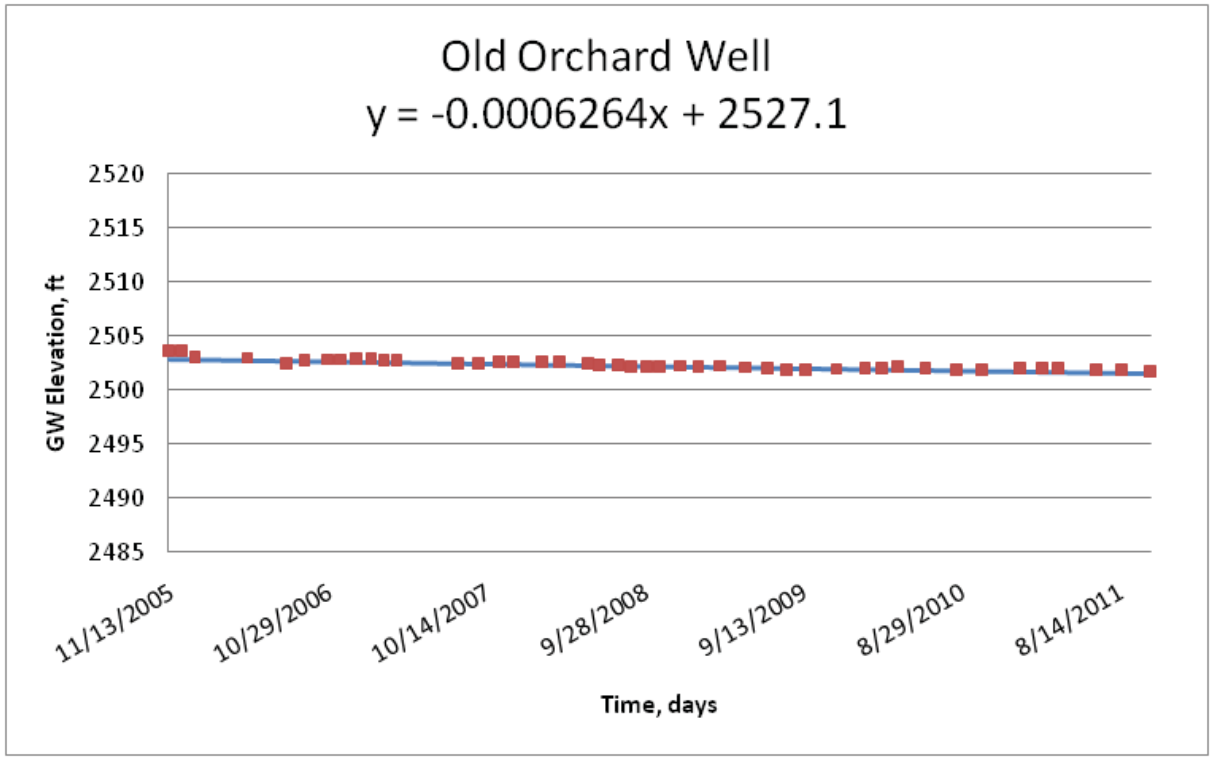




**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**
SOURCE: Energy Commission Staff

**WATER SUPPLY - FIGURE 18**
Hidden Hills Solar Electric Generating System (HHSEGS)

Water level trends in feet per day, between November 2005 and November 2011, for the Jeep Trail and Old Orchard wells.

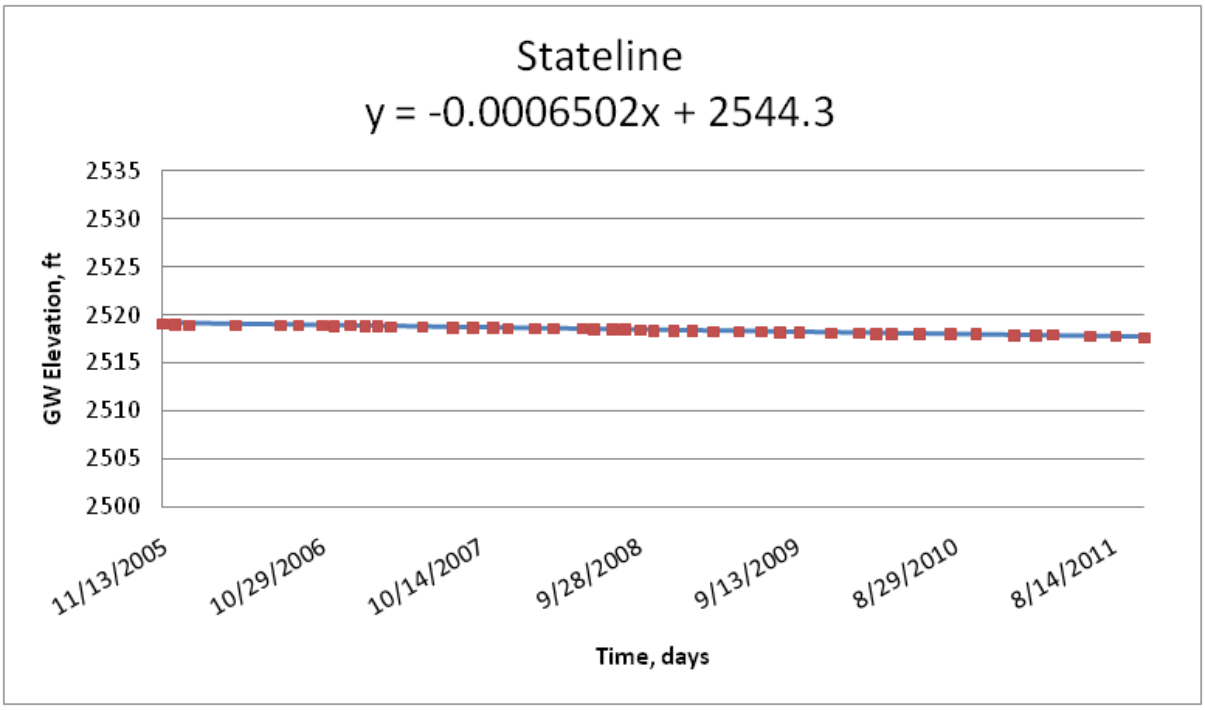


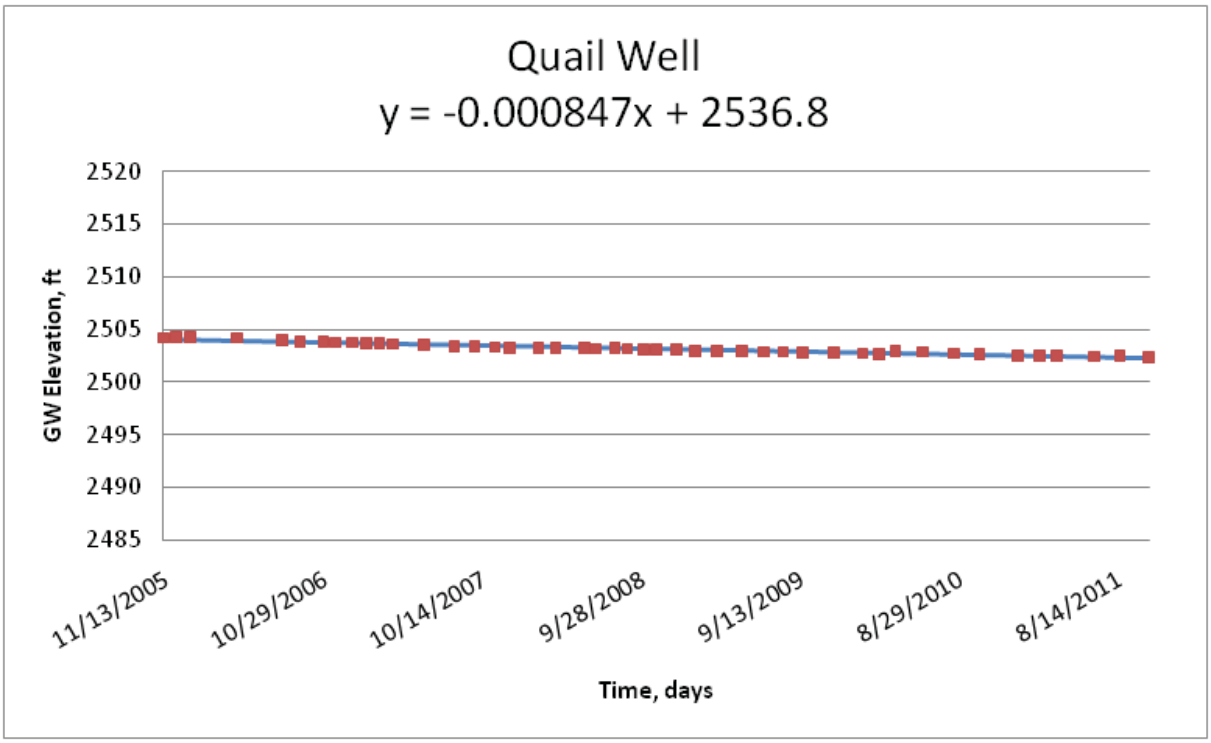




**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**
SOURCE: Energy Commission Staff

**WATER SUPPLY - FIGURE 19**
Hidden Hills Solar Electric Generating System (HHSEGS)

Water level trends in feet per day, between November 2005 and November 2011, for the Stateline and Quail wells.




**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**
SOURCE: Energy Commission Staff

**WATER SUPPLY - FIGURE 20**

Hidden Hills Solar Electric Generating System (HHSEGS) - Southern Pahrump Valley groundwater basin as delineated for this study.

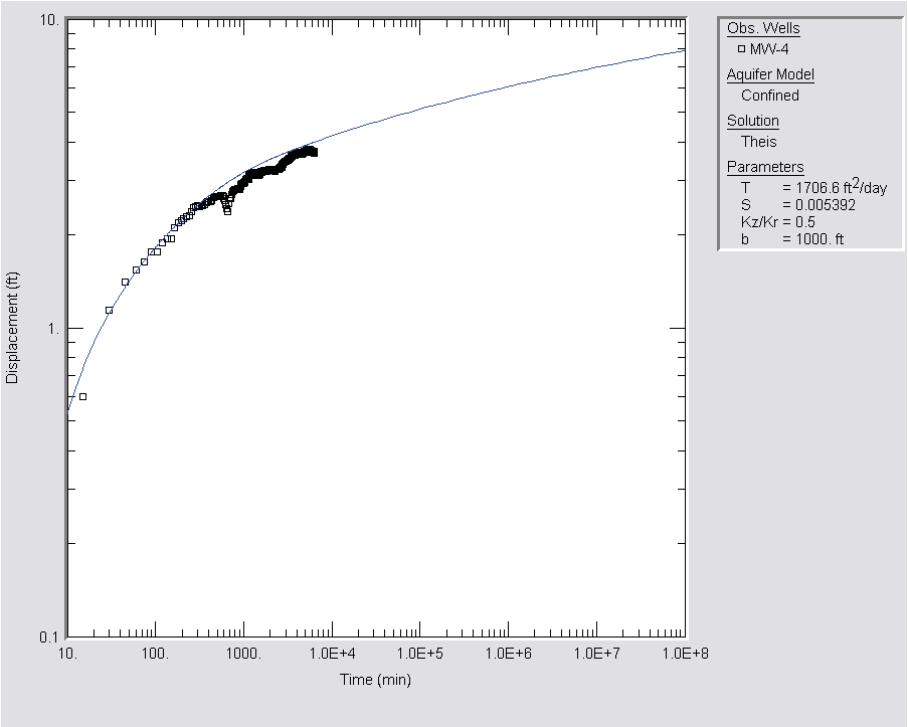


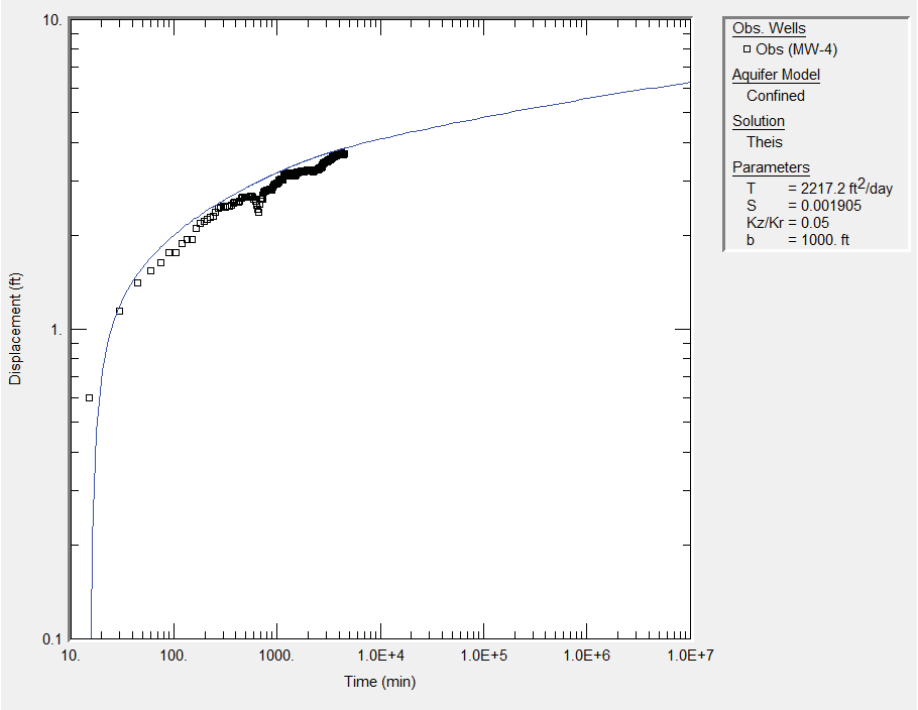

**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: Energy Commission Staff

**WATER SUPPLY - FIGURE 21**
Hidden Hills Solar Electric Generating System (HHSEGS)

Type-curve fitting of aquifer pump test data from MW-4. The data in the samples below were matched to a Theis type curve

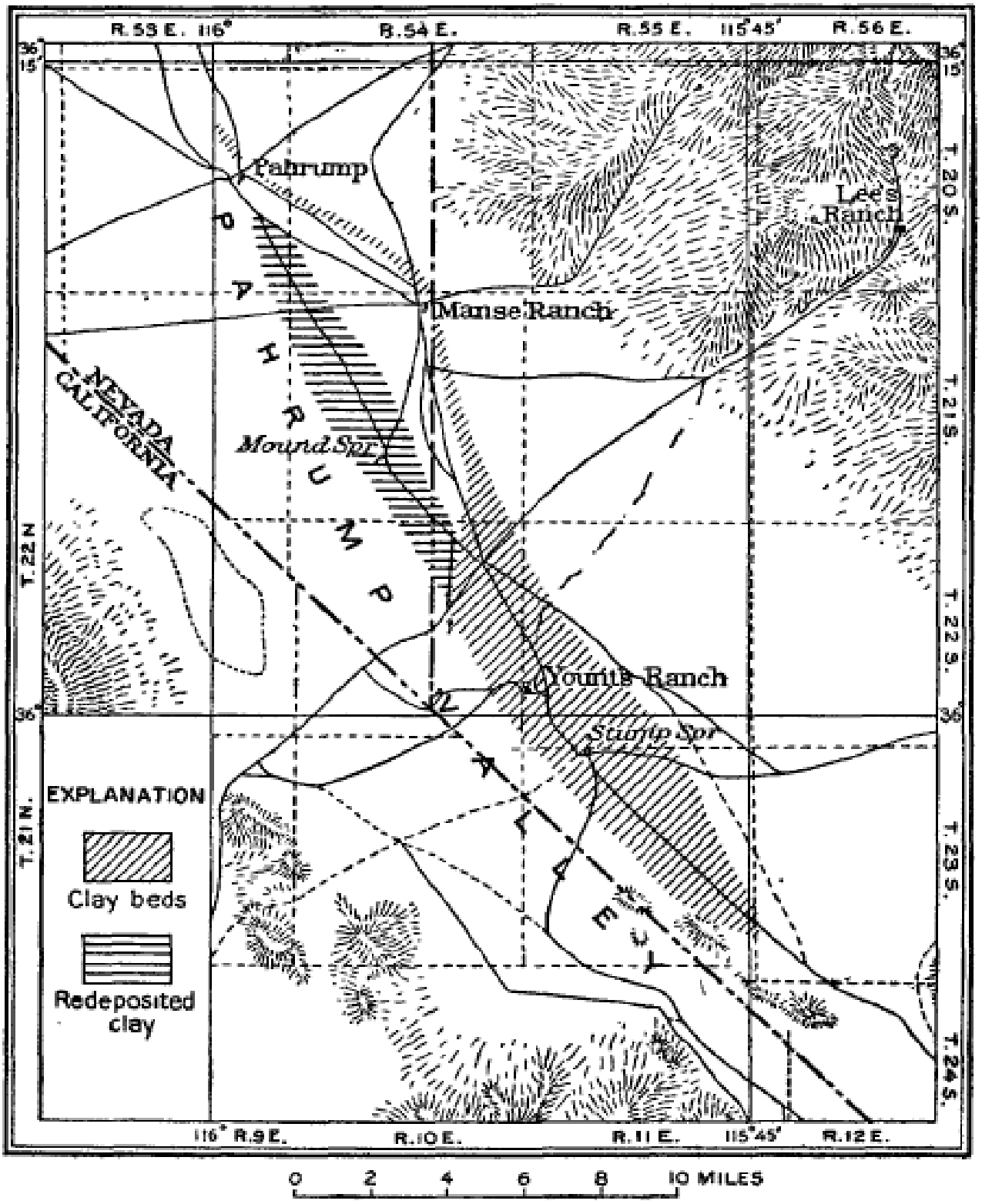



**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**
SOURCE: Energy Commission Staff

**WATER SUPPLY - FIGURE 22**
Hidden Hills Solar Electric Generating System (HHSEGS)

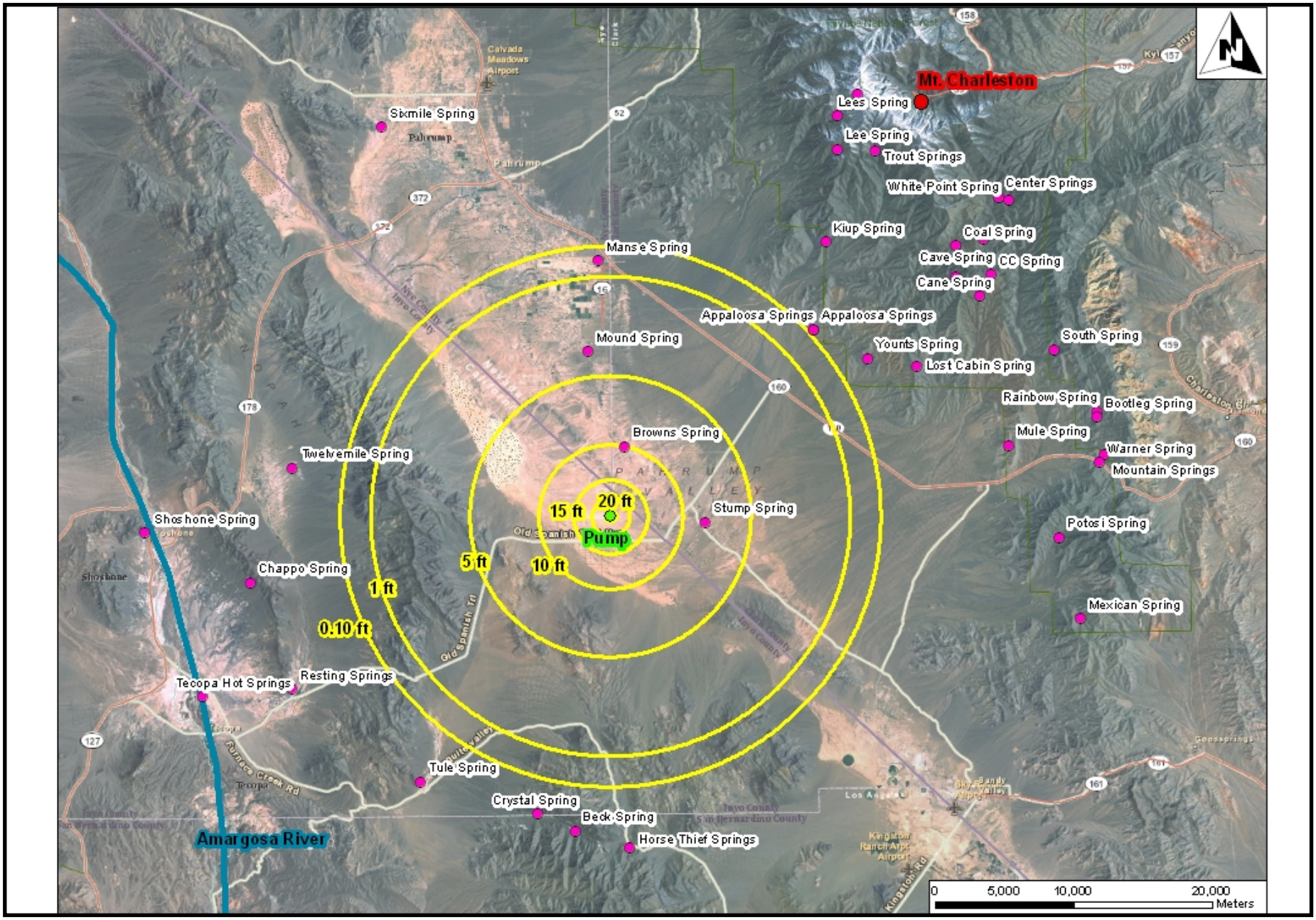
TA significant exposure of clay bedding is observed around the Stump Springs region. The clay bedding is said to reach its maximum thickness of 50 feet near Stump Springs .




**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**
SOURCE: (Grover, 1919).

**WATER SUPPLY - FIGURE 23**

Hidden Hills Solar Electric Generating System (HHSEGS) - This figure shows the superimposed cone of depression on the proposed site. Aquifer parameters used were T=3,153 gpd/ft, S=0.0025. Figure depicts 30 years of pumping 101 gpm.




**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: Energy Commission Staff

**WATER SUPPLY - FIGURE 24**

Hidden Hills Solar Electric Generating System (HHSEGS) - Proposed impacts of HHSEGS project pumping presented in the AFC. Aquifer parameters used were T=3,612 gpd/ft, S=0.01. Figure depicts 25 years of pumping about 87 gpm. This depiction takes of the cone of depression takes into account a 0.01 regional groundwater gradient (HHSG 2011a).

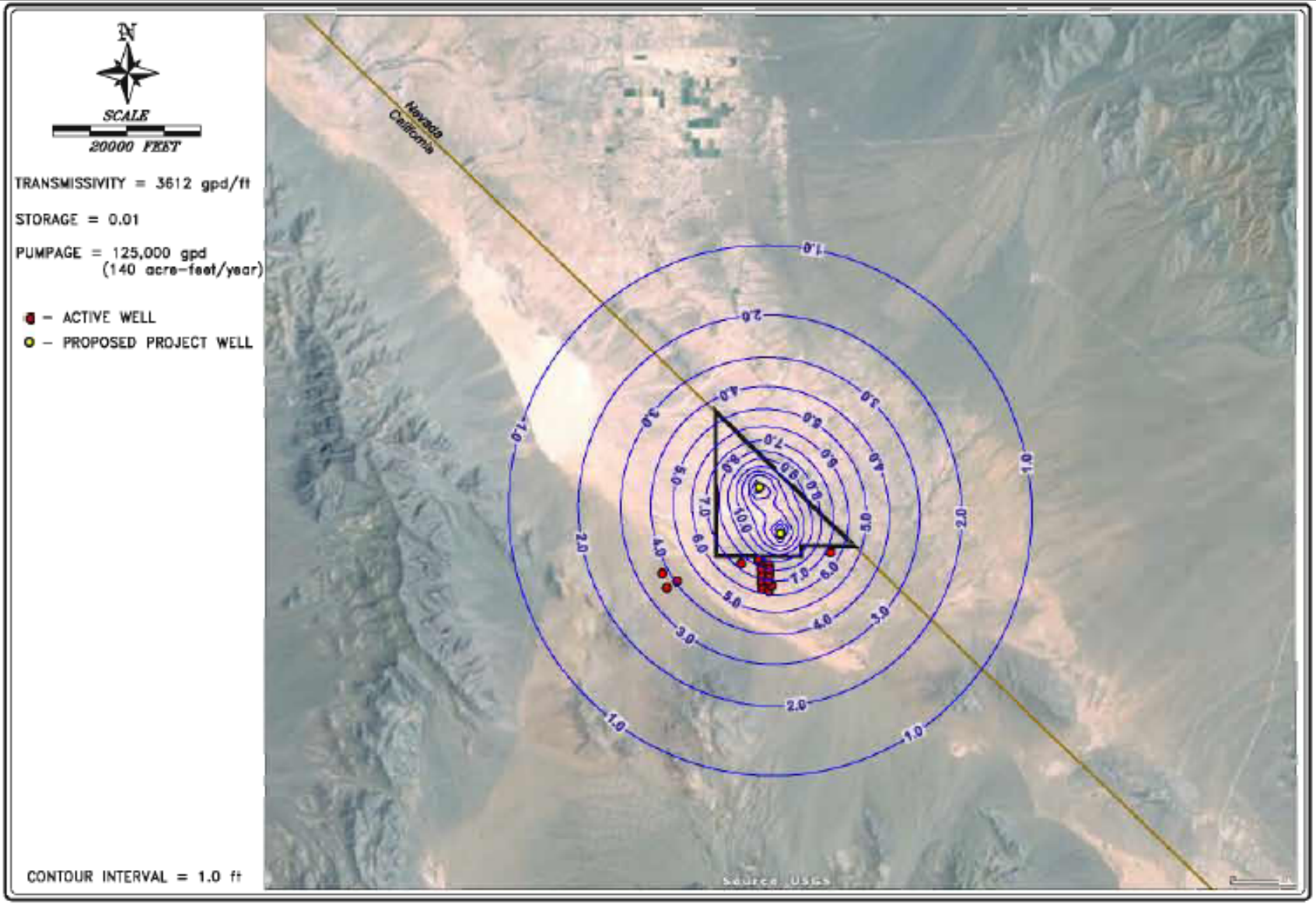



FIGURE 6. MAP SHOWING SIMULATED DRAWDOWN DUE TO PUMPING 125,000 GALLONS PER DAY FOR 25 YEARS. TRANSMISSIVITY = 3612 gpd/ft

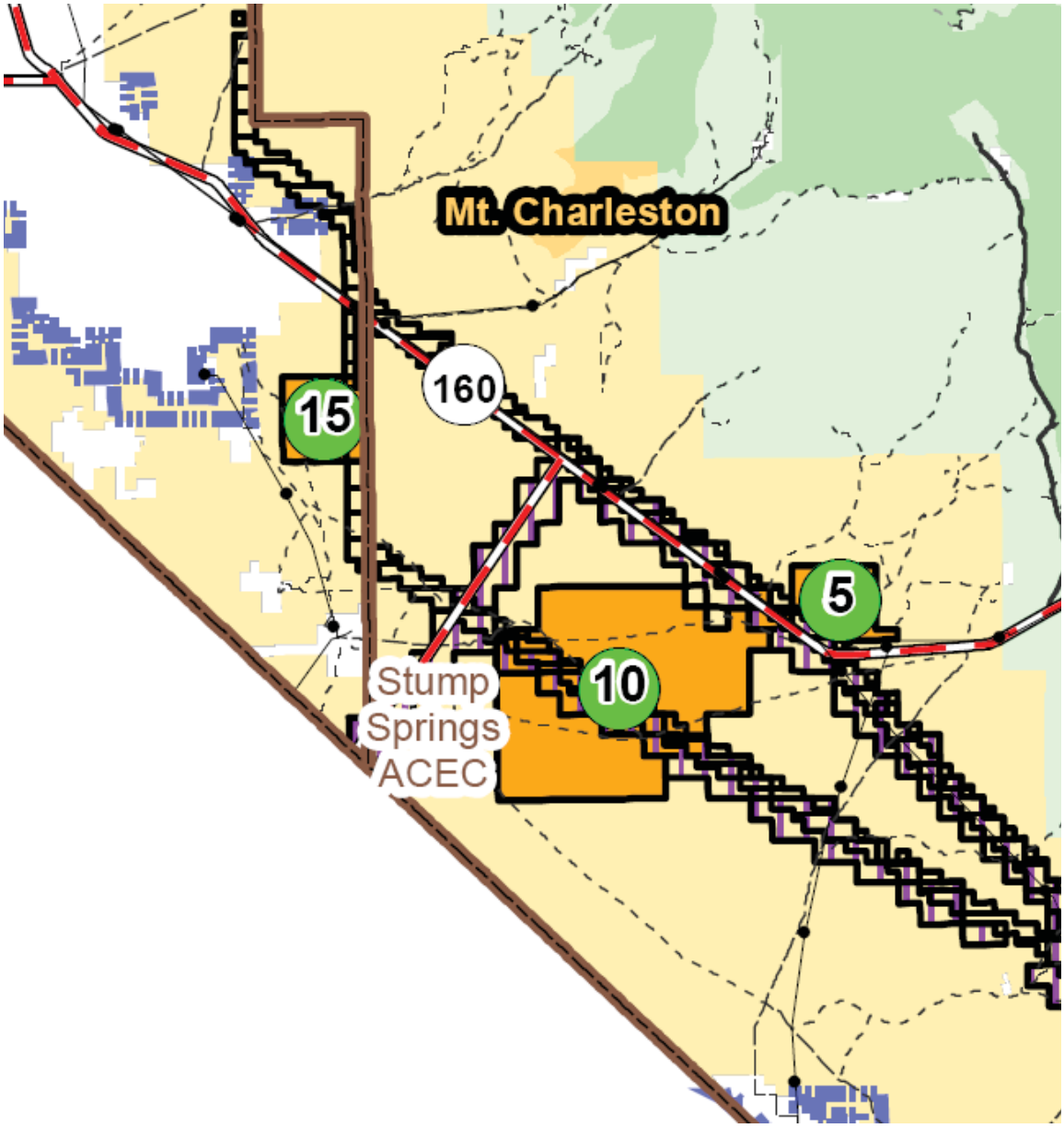
WATER SUPPLY

**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: (HHSG 2011a).

**WATER SUPPLY - FIGURE 25**

Hidden Hills Solar Electric Generating System (HHSEGS) - Projects considered for cumulative impacts analysis.



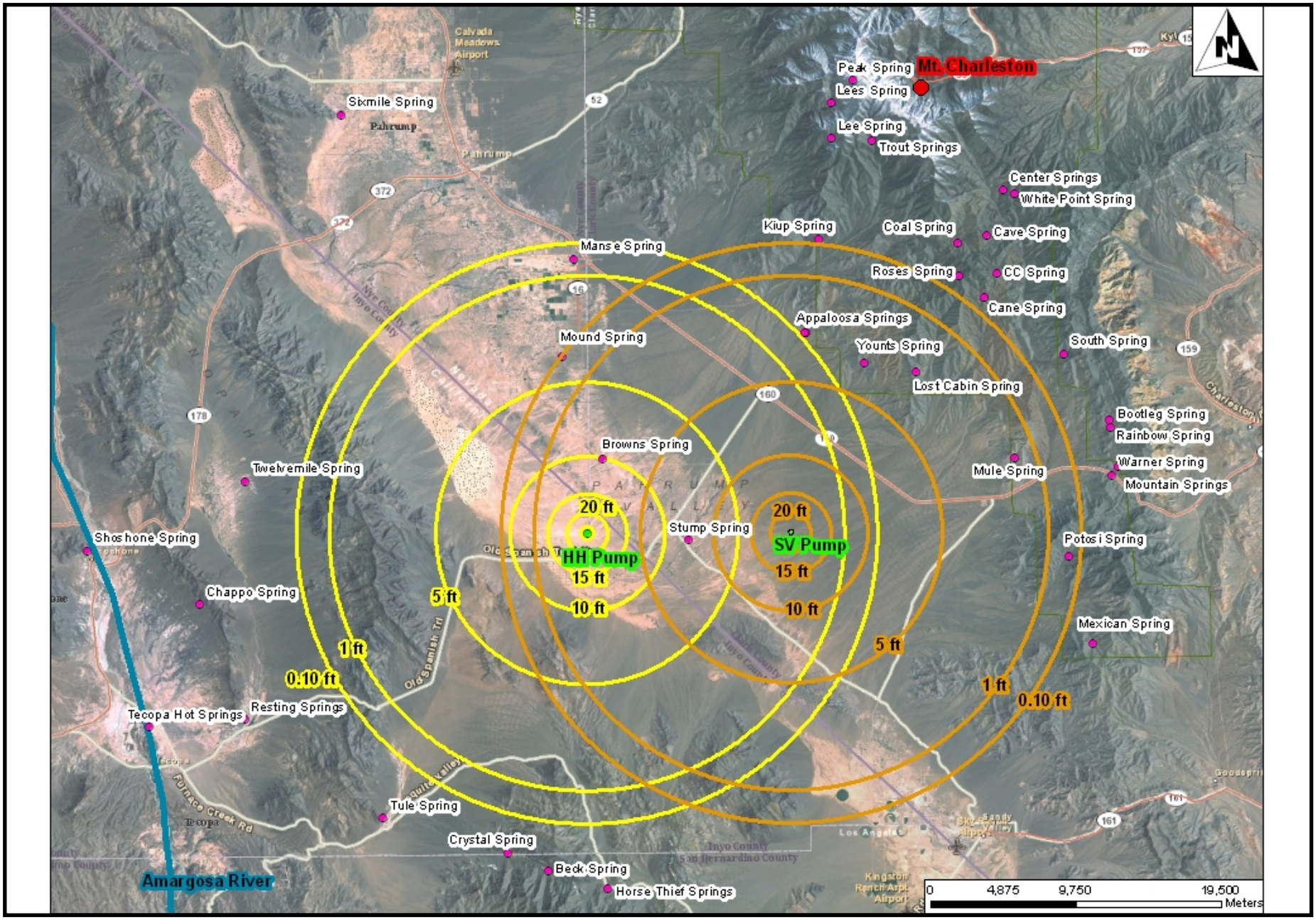

| | Applicant | Project Name | Serial Number | County | MW | Application Acres | Development Acres | Water Use (ac-ft/year) | Status |
|---|---|---|---|---|---|---|---|---|---|
| 5 | Pacific Solar Investments, Inc. | PSI Amargosa PV | NVN-084465 | Nye | 300 | 7,500 | 1,700 | 0 (offsite) | DEIS-Plan Amendment |
| 10 | Bright Sources Energy Solar Partners | Sandy Valley | NVN-090476 | Clark | 750 | 15,190 | - | 170 | application-POD |
| 15 | Element Power | PV Project | NVN-089655 | Clark | TBD | 2,560 | - | 5-7 | application-POD |

**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: Energy Commission Staff

**WATER SUPPLY - FIGURE 26**

Hidden Hills Solar Electric Generating System (HHSEGS) - This figure shows the superimposed cone of depression on the proposed site. Aquifer parameters used were T=3,153 gpd/ft, S=0.0025. Figure depicts 30 years of pumping at each project's center.

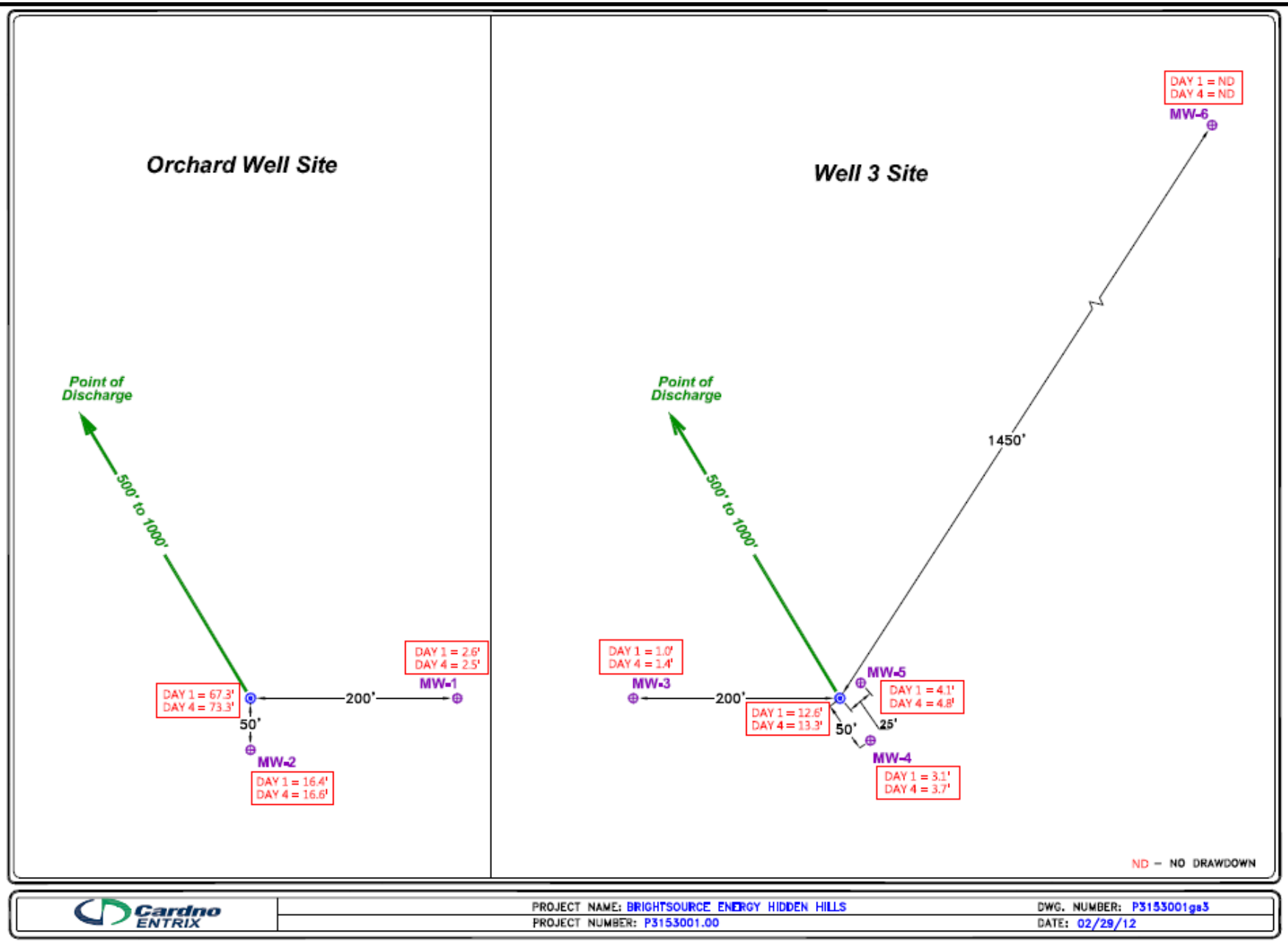



**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: Energy Commission Staff

**WATER SUPPLY - FIGURE 27**

Hidden Hills Solar Electric Generating System (HHSEGS) - Monitoring well layout for February 2012 aquifer performance test



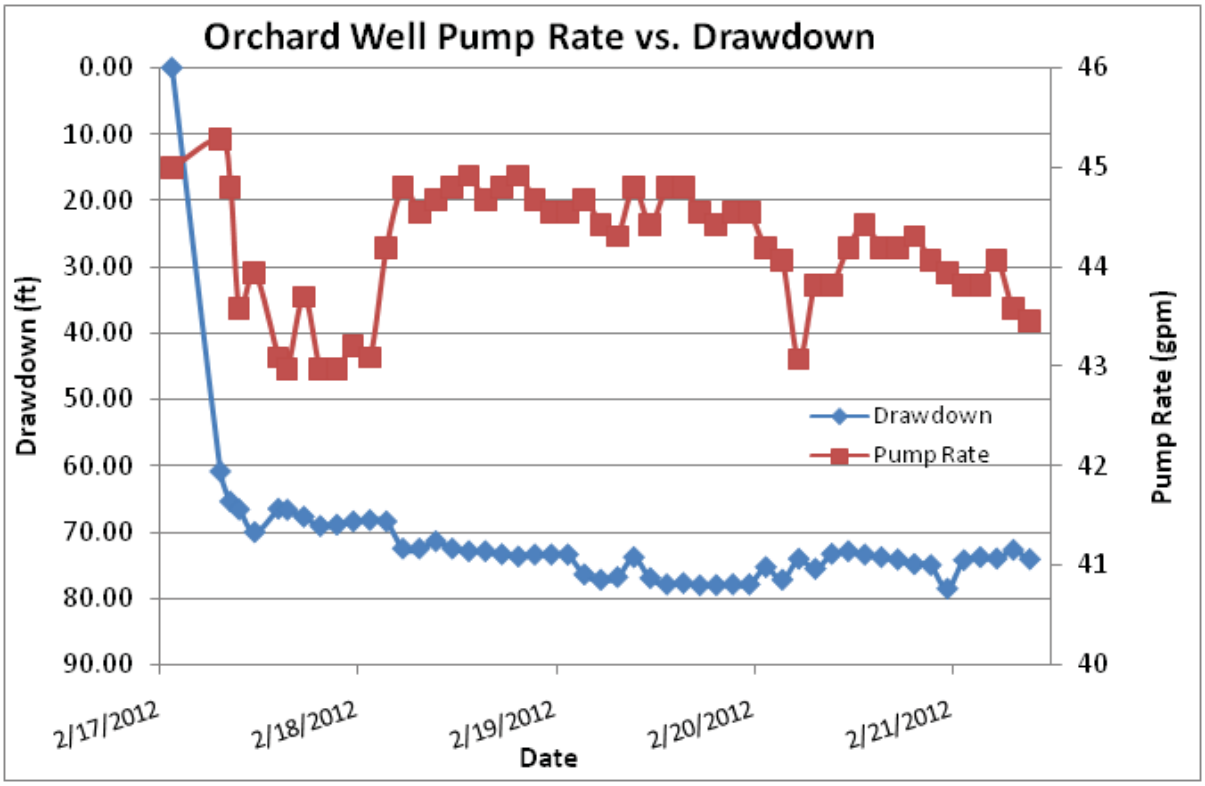

WATER SUPPLY

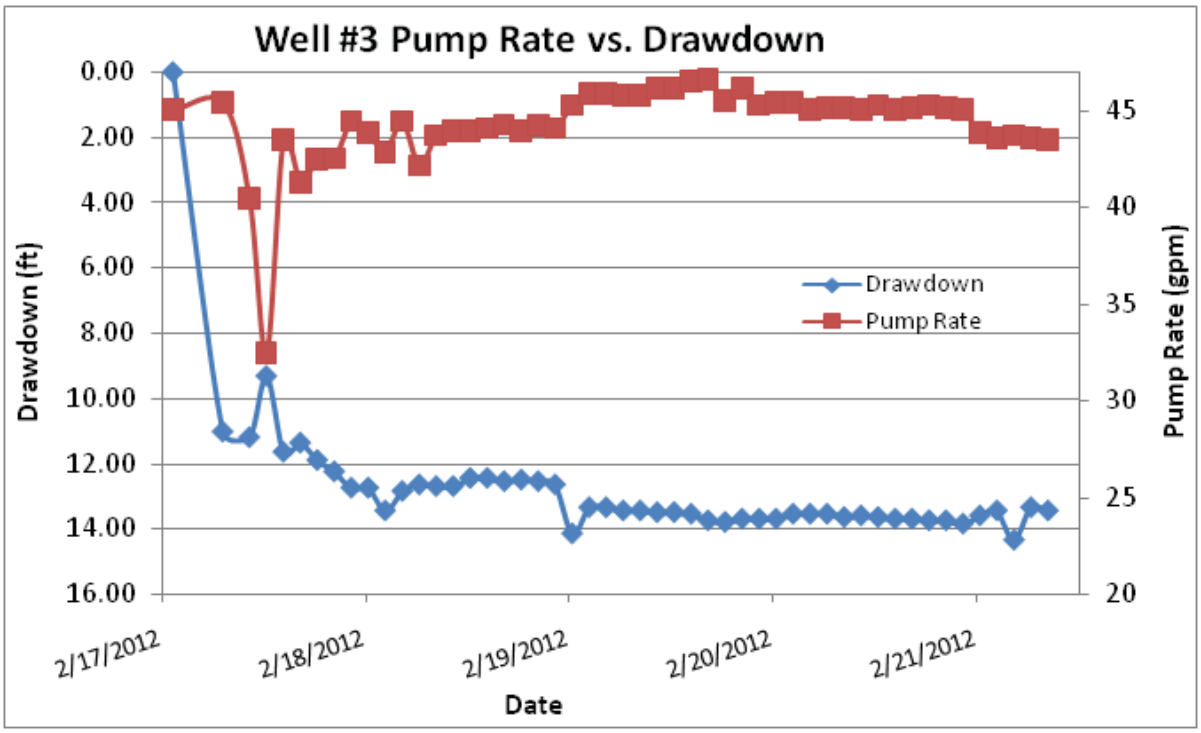
**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: (CH2, 2012l)

**WATER SUPPLY - FIGURE 28**
Hidden Hills Solar Electric Generating System (HHSEGS)

This figure shows the pump rates and associated drawdowns in each pump well during the February 2012 pump test.

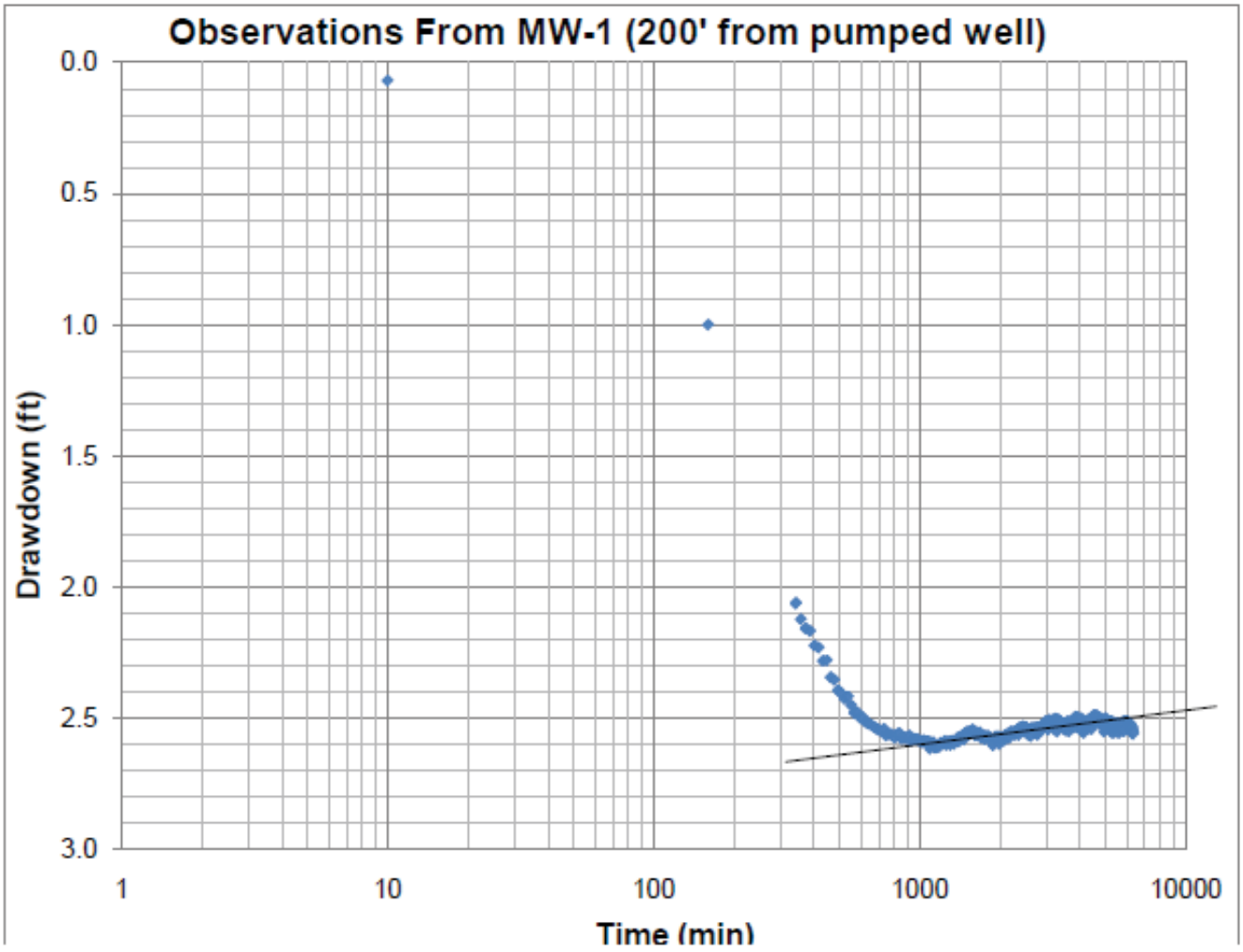



**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**
SOURCE: Energy Commission Staff

**WATER SUPPLY - FIGURE 29**

Hidden Hills Solar Electric Generating System (HHSEGS) - Observations from MW-1 indicate some recovery of water levels during the pump drawdown test.




**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: Energy Commission Staff

# WORKER SAFETY AND FIRE PROTECTION

Geoff Lesh, PE, and Rick Tyler

## SUMMARY OF CONCLUSIONS

Energy Commission staff (staff) have 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 **-6** 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 that it will 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.

The applicant provided the 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 Rescue Services (PVRS) 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 established. The SIFPD has not yet reviewed and commented on the FESNA.

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. However, staff requires the review and comment of the local SIFPD on the applicant's plans before completing a determination on the level of impact. The applicant and SIFPD have met -- and are continuing to meet -- to discuss how best to provide services and address impacts, but have not yet reached an agreement.

Staff expects to receive comments from SIFPD regarding potential impacts and suggested mitigation measures in the near future. Appropriate consideration of these comments will then enable staff to make the necessary detailed analysis of potential impacts and recommended mitigations (if the applicant and SIFPD fail to reach a mutual agreement).

Therefore, at this time, Staff is unable to recommend the project as being without unmitigated significant impacts. Most of the transmission line and natural gas pipeline linears are 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 will be conducted by BLM.

## INTRODUCTION

The proposed action evaluated within this Preliminary Staff Assessment (PSA) 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 southern 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 PSA 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's review and evaluate the local fire department capabilities and response time in each area and interviews the local fire officials to determine whether they feel adequately trained, manned, 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 a procedure 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 conduct an initial review of the fire department's position and either agree or disagree 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 3,277 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 (26 road-miles), and approximately 45 miles northwest of Las Vegas (**Project Description Figure 1**).

As proposed, HHSEGS would be comprised 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 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 (**Project Description Figure 2**).

## 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, and 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 use 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 published at 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 be comprised of 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;
- 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 staff has proposed additional requirements to proposed 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 has identified and 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.

## 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)(VF2010). Staff believe 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 has identified and 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 recent past 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. During the audits conducted by staff, most site safety professionals welcomed the audit team and actively engaged it in questions about the team's findings and recommendations. These safety professionals recognized that safety requires continuous vigilance and that the presence of an independent audit team provided a fresh perspective of the site.

## 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. The project will 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 will 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, 26 miles from the project site, would take about 30 to 40 minutes (HHSG 2011a, p. 5.16-21, 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. All firefighters in SIFPD have first response medical training called Basic Life Support (BLS) training. All personnel currently respond as volunteers who are on call 24 hours per day, seven days per week. 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).

SIFPD has mutual aid agreements with Pahrump Valley Fire-Rescue Service (PVFRS) and Round Mountain/Smoky Valley Fire Services and additional county resources as part of Nye County Emergency Services (NCES). SIFPD also has mutual aid agreements with Clark County (Las Vegas Fire Department) for responses requiring more assistance.

In an email from Larry Levy, Acting Chief of the SIFPD (CEC 2012h), and in a letter from William D. Ross, District Attorney 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.

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 did not include documentation of a major fire 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 fire required fire department response.

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, sometimes approaching a thousand workers. 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 50-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 given their mutual aid agreements with Inyo County (CEC 2011j). The Pahrump Valley Fire Rescue Services' Main Station in Pahrump, Nevada, is the closest Hazardous Material or "HazMat" responder. It is located 26 road miles from the project site, and has an approximately 40 minute response time. Nye County Emergency Services 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. The station 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, § 5.5.4.3). For more details on this topic, please see the **Hazardous Materials Management** section of this PSA.

Staff has considered the position of the SIFPD and all relevant information as well as past experience at existing solar power plants all of which have higher risk than the proposed HHSEGS. The proposed facility would be located in an area that is currently served by the SIFPD. The fire, hazmat, and EMS needs at the proposed plant are real and would pose significant added demands on local fire protection and emergency medical services. SIFPD is currently working on their own needs assessment and plan to meet with the applicant to have further discussions once the assessment is complete (CEC 2012h). The applicant has responded that they are currently in discussions with SIFPD and information regarding this data request (and details on any mutual agreement) will be provided in the near future. (CH2 2011d, p. 43).

### *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 an Energy Commission 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 bear 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 believes 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 believes that the potential for a large conflagration does not exist at HHSEGS.

## Emergency Medical Services Response

Staff conducted a statewide survey to determine the frequency of Emergency Medical Services (EMS) response to 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 response to staff's Emergency Medical Response Needs Assessment Form, SIFPD Acting Fire Chief, Larry Levy, stated that SIFPD would like to enhance their EMS in the Charleston View area to provide response times to the project site in the 5-10 minute range (CEC 2012h). 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. (see the **Socioeconomics** section of this PSA for additional analysis on Emergency Medical Response impacts and mitigation).

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 believe 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 has identified and 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 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 PSA.

## 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 expect 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' analysis for the construction and operation phases of this project, staff concludes that hazardous materials-related impacts from closure and decommissioning of the HHSEGS would be insignificant with respect to CEQA.

## CUMULATIVE IMPACTS

Staff considered the potential for impacts due to construction and operation of the proposed HHSEGS with other existing or foreseeable nearby facilities. 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 cannot determine whether they would cause a substantial adverse effect on local emergency services without first receiving review comments from SIFPD.

## COMPLIANCE WITH LORS

Staff concludes that construction and operation of the HHSEGS project with staff's proposed mitigation/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 (HHSEGS) 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 **-6** 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 that it will be significantly impacted (CEC 2012h) because of the magnitude of the proposed project and the large (relative to local population) workforce.

At staff's request, the applicant provided Fire and Emergency Services Risk and Needs Analyses (FESNA) on May 9, 2012 (CH2 2012z). The provided 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 Rescue Services (PVRS) 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 established. The SIFPD has not yet reviewed and commented on the FESNA Although there was a mutual aid agreement between SIFPD and PVRS in the past, there is not currently a formal agreement. Proposals between the districts are being reviewed with the intent to establish a formal agreement (Levy2012a).

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. However, Staff requires the review and comment of the local SIFPD on the applicant's plans. The applicant and SIFPD have met, and are continuing to meet, to discuss how best to provide services and address impacts, but have not yet reached an agreement.

Staff expects to receive comments from SIFPD regarding potential impacts and mitigation in the near future that will then enable staff to make the necessary detailed analysis of potential impacts and recommended mitigations, if the applicant and SIFPD fail to reach an agreement. Most of the transmission line and natural gas pipeline linears are located in Nevada on United State Bureau of Land Management (U.S. BLM) land. Therefore, the environmental and permit review of impact from the Nevada portion of the linears will 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.
- 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 concerning compliance of the program with all applicable safety orders. The Construction Emergency Action Plan and the Fire Prevention Plan shall be submitted to the Southern Inyo Fire Protection District for review and comment prior to submittal to the CPM for approval.

**Verification:** 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).

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 comment concerning compliance of the programs with all applicable safety orders. The Fire Prevention Plan and the Emergency Action Plan shall also be submitted to the Southern Inyo Fire Protection District for review and comment.

**Verification:** 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 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; and
- assure that all the plans identified in Conditions of Certification Worker Safety-1 and -2 are implemented.

The CSS shall submit in the Monthly Compliance Report 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 the project);
- 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.

**Verification:** 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.

**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 (including linear facilities) 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 60 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 provide a second access gate for emergency personnel to enter the site. This secondary access gate shall be at least one-quarter mile from the main gate. Plans for the secondary access gate and the method of gate operation shall be submitted to the Southern Inyo Fire Protection District for review and comment and to the CPM for review and approval.

**Verification:** At least sixty (60) days prior to the start of site mobilization, the project owner shall submit to the Southern Inyo Fire Protection District and the CPM preliminary plans showing the location of a second access gate to the site and a description of how the gate will be opened by the fire department. The final plan submittal shall also include a letter containing comments from the Southern Inyo Fire Protection District or a statement that no comments were received.

## 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

Levy2012a – Personal communication with Larry Levy, Fire Chief, Southern Inyo Fire Protection District, May 14, 2012

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

# Engineering

# Assessment

# FACILITY DESIGN

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)<br>American Society of Mechanical Engineers (ASME)<br>American Welding Society (AWS)<br>American Society for Testing and Materials (ASTM) |

**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 built on an approximately 3,277-acre land located 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).

## 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 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.

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 for 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 (including Inyo County Title 21 LORS[1] – INYO2011a), 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.

[1] Title 21, Chapter 21.20.20, (Development Standards for Renewable Energy Development) of the Inyo County Code -- http://qcode.us/codes/inyocounty/

## CONCLUSIONS AND RECOMMENDATIONS

The laws, ordinances, regulations and standards (LORS) identified in the AFC and supporting documents directly apply to the project.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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-built shall be provided to the CBO for retention by the CPM.

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.

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.

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.

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.

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.

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.

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.
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.

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 (including Title 21).

The CBO may deputize inspectors to carry out the functions of the code enforcement agency.

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.

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.

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.

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

HHSG 2011a – BrightSource Energy/J. Woolard (tn: 61756) Application for Certification, Volume 1 & 2. 08/5/2011

INYO 2011a – Inyo County/J. Hart (tn: 63054) Request for Agency Participation.11/29/2011

# GEOLOGY AND PALEONTOLOGY

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 effects of strong ground shaking on the HHSEGS structures must be mitigated, to the extent practical, 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 believes that the potential for significant adverse cumulative impacts to project facilities from geologic hazards during its design life is low. Similarly, staff believes the potential for significant adverse cumulative impacts to potential geologic, mineralogic, and paleontologic resources from the construction, operation, and closure of the proposed project, is low. 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, to the extent practical.

## 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 negatively affected, evaluate the potential of the project construction and operation to impact the resources and provide mitigation measures as necessary to ensure that there would be no consequential adverse impacts to significant 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 monitoring and mitigation measures for geologic hazards and geologic, mineralogic, and paleontologic resources, with the proposed Conditions of Certification.

## 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 | Protects and permits collection of paleontological resources on federal lands; requires inventory, assessment of effects, and mitigation if appropriate. |
| National Environmental Policy Act of 1969 | Prevents or eliminates damage to the environment. |
| Omnibus Public Land Management Act of 2009, Title VI—Department of the Interior Authorizations, Subtitle D—Paleontological Resources Preservation | Causes the management and protection of paleontological resources on Federal land using scientific principles and expertise. Requires appropriate plans for inventory, monitoring, and the scientific and educational use of paleontological resources, in accordance with applicable agency laws, regulations, and policies. |
| **State** | |

| Applicable Law | Description |
|---|---|
| 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 | Requires that impacts on paleontological resources be assessed and mitigated on all discretionary projects, public and private. |
| **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. |

## 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 south of Pahrump, Nevada and approximately 45 miles west of Las Vegas, Nevada. As detailed in the **PROJECT DESCRIPTION SECTION** of this PSA, the project 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, 19 transmission towers, 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 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 northwest. 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 3,227 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 abandoned 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 (X) (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 (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 potential for significant adverse direct or indirect impacts from the project to potential geologic and mineralogic resources would be low.

## 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 has developed a recommended potential fossil yield classification system that offers a more detailed system of evaluating the likelihood that a given geological unit may yield fossils (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. |
| 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. |

**Geology and Paleontology Table 2**
**SVP Paleontological Sensitivity Ratings (Sensitivity) and Equivalent Potential Fossil Yield Classifications (PFYC) Consistent with BLM Guidelines**

| Sensitivity (PFYC) | **Definition** |
|---|---|
| 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 conducted an initial 5 day long site reconnaissance followed by a day of monitoring the excavation of 10 geotechnical test pits in the project area (HHSG 2011a §5.8-10).

The site reconnaissance 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 reconnaissance, 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 area, 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 reconnaissance, 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 reconnaissance and subsequent field investigation, it was noted that a blanket of Holocene, alluvial silty sand appears to mantle an 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 reconnaissance 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 dry lake 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 any time potential fossils are recognized by either the paleontologist 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 CEC 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.

## 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% 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 ~ 30 km of dextral offset along the fault since ~13 Ma, which translates to a minimum long-term geologic slip rate of ~ 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 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 are 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 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 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 FACILITY DESIGN.**

## 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.

## FINDINGS OF FACT (LIFTED FROM THE CARLSBAD PMPD…FOR YOUR CONSIDERATION)

Based on submitted findings from the applicant, we make the following findings:

1. Several northwest-striking active and potentially active faults are present in the project area and throughout the Peninsular Ranges Geomorphic Province.

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 project site is located within Seismic Zone 4, which is the most active seismic designation under the California Building Standards Code (CBSC).

4. The primary geologic hazards that could affect the project include intense levels of earthquake-related ground shaking and settlement due to expansive clays.

5. **CONDITIONS GEN-1, GEN-4, GEN-5, AND CIVIL-1 OF THE FACILITY DESIGN** section of this Decision 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 depth of the Santiago Foundation beneath the project footprint, before project design can be finalized.

6. **CONDITIONS GEN-1, GEN-4, GEN-5, AND CIVIL-1 OF THE FACILITY DESIGN** section of this Decision 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.

7. The evidence assumes that liquefaction, lateral spreading, dynamic compaction, hydrocompaction, landslides, flooding, tsunamis, and seiches pose low or negligible project risks but this assumption must be confirmed by the site-specific geotechnical investigation referenced above in **FINDINGS #7, #8, AND #9.**

8. There is no evidence of existing or potential geologic or mineralogic resources at the project site or along the linear alignments.

9. 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.

10. To mitigate any potential impacts to newly discovered paleontologic resources during excavation and construction, the project owner will implement 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.

11. 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.

## 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 FOLLOW IN PAL-1 THROUGH PAL-7**. It is staff's opinion that the likelihood of encountering paleontologic resources would be high in areas where dry lake 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.

**PAL-1** The project owner shall provide the Compliance Project Manager (CPM) with the resume and qualifications of its 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 the 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 he or she 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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**GEOLOGICAL RESOURCES - FIGURE 3**

Hidden Hills Solar Electric Generating System (HHSEGS) - Geomorphic Provinces

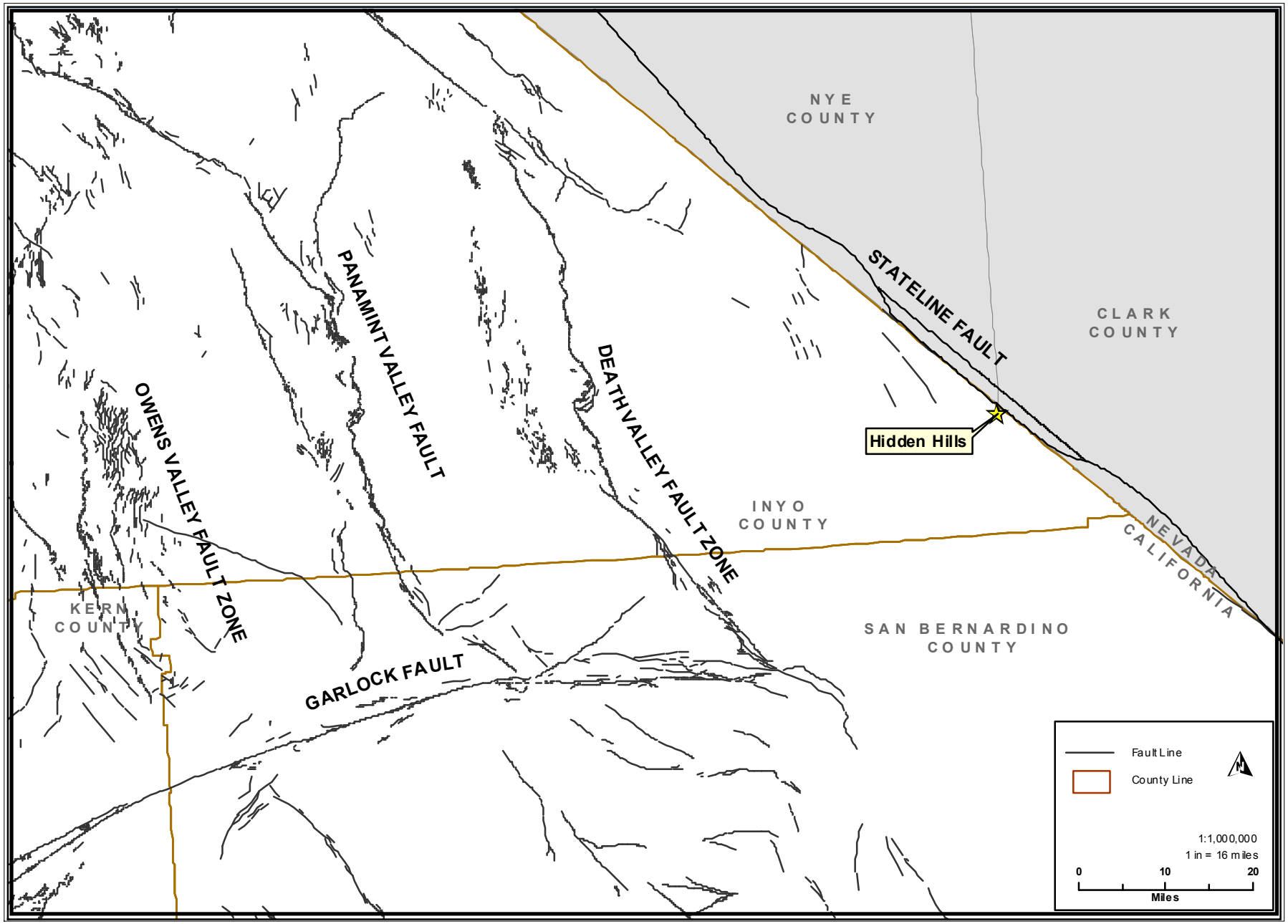



**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: California Department of Conservation, California Geological Survey, 2002.

**GEOLOGICAL RESOURCES - FIGURE 2**

Hidden Hills Solar Electric Generating System (HHSEGS) Regional - Fault Map



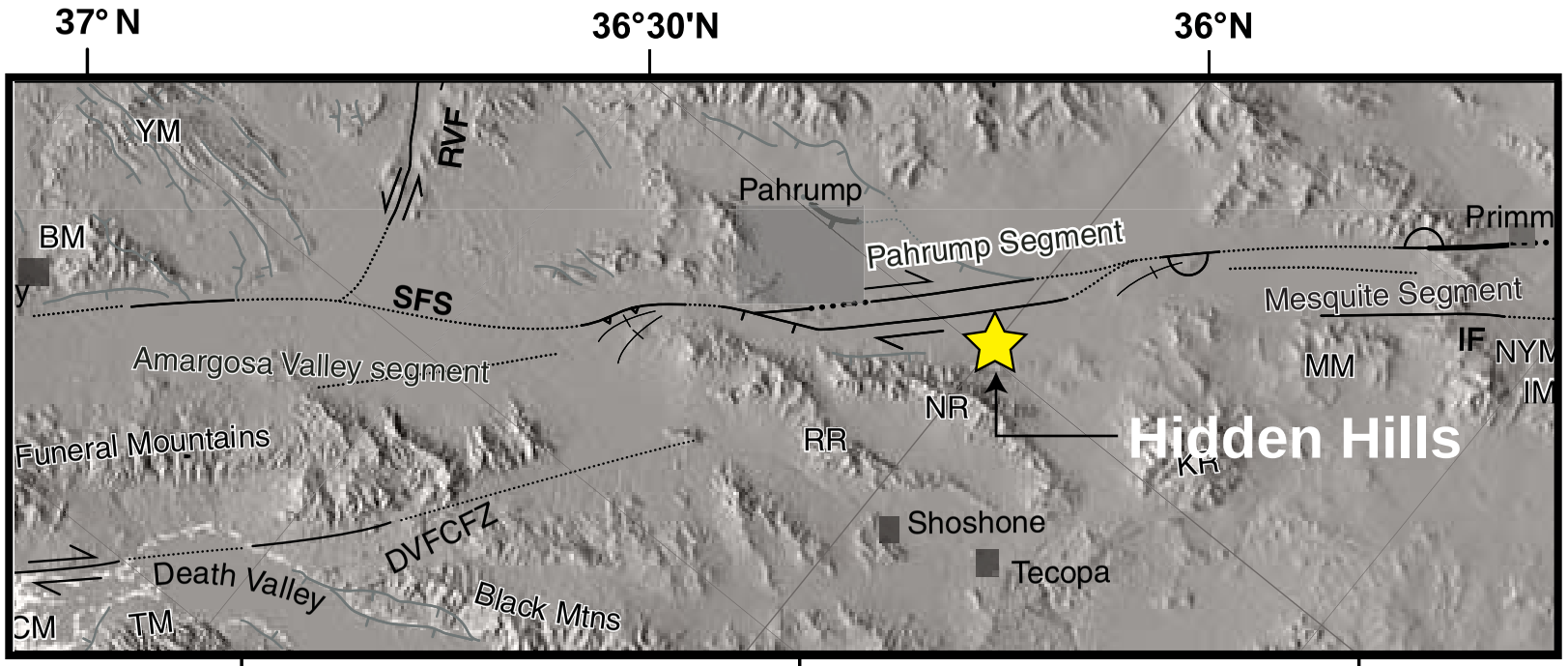

GEOLOGICAL RESOURCES

**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 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 4

Hidden Hills Solar Electric Generating System (HHSEGS) - General Geologic Map

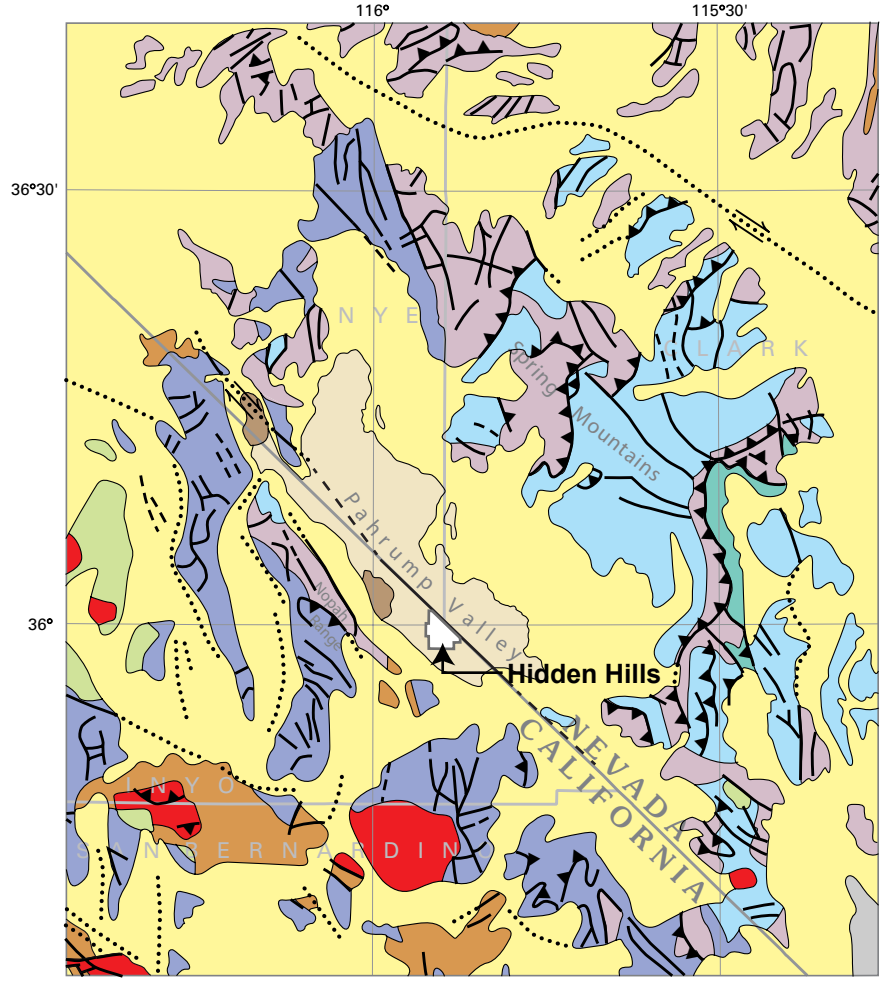
### EXPLANATION

**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

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 6.5 acres per MW of power output, a figure lower 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 capacity. The project would use the solar thermal power tower technology 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 3,277 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.

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), this effect is accounted for. 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**, immediately following.) 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 heliostats (mirrors) 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 3,277 acres. Each solar field would consist of arrays of parabolic mirrors, one solar receiver steam generator (SRSG), one steam turbine generator, and an air-cooled condenser (HHSG 2011a, AFC §§ 1.1, 2.1, 2.2.5).

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 % of the heat from the sun (HHSG 2011a, AFC Appendix Table 5.1B-13R).

## 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 757,500 million British thermal units (MMBtu) (HHSG 2011a, AFC Appendix Table 5.1B-13R); equal to roughly 5 % 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 % (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. Natural gas supply pipeline for HHSEGS would connect to a Kern River Gas Transmission (KRGT) pipeline approximately 35.3 miles southeast of the project site. A tap station on the main KRGT transmission pipeline would be installed at that interconnection point. 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 gas for this project. Staff believes that there would be adequate natural gas supply and pipeline capacity to meet the project's needs.

## 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 **ALTERNATIVES** section of this document 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 % 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 uses.

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.

As this is written, there are currently 11 solar power plant projects that are going through the Energy Commission siting process or have been licensed by the Energy Commission. These projects' power and energy output, and the extent of the land occupied by them, 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 3,277 acres (HHSG 2011a, AFC §§ 1.1, 1.2.1, Appendix Table 5.1B-13R).

Staff calculates power-based land use efficiency thus:

**Power-based efficiency**: 500 MW ÷ 3,277 acres **= 0.15 MW/acre** or **6.5 acres/MW**

Staff calculates energy-based land use efficiency thus:

**Energy-based efficiency**: 1,432,000 MWh/year ÷ 3,277 acres = **436 MWh/acre-year**

As seen in **EFFICIENCY TABLE 1**, HHSEGS, employing the power tower technology, is less efficient in use of land than the Beacon Solar Energy Project, which uses the linear parabolic trough technology, but slightly more efficient than Genesis Solar Energy Project, which also uses the linear parabolic trough technology. Also, HHSEGS is more efficient in use of land than the Ivanpah SEGS project which employs the same technology as HHSEGS, and the Calico Solar and Imperial Valley Solar projects which would employ the Stirling Engine technology.

Based on information regarding several solar PV (photovoltaic) projects (see **ALTERNATIVES** section of this document), the expected average occupied land per MW of output is approximately 6 acres/MW. Compared to 6.5 acres/MW for HHSEGS, PV is only slightly more land-use efficient and does not present a clear superiority in terms of land-use efficiency.

## 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.

# POWER PLANT RELIABILITY

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.

[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.

## 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 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.

## 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

[2] Auxiliary boilers will supplement power generation when solar insolation drops below the level required to keep the turbines online.

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 36-inch natural gas supply pipeline for HHSEGS would connect to a Kern River Gas Transmission (KRGT) pipeline approximately 35.3 miles southeast of the project site (**Project Description Figure 6**). A tap station on the main KRGT transmission pipeline would be installed at that interconnection point. 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 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 from three onsite wells for plant service needs, steam boiler makeup, heliostat washing, and fire protection. To save water in the site's desert environment, each solar plant would use a dry-cooled condenser. 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). 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

[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.

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), staff believes there are no concerns with power plant functional reliability due to flooding. For further discussion, see **Water Quality & Hydrology**, **Water Resources** and **Geology and Paleontology**.

## 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

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

Sudath Edirisuriya and Mark Hesters

## SUMMARY OF CONCLUSIONS

The proposed Hidden Hills Solar Electric Generating Station (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.

Staff does not have a complete description of the proposed interconnection for the HHSEGS. The Application for Certification (AFC) and the California Independent System Operator's (California ISO) Phase I and Phase II interconnection studies describe an interconnection to the Eldorado Substation. At the April 26, 2012 workshop, the applicant indicated that the interconnection had changed, and that instead of interconnecting to the Southern California Edison (SCE) Eldorado Substation, the HHESEGS would be interconnecting to the Valley Electric Association's (VEA) Gamebird Substation. The applicant has not yet provided the description of the new interconnection facilities or the VEA interconnection study.

Staff is therefore unable to complete its analysis of the HHSEGS without the complete project information on the switchyard, generation tie line and the interconnection impacts as analyzed in the VEA interconnection study.

## 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 California Environmental Quality Act (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 SCE's 230-kV transmission network and requires both analysis by SCE and the approval of the California ISO.

## SCE'S ROLE

SCE is responsible for ensuring electric system reliability in its service territory for proposed transmission modifications. For the HHSEGS project and at the request of the

California ISO, SCE performed the Cluster Study Phase One and Phase Two 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 Cluster Study Phase One and Phase Two 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 SCE's Eldorado 230kV or Valley Electric Association's Tap substation. Therefore, California ISO conducts the studies of the SCE system to ensure adequacy of the proposed transmission interconnection. The California ISO determines the reliability impacts of the proposed transmission modifications on the SCE 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 SCE Cluster 4 Phase One 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 Hidden Hills Solar Electric Generating Project (HHSEGP) 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 297 MW SRSGs will generate maximum plant net output of 540 MW. Each SRSG auxiliary load would be 27 MW, resulting in a maximum net output of 270 MW at a 90 percent power factor. Each SRSG unit would be connected to the low side of its dedicated 18kV/230kV and 190/253/315 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 HHSEGP Switchyard through an underground segment of 230kV, 1000 kcmil, copper per phase cable and overhead segment of 230kV, 795 kcmil ACSR per phase conductors.

Each of the project onsite generator–tie lines will be constructed underground from the power block through the heliostat field until reaching the HHSEGP switchyard. 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 HHSEGP 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 SCE's Eldorado 230kV substation. (HHSEGP, 2011a section 3.0 pages 3-1 to 3-10 and Figure 3.2-1, 3.2-2R).

## INTERCONNECTION FACILITIES

The applicant proposes a 230kV, 1272 kcmil, ACSR per phase single circuit generator-tie line to interconnect the power plant switchyard to the grid. There are two proposed generator tie-line each would be rated to carry the full output of the project. Under either option, the generator tie-line leaves the State of California boarder 900 feet from the HHSEGP switchyard when it crosses over the eastern border of the project site.

Option 1:
The Tecopa Road/SR 160 option would require an approximately 10-mile long generation tie-line from plant switchyard to the proposed Valley Electric Association's Tap substation. Additionally, this option includes 230kV single circuit approximately 28.1 miles long from the Tap substation into the town of Pahrump and a 2 acre switch on private land with a one mile long connection to the Eldorado substation. This option is viable only if the Tap substation and the associated transmission lines ultimately become part of the California ISO balancing authority area, pursuant to the VEA's current plans.

Option 2:
The Eldorado generator-tie line option would follow the same 10 mile long single 230kV circuit to the Tap substation and would continue as a 230kV circuit for approximately 53.7 miles to the Eldorado substation in Boulder City, Nevada.(HHSEGP, 2011a section 3.0 pages 3-1 to 3-10 and Figure 3.2-1, 3.2-2R, TSE-1 and TSE-2)

## Assessment of Impacts and discussion of mitigation

For the interconnection of this proposed project to the grid, the interconnecting utility (SCE or 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 queue Cluster 4 (QC4) Phase One interconnection study was performed by SCE in coordination with California ISO to identify the transmission system impacts caused by the Cluster 4 projects on SCE's 115/230/500-kV system. The study included power flow, sensitivity, and short circuit studies, and transient and post-transient analyses (Queue Cluster 4 Phase 1 Draft Report). The QC4 study base cases were developed from the same power flow base cases that were utilized in performing the QC3 interconnection studies representing peak and off-peak conditions. The base cases were developed to represent stressed scenarios of loading and generation conditions for the study group area, based on 2015 load forecast. The QC4 study included the modeling of all California ISO approved transmission projects in the East of Pisgah area base cases. In addition, a number of transmission upgrades needed to support load growth and queued ahead generation projects in SCE's East of Pisgah area were modeled in order to determine if additional facilities would be needed to support the QC4.These base cases included all California ISO approved higher queued Serial Group, Transition Cluster, QC1, QC2 and QC3 generation projects with associated Network upgrades and Special Protection Systems. The detailed study assumptions are described in the study.

The individual study modeled the proposed project for a net output of 540 MW. The project power flow studies were conducted with and without HHSEGP connected to SCE's grid at the Eldorado 230kV substation, using 2015 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 for Eldorado using the 2015 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 HHSEGP would overstress existing substation facilities.

Project study assumptions:
The following facilities are required due to the interconnection of the project.

These facilities will be installed by SCE and are included in this Phase One study.

- The segment of 220kV generator tie line inside the Eldorado substation property line.
- The segments of each one of the two generator owned telecommunications channels inside the SCE owned Eldorado substation property line.
- The required revenue metering cabinet and retail load meters as determined by the local retail service provider.

These facilities are to be installed by the interconnection customer and are not included in the Phase One study.

- The 220kV generator tie line from the generating facility to the last structure outside the Eldorado substation property line.
- The 220kV generator tie line optical ground wire (OPGW) and an additional Fiber Optic Pole line to provide to diverse route telecommunication paths required for the line protection relays and the special protection system.
- The required California ISO metering equipment.
- The metering voltage and current transformers installed for the California ISO metering will also be used for the SCE owned retail meters.
- The following line protection relays to be installed at the generating facility end of the 220kV generator tie line;
    - One G. E. L90 current differential relay with dual dedicated digital communication channels to SCE owned Eldorado Substation.
    - One SEL 311L current differential relay with dual dedicated digital communication channels to SCE owned Eldorado substation.
- The following SPS relays to be installed at the generating facility;
    - Two N60 relays (one each for SPS A and B) to trip the main generator breaker.
    - One SEL-2407 Satellite Synchronized Clock.

## Deliverability Assessment

California ISO performed an on-peak deliverability assessment. The deliverability assessment results for category "A", "B", "C" are detailed in the East of Lugo group report.

Category A

Overload: Eldorado-Mc McCullough 500kV circuit one was overloaded at 103% of its rated capacity under the pre project base case.

Mitigation: The following 500kV network upgrades are recommended to mitigate the impacts on Los Angeles Department of Water and Power transmission lines:

- Build new Eldorado-Nipton No.2 and No.3 500kV lines.
- Build new Nipton-Pisgah No.2 and No.3 500kV lines with VAR compensation.
- Build new Pisgah-Rancho Vista 500kV line with VAR compensation.
- Build new Pisgah-Serrano 500kV line with VAR compensation.

Category B

No mitigation has been identified for the Category B overloads because mitigation of the Category A overloads would eliminate the Category B overloads.

Overload: Lugo-Victorville No.1 500kV tie line with LADWP was overloaded to 146% of its rated capacity due to the outage of Nipton-Pisgah 500kV circuit one.

Overload: Eldorado-McCullough 500kV tie line with LADWP was overloaded to 121% of its rated capacity due to the outage of Mohave-Pisgah 500kV circuit one.

Overload: Eldorado-NSO 220kV transmission line was overloaded to 143% of its rated capacity due to the outage of the Eldorado-Mc McCullough 500kV circuit one.

Overload: Mc McCullough-NSO 220kV transmission line was overloaded to 125% of its rated capacity due to the outage of Eldorado McCullough 500kV circuit one.

Overload: Lugo-Pisgah 500kV transmission line was overloaded to 137% of its rated capacity due to the outage of Lugo-Pisgah 500kV circuit one.

Mitigation: The recommended mitigation is to upgrade the terminal equipments at Lugo substation to boost the thermal ratings of Lugo Pisgah 500kV lines.

Overload: SCE owned Eldorado 500/220kV AA banks were 105% overloaded due to outage of Ivanpah-Nipton 220kV transmission line.

Overload: Ivanpah/Primm/Eldorado/Merchant 220kV system case divergence occurred due to loss of any single SCE owned Eldorado 500/220kV AA transformer bank.

Mitigation: The recommended mitigation for the above two overloads is to build a new Ivanpah-Nipton 220kV line. This will improve the load flow pattern in the area and get rid of the power flow divergence issues.

Category C

Overload: Lugo-Victorville 500kV tie line with LADWP was 153% overloaded due to outages of Lugo-Pisgah 500 kV double circuits.

Overload: Eldorado- McCullough 500kV tie line with LADWP was 150% overloaded due to outage of Lugo-Pisgah double circuits.

Mitigation: To mitigate the above two overloads the following major 500kV network upgrades are recommended.

- Build new Eldorado-Nipton No.2 and No.3 500kV lines.
- Build new Nipton-Pisgah No.2 and No.3 500kV lines with VAR compensation.
- Build new Pisgah-Rancho Vista 500kV line with VAR compensation.
- Build new Pisgah-Serrano 500kV line with VAR compensation.

## Reliability Network Assessment

The delivery network upgrades recommended are not adequate to mitigate all the overloads identified. Therefore Special Protection Schemes (SPS) have been proposed as mitigations for the inadequate delivery network upgrades.

SPS-1:
Expand existing Eldorado Bulk System SPS triggered by higher queued projects in the Eldorado Bulk System.

Previously identified generator tripping SPS triggered by higher queued projects in the Eldorado Bulk System needs to be modified to mitigate the Eldorado-McCullough 500kV line overloads for the Eldorado-Nipton 500kV transmission line N-2 outages or the Nipton-Eldorado 500kV transmission line N-2 outages.

SPS-2:
Modify the existing Eldorado AA banks SPS triggered by higher queued projects in Ivanpah/Primm/Eldorado/Merchant 220 kV system.

Previously identified generator tripping SPS triggered by higher queue projects in the Ivanpah/Eldorado 220kV system needs to be modified so as to mitigate the 500/220kV AA banks overloads for the outage of either AA Banks at the future SCE owned Eldorado 220kV bus and the outage of the new Ivanpah-Nipton 220kV line.

SPS-3:
New generator tripping SPS for the Nipton-Pisgah double 500kV line outages.

A new SPS is recommended to trip generation in order to mitigate the overloads on the remaining Nipton-Pisgah double 500kV line for the N-2 of any Nipton-Pisgah 500kV lines outages.

## Power Flow Analysis

The group study indicated that the project contributes to the following transmission facility overloads or non-convergence problems. The details of the analysis and overloads levels are provided in the group study.

Category A
Both (1AA or 2AA) future SCE Eldorado 500/ 220 kV transformers.
Eldorado-McCullough 500kV transmission line (LADWP owned)

Category B
Both (1AA or 2AA) future SCE Eldorado 500/ 220 kV transformers.
Both (1AA or 2AA) future SCE Pisgah 500/ 220 kV transformers.
Eldorado-McCullough 500kV Transmission line (LADWP)
Lugo-Victorville 500kV transmission line (jointly owned with LADWP)

There were no non-convergence issues identified by addition of this project with all proposed system upgrades.

Mitigations: Facility upgrades are necessary to address the problems identified above. These upgrades involve both Reliability network and Delivery network upgrades and are describe in the group study.

## Short Circuit Analysis

Short circuit studies were performed to determine the fault duty impact of adding the QC4 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 QC4 is determined.
All bus locations where the QC4 projects increase the short-circuit duty by 0.1 kA or more and where duty is in excess of 60% of the minimum breaker nameplate rating are listed in the group report Appendix H. As discussed in the group report, the QC4 breaker evaluation identified overstressed circuit breakers as follows;

- Four, 40kA, 500kV CBs at Valley substation.
  Mitigation: Install eight sets of 500kV TRV capacitors at Valley substation.
- Two, 50kA, 220kV CBs at Antelop substation.
  Mitigation: Install four sets of 220 kV TRV capacitors at Valley substation.
- Six, 50kA, 220kV CBs at Colorado substation.
  Mitigation: Install twelve sets of 220kV TRV capacitors at Colorado River substation.
- Five, 25.1kA, 220kV CBs at Kramer substation.
  Mitigation: Replace five 220kV CBs at Kramer substation.
- Eight, 50kA, 220kV CBs at Redondo substation.
  Mitigation: Replace eight 220kV CBs at Kramer substation.
- Fourteen, 50kA, 220kV CBs at Vista substation.
  Mitigation: Install twenty-eight sets of 220kV TRV capacitors at Vista substation.

## 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 QC4 projects in the east of Pisgah area.

### 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 QC4 generation projects.

The study identified that with the addition of QC4 projects and upgrades in place to mitigate base case and outage related overload problems, no new transient instability problems were identified in the East of Pisgah area. Post-transient studies conducted for similar or larger generators in the area concluded that voltage remains stable under both N-1 and N-2 contingencies.

## COMPLIANCE WITH LORS

Staff is unable to make a LORS determination until the updated VEA Phase I Study and the updated information on the switchyard equipment, switchyard location and point of interconnection is provided by the applicant.

## RESPONSE TO AGENCY AND PUBLIC COMMENTS

No agency or public comments related to the TSE discipline have been received.

## CONCLUSIONS AND RECOMMENDATIONS

Staff is unable to complete its analysis of the HHSEGS without the complete project information on the switchyard, generation tie line and the interconnection impacts as analyzed in the VEA interconnection study.

## 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, 1998, 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 HHSEGP project will be interconnected to the SCE grid via a 220-kV, 1272 kcmil per phase, and approximately 64 miles long single circuit (generator- tie line). The proposed HHSEGP 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 agreed 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 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

[1] Worst-case conditions for the foundations would include for instance, a dead-end or angle pole.

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.

California ISO (California Independent System Operator). 1998b. Cal-ISO Dispatch Protocol. Posted April 1998.

California ISO (California Independent System Operator). 2002a. Cal-ISO Grid Planning Standards. February 2002.

HHSEGP (Hidden Hills Solar Electric Generating Project-Q714). 2012a. Brightsource Energy, Inc., Hidden Hills Ranch (Queue Cluster 4 Phase One Interconnection Study Report) submitted to the California Energy Commission.

HHSEGP (Hidden Hills Solar Electric Generating Project). 2012b. Brightsource Energy, Inc., Hidden Hills Ranch (Queue Cluster 4 phase One Draft Report) submitted to the California Energy Commission.

HHSEGP (Hidden Hills Solar Electric Generating Project). 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.

# ALTERNATIVES

Jeanine Hinde

## INTRODUCTION

This analysis is being prepared to evaluate 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.

Many of the sections that follow provide analyses comparing the potential environmental impacts of the project alternatives to the impacts that would occur with implementation of the proposed HHSEGS project. Additional analyses will be completed for publication in the final staff assessment (FSA) for the proposed project, including an evaluation of the environmentally superior alternative, in accordance with the California Environmental Quality Act (CEQA).

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 these five 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)

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 are not considered potentially feasible alternatives to the proposed project are presented in **Alternatives Appendix-1** 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]). 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:

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 (Cal. Code Regs., tit. 14, § 15124[b]).

The Energy Commission's underlying purpose is to continue to fulfill its role in implementing 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]).

In accordance with applicable legislative mandates, the project objectives, as identified in this staff assessment, are 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) 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 manner that will avoid or minimize significant environmental impacts to the greatest extent feasible.
- Obtain site control and use within a reasonable time frame.

Although these project objectives are generally consistent with the project objectives set forth by the project applicant, they have been altered to facilitate staff's analysis of a reasonable range of potentially feasible alternatives, including alternatives that may not be preferred by the project applicant. The project applicant's original project objectives are listed in the "Executive Summary" of the AFC for the HHSEGS project (BrightSource Energy 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 (BrightSource Energy 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 (BrightSource Energy 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. [2] |

Source: BrightSource Energy 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).
[2] The linears for the Sandy Valley alternative may be comparable to those proposed for the HHSEGS project. The transmission line alignment for the proposed project has not yet been determined.

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; 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 (BrightSource Energy 2011a). 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 to 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 (BrightSource Energy 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.

As described in the AFC, 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 AFC states that 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 is not retaining 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.

Several issues and potential environmental impacts are identified 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" (BrightSource Energy 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."

## 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 energy servers or solid oxide fuel cells) in the analysis of project alternatives* – A discussion of bloom energy servers is included in **Alternatives Appendix-1**, "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 of distributed generation is included in **Alternatives Appendix-1**, "Other Renewable Energy Technologies."

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.

## 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-MW renewable energy facility to be constructed and operated in the Barstow renewable energy study area and determined the alternative to be potentially infeasible. *Energy efficiency* strategies are critical to reducing energy consumption in the state, however, no particular regulatory program or confluence of conservation strategies can be specifically identified and implemented as an alternative to the proposed project. Energy efficiency measures alone would not satisfy the project objectives. A discussion of energy efficiency is provided below to acknowledge the importance of achieving 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 preliminary renewable energy study areas (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<br>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 | — |
| 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 (U.S. Bureau of Land Management 2006).

The amended CDCA plan established a 1.0 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 (U.S. Bureau of Land Management 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 (U.S. Bureau of Land Management 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 2012). Projects mapped in the east side of the Barstow RESA include the 1,500-acre Riverbluff Photovoltaic (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 utility-scale 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 potentially infeasible.

## 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 potentially infeasible.

## Energy Efficiency

*[This subsection will provide a discussion on cost-effective energy efficiency in the state. This subsection will be published in the FSA for the proposed project.]*

# 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 five 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)

The proposed HHSEGS project would contribute to a net reduction in greenhouse gas (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-2**. **Alternatives Appendix-3** contains a list of staff contributors to the comparative analysis of alternatives.

The Energy Commission has the exclusive authority to license 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.

The proposed HHSEGS site is currently undeveloped, vacant private land. The Charleston View area, including the project site, was previously subdivided into small- and medium-size parcels, and evidence remains showing a dirt road grid system at the site. Most of the project site is subdivided into 20-acre parcels. However, no significant development occurred, no improvements were implemented, and no infrastructure was brought to the site.

In a February 16, 2012, letter from Inyo County addressing socioeconomic impacts of the proposed project, it 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." The lack of a water source will continue to restrain development in the Charleston View area. (Refer to the **WATER SUPPLY** section of this staff assessment for a discussion of groundwater conditions in the Pahrump Valley.) Inyo County staff's ideas for future uses of the site may not be realized for many years, and it is not presently known how the infrastructure issues (e.g., water supply) would be resolved to allow such land uses to be implemented.

The potential exists for minor land use changes to occur at the site (e.g., construction of a few residences). However, it is unknown whether the County would issue a well permit for a new residence. 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.

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, continued anthropogenic uses (e.g., unauthorized recreational uses) would cause a slow, continuous degradation of the site that would affect plant and wildlife assemblages by reducing the abundance and health of the habitat system. Impacts on all special-status species, 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, groundwater levels would probably continue to decline. The Pahrump Artesian Aquifer underlying the proposed project site has been in overdraft since the last century (Buqo 2004). Despite this decline, impacts on groundwater dependant plants and wildlife species under the No-Project Alternatives would be **much less than the proposed HHSEGS project**. While no collision or singeing/burning impacts would occur to avian species, ongoing habitat degradation and aquifer decline would impact avian species to some degree. These impacts would also be **much 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, potential soil erosion could result from occasional vehicle use, and the possibility of litter could cause contamination of storm water runoff. 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). Despite this decline, impacts from potential drawdown of local wells and impacts on groundwater basin balance would be **much less than HHSEGS**.

## SANDY VALLEY OFF-SITE ALTERNATIVE

### Overview

This alternative would consist of constructing and operating a 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, at 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.

On February 9, 2012, the project applicant responded to staff's data requests for additional information on a potential off-site alternative in the Sandy Valley area (BrightSource Energy 2012). 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 the 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 owned by BLM. The remaining approximately 2,697 acres are in private ownership. Staff estimates that the properties listed in **Alternatives Table 3** are owned by 24 individual owners.

**Alternatives Table 3** lists property owners for the parcels shown in **Alternatives Figure 3**.

**Alternatives Table 3**
**Landowners at the Sandy Valley Off-site Alternative**

| Assessor’s Parcel Number | Owner | County | Acres |
|---|---|---|---|
| 04835005 | American Gear Reduction Inc. | Inyo | 151.84 |
| 04835006 | Anderson Trust, Mildred R. Est. | Inyo | 38.96 |
| 04835018 | Gibson Trust | Inyo | 53.33 |
| 04835019 | Gibson, Gail F. | Inyo | 55.80 |
| 04835020 | Ewaldt Trust, Barbara F. | Inyo | 54.74 |
| 04835021 | Spear Trust, James & Debera | Inyo | 40.86 |
| 04835022 | 5-C Living Trust | Inyo | 41.06 |
| 04835023 | Khong, Bachhong | Inyo | 41.24 |
| 04835024 | Dance Trust, Blaine & Joan | Inyo | 41.04 |
| 04835025 | Price, Basil M. | Inyo | 40.71 |
| 04835026 | Colon, Reynaldo (¼ int.) | Inyo | 40.51 |
| 04835027 | Beltram, Reagan A. (½ int.) | Inyo | 40.69 |
| 04835028 | Newton, Rosemary | Inyo | 40.89 |
| 04835033 | Tongsiri, Bhichai & Pratharm | Inyo | 41.33 |
| 04835034 | Tongsiri, Bhichai & Pratharm | Inyo | 39.13 |
| 04835035 | U.S. Bureau of Land Management | Inyo | 124.38 |
| 04835037 | Addink Turf Farms, Inc. | Inyo | 164.28 |
| 04835038 | Sandy Prem 3 LLC | Inyo | 163.49 |
| 057229101 | Rosequist, Layne | San Bernardino | 40.50 |
| 057229102 | Rosequist, Layne | San Bernardino | 40.50 |
| 057229104 | Government Land | San Bernardino | 53.32 |
| 057229105 | Austin, Linda | San Bernardino | 80.63 |
| 057229106 | Xie, Jinxin | San Bernardino | 40.62 |
| 057229107 | Politis, Cristobal | San Bernardino | 40.61 |

| Alternatives Table 3<br>Landowners at the Sandy Valley Off-site Alternative | | | |
|---|---|---|---|
| **Assessor's Parcel Number** | **Owner** | **County** | **Acres** |
| 057229108 | Rhodes, Steven M. | San Bernardino | 162.65 |
| 057229109 | SPSV 3 LLC | San Bernardino | 160.34 |
| 057229110 | SPSV 2 LLC | San Bernardino | 40.77 |
| 057229111 | SPSV 2 LLC | San Bernardino | 38.86 |
| 057229113 | SPSV 2 LLC | San Bernardino | 81.62 |
| 057229129 | Spear, James A. | San Bernardino | 37.29 |
| 057229130 | Austin, Linda L. | San Bernardino | 36.02 |
| 057230101 | Rosequist, Layne | San Bernardino | 159.88 |
| 057230102 | Government Land | San Bernardino | 479.65 |
| 057230105 | J & S Real Estate & Investment LLC | San Bernardino | 161.97 |
| 057230119 | Rhodes, Steven M. | San Bernardino | 162.52 |
| 057230120 | Rhodes, Steven M. | San Bernardino | 163.32 |
| 057230125 | Spear Trust DTD | San Bernardino | 81.03 |
| 057230135 | Spear Trust DTD | San Bernardino | 18.52 |
| 057230136 | Spear Trust DTD | San Bernardino | 59.50 |
| | | Total | 3354.41 |
| Source: San Bernardino County Parcel GIS Data, 2010, San Bernardino County ISD/GIS, retrieved 1/12/2012, from <ftp://gis1.sbcounty.gov/>. Inyo County Parcel GIS Data, 2012, Inyo County Planning Commission, retrieved 2/24/2012. | | | |

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 14.5 or 15.5 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 would meet the project objectives related to construction and operation of a utility-scale renewable electrical generation facility, which would lead to sales of renewable energy and contribute to achieving California's renewable energy goals. This alternative would also satisfy the project objectives addressing the requirement to comply with applicable LORS and avoid or minimize significant impacts to the greatest extent feasible. See the discussions below under, "Environmental Analysis," for general analyses of the potential environmental impacts and mitigation measures pertaining to this alternative.

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 ramped both 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., the current MW output or operating range of the resource) (CAISO 2012).

**Alternatives Table 4** shows the relative flexibility of different types of electrical power generation facilities, including two types of natural gas-fired power plants. The information in the table is conceptual.

**Alternatives Table 4**
**Relative Flexibility of Different Types of Electrical Power Generation Facilities**

| Type of Electrical Power Generation Facility | Relative Flexibility[1] |
|---|---|
| Simple Cycle Natural Gas | High |
| Combined Cycle Natural Gas | Medium |
| Solar Thermal with Energy Storage | Medium |
| Solar Thermal without Energy Storage (HHSEGS) | Low-Medium |
| Solar Photovoltaic | Very Low |
| Wind | Very Low |

Source: Energy Commission staff

[1] For this table, relative flexibility is generally rated from very low to high, with very low representing *minimally flexible* and high representing the *most flexible* of the energy generation facilities presented in the table.

*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)[1].

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.

Energy storage can provide flexible and controllable *ancillary services* at the transmission level through voltage support and frequency response (output-to-input ratio), and can store excess energy when online generation exceeds load (Energy Commission 2011b)[2]. Adding thermal storage to a concentrating solar power plant can result in generation of dispatchable electricity depending on daily resource constraints. Relative flexibility for solar thermal with energy storage is considered medium (**Alternatives Table 4**).

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. 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. This increases operational flexibility during daylight hours. Relative flexibility for solar thermal without energy storage is considered low to medium (**Alternatives Table 4**).

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 provide minimal relative flexibility (**Alternatives Table 4**) and, in fact, increase the need for other flexible resources to assist in the integration of these variable resources.

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

[1] 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.

[2] Ancillary services help balance demand and supply fluctuations, maintain grid conditions within prescribed limits, and provide reserves for unexpected events over different time horizons (Energy Commission 2011b).

proposed project to become potentially 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 would likely satisfy four of the six project objectives. This alternative would partially 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's data requests to the project applicant included 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" (BrightSource Energy 2012). In other responses to staff's data requests, the applicant states the following:

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 (BrightSource Energy 2011b).

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 original project objectives, which are listed in the "Executive Summary" of the application for certification for the HHSEGS project (BrightSource Energy 2011a). The applicant's project objectives have been altered to facilitate staff's analysis of a reasonable range of potentially feasible alternatives, and the objective addressing the targeted date for commercial project operations has not been considered in this analysis. See the discussion above under, "Alternatives Screening."

CEQA requires the discussion of alternatives to "focus on alternatives to the project or its location which are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly" (Cal. Code Regs., tit. 14, § 15126.6[b]). The alternatives analysis cannot be limited to alternatives that would satisfy only the applicant's project objectives. The project objectives cannot be so narrow as to render all project alternatives potentially infeasible.

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 potentially 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. The possible requirement to amend the CDCA plan and obtain a right-of-way grant for the three parcels that are owned by BLM 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 (BrightSource Energy 2012). 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" (BrightSource Energy 2012). 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 recently 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

### 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. Commuting workers could also drive 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 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 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 briefly toured the Sandy Valley Off-site Alternative study area on January 19, 2012. The dominant land use is agriculture, with a network of irrigation drainages and pivots, and wind rows between crop fields. The California Natural Diversity Database (CNDDB) for the Sandy Valley study area (DFG 2012) was reviewed before the site visit. Goodding's phacelia (*Phacelia pulchella* var. *gooddingii*), a special-status plant, is recorded in the study area. No special-status wildlife species are recorded in the study area. Staff notes that the area has probably not been surveyed; therefore, negative CNDDB results are inconclusive. Mesquite bosques, another sensitive community, are mapped south of the Sandy Valley Off-site Alternative site, and these areas could be impacted by declines in groundwater supply. 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**.

Impacts on the desert tortoise (*Gopherus agassizii*), which is state and federally listed as threatened, would be **much less than HHSEGS**, as little native vegetation exists to support this species. 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 conditions of certification.

Operational impacts of the proposed project would mainly affect avian species, including raptors. Operational impacts would be **similar to or slightly less than HHSEGS**. While agriculture can attract certain species of birds and bats, the species that utilize agriculture are typically common wildlife species, such as pigeons and common raven. Impacts would stem from loss of habitat, collisions with project features, and burning or singeing from solar flux. These impacts would be **similar to or slightly**

**less than HHSEGS**. Feasible mitigation measures to reduce operational impacts on avian species to below a level of significance have not yet been developed; therefore, this impact would be significant and unavoidable.

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 seemingly not to as great an extent as the decline in Pahrump Valley. Declines in groundwater levels could impact special-status plants, wildlife, and other protected natural features such as desert wash habitat. 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 to reduce the level of significance for impacts on water resources are being recommended. (Refer to the **Water Supply** section 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 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 also contributed key information. Absent more intensive research focused narrowly on the Sandy Valley Off-site Alternative site, the conclusions of this analysis must be considered to have a significant margin of error.

The discussions below of the environmental contexts and of the potential effects of the proposed project on cultural resources suggest that the effects of the Sandy Valley Off-site Alternative would be **somewhat greater than those of the proposed HHSEGS project**.

## Environmental Setting

### *Natural Setting*

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 12,000 years, the minimum timeframe for a human presence in the Mojave Desert. The climate of the Mojave Desert since the late Pleistocene epoch (prior to 10,000 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 the early Holocene epoch (10,000 years ago to present) as the climate progressively became more arid. 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 it marks 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, 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 can found in the "Cultural Resources" section of this staff assessment. The background information provided as the broader prehistoric context for the site of the proposed project can be applied to the alternative site as well.

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 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 that are 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 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, 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 site of the proposed project can be applied to the alternative site as well.

The Sandy Valley area is within the Pahrump Paiute Tribe's ancestral territory. The valley rests between two tribal districts. To the east of the alternative site rests the Potosi District traditionally represented by Chief To-ko'-pur. Chief To ko'-pur was widely referred to as Chief Tecopa. Chief Tecopa was also the head Chief for the larger seven district ancestral territory of the Pahrump Paiute tribe. Chief Tecopa passed away in 1904. To the west of the project area is the Mo-quats District that was represented by Chief Hu-nu'na-wa. The Sandy Valley study area was a common use 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. These springs 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. While Pahrump tribal families have since moved away from the springs, with many now residing in Pahrump or Las Vegas, 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*

The valley is traversed by various historic-era transportation corridors/roads, spotted with late 19th century homesteads, and mines and mining related features. The Sandy Valley Off-site Alternative site is between the Goodsprings and Ivanpah mining districts and within the Old Spanish Trail-Mormon Road corridor. Goodsprings Mine is located approximately 15 miles east and Ivanpah Mine is approximately 40 miles south of the Sandy Valley alternative site.

## Extant Alternative Site Information

### *Cultural Resource Inventory*

Results of the records searches conducted for the Sandy Valley Off-site Alternative would appear to indicate a relative dearth of cultural resources on the alternative site. There is, however, a record of only one previous investigation for the alternative site (Knight and Leavitt 2003). The investigation was an intensive pedestrian survey done in conjunction with a land exchange among the American Gear Reduction Company, the Barstow Field Office of the Bureau of Land Management (BLM), and Death Valley National Park. The total area subject to survey was approximately 3,747 acres. That area was split among six discontiguous survey parcels. Parcels 2 and 3 (Knight and Leavitt 2003, Survey Area Maps 2 and 3 of 4, respectively) of the study cover a total of approximately 573 acres of the Sandy Valley Off-site Alternative. A total of approximately 17.1 percent of the 3,354-acre alternative site has therefore been subject to prior survey. 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, recorded as one historical archaeological isolate, that appear to date to the 1940s (CHRIS Primary No. 36-020488); and the remains of what appears to be an historic irrigation ditch (CA-SBR-12123H). Study of available maps and remote imagery reveal a few scattered homes on the alternative site as well as a sod-farming operation. The buildings on site appear to consist of non-historic age single-family homes and associated structures (e.g., sheds, detached garages, etc). Historic aerials show the circular patterns of the sprinkler

systems appearing after 1958. The 1989 aerial shows only one of the six circles in use at that time.

The results of the effort to gather cultural resources information on the alternative site are broadly consistent with the cultural resources inventory that one would anticipate, given our present general knowledge of the prehistory and history of the area. The prehistoric materials, largely sparse, isolate chipped stone debris and, rarely, small, more diverse deposits of chipped stone, groundstone, and fire-affected rock 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 (buildings, structures, and linear infrastructure elements) on the alternative site appear to represent scattered single-family residences and buildings and infrastructure related to mid- to late 20th century sod-farming operations. A segment of an apparent wagon road that has been identified as the 1880s Hay Road terminates outside of the alternative site at the site's south-central boundary. No further evidence of the road has been identified on the alternative site.

The use of the known inventory of archaeological and built-environment resources on the alternative site to properly assess the potential effects of the construction and operation of the alternative facility on those resources requires that the limitations of the extant data be identified and taken into account. The archaeological data represents an approximately 17.1 percent sample that is weighted heavily toward the floor of Mesquite Valley and away from the valley margins where prehistoric archaeological deposits are more likely to be found. The sample, therefore, may underrepresent the actual number of archaeological resources on the alternative site. Conversely, the mid- to late 20th century use of large areas of the alternative site for sod-farming is likely to have disturbed or obliterated surface prehistoric and historical archaeological deposits in those areas and may have led to the loss of the valley margin resources that the survey sample may underrepresent. Sod-farming may have also obliterated the segment of the Hay Road that appears to have traversed the site alternative. A pedestrian survey of the balance of the alternative site would be necessary to verify the extent of the sod-farming and to note the locations and the 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 would also function as a potential index of the distribution of subsurface archaeological resources. No information on the geoarchaeology of the alternative site is presently available to Energy Commission staff. This lack of information and the limitations of the one extant pedestrian survey sample make the assessment of the potential presence of subsurface archaeological deposits and the potential effects of the alternative facility on any such deposits quite problematic. A built-environment reconnaissance or survey would be necessary to verify the results of the staff analysis of available maps and remote imagery.

Exhaustive studies have also not been conducted to identify all ethnographic resources in and around Sandy Valley. However, several resources were identified in the course of conducting broader ethnographic studies related to the site of the proposed project, approximately 15 miles northwest of the Sandy Valley Off-site Alternative site. The following lists and describes 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 problematic to discuss the likelihood or character of any relatively intact, historically significant cultural resources that may be present on the alternative site or in the geographic area in which the alternative facility would have the potential to affect such resources. A broad-stroke synthesis of the cultural resources that may be on the alternative site and that would have the potential to be historically significant, for information and associative values, includes any 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. Built-environment resources on the alternative site, on the basis of the information that staff has to date, appear unlikely to be determined historically significant.

A number of linear cultural resources probably traverse the alternative site and extend out from it. Linear resources such as prehistoric trails or historic wagon roads, which have the potential to be historically significant for their information and associative values, have probably been subject to significant degradation on the alternative site as a result of recent sod-farming, while the off-site portions of those resources, depending on the nuances of local land use history, may be largely intact. On-site trail and road segments would most likely not retain enough integrity to contribute to the potential historic significance of the longer resources of which they are a part. Off-site segments may well retain such integrity. The alternative site and near vicinity fall within the broad 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 may contribute to the historic significance of this National Historic Trail may exist within sight of the Sandy Valley Off-site Alternative site and would, therefore, need to be taken into account.

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 the vicinity of it. Off-site archaeological deposits and built-environment resources that may be determined historically significant for their associative values have the potential to be subject to this visual degradation. On the basis of the information that staff has to date, 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 appear to be present toward the valley margin. It is difficult to envision how individual resources like these would be found to be historically significant for their associative values, but staff believes that a multiple-deposit district of such resources, were such a district to be present in the vicinity of the alternative site, does 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 taken into account. Staff's cursory analysis of available satellite imagery and interpretation of visual vegetation association signatures also 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.

Staff believes, on the basis of the records search data that encompasses a substantial portion of the unincorporated community of Sandy Valley, Nevada, that there are unlikely to be historically significant built-environment resources on which the construction of the alternative facility would have a visual effect.

### *Environmental Effects and Resultant Mitigation Measures*

The construction and operation of the Sandy Valley alternative facility has the potential to physically disturb and visually degrade historically significant cultural resources both on and near the alternative site. On the alternative site, the construction of the facility has the potential to alter or destroy the integrity of the information for which individual prehistoric and historical archaeological sites may be of value. Any such alteration or destruction would require mitigation for the loss of those data sets for which each individual archaeological deposit had been found to be significant. Such mitigation typically includes data recovery excavations as at least one mitigation component. The visual effects of the alternative facility on any historically significant prehistoric or historical archaeological districts that may be identified in the near vicinity of the alternative site or on the potential Pahrump Metapatch Mesquite Woodland-Coppice

Dune Archaeological Landscape analog to the southeast of the site would also require mitigation as result of the potential degradation to the setting, feeling, and association of 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. What the character of the specific mitigations for the degradation or loss of such associative values would be are more difficult to foresee, because the mitigation for each resource would be tailored to that resource's unique associative values. Example mitigations might range from higher resolution resource recordation to the dissemination of our knowledge about subject resources through public outreach materials to compensatory mitigation such as the purchase and conservation of comparable resources.

Staff presently believes that any effects that the construction and operation of the alternative facility would have on built-environment resources would primarily occur in the vicinity of, rather than on the alternative site. There is only one known built-environment resource on the alternative site as described above. Only remnants of historic era activity remain on the site in the form of 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 presently unconfirmed, although the integrity of such resources on the alternative site are thought, most likely, to not have retained enough integrity to contribute to the potential historic significance of the longer resources of which they are a part. Segments adjacent to or near the alternative site may, in theory, retain such integrity, and may therefore require mitigation similar to that described above for archaeological resources as a result of the potential degradation or loss of their respective associative values.

The potential for the construction and operation of the alternative facility to affect ethnographic resources in a significant manner is presently difficult to assess. Further focused study would definitely contribute to 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. On the basis of the information presently available to staff, an obvious conclusion would be that the alternative facility would constitute an intrusive visual element in Sandy Valley and would degrade the viewsheds both from and toward Potosi Mountain and the Kingston Mountains. A more comprehensive analysis would be necessary to concretely 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. Staff believes that the alternative facility has the potential to introduce intrusive visual elements into Sandy Valley the scale of which would exceed that of any other visual elements introduced in the valley to date. If further analysis were to confirm this belief, it would become necessary to mitigate the potential degradation to the integrity, to the setting, feeling, and association, that significant ethnographic resources would suffer. Example mitigations might range from thorough ethnographic investigations to contextualize, document, and interpret the subject resources to other measures the purpose of which would be to facilitate the preservation of Pahrump Valley Paiute culture. Ultimately, staff believes that no feasible

amount of mitigation would resolve the significant visual effects of the alternative facility on the local ethnographic resources. A group of viewsheds 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 has the potential to have a somewhat greater negative effect on prehistoric and historical archaeological resources than would be the case for the proposed project. The alternative site appears to 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 presently known on the site of the proposed project. The effects of the alternative facility on archaeological resources away from the alternative site would appear to be comparable to the effects of the proposed project on such resources. The visual effects of the alternative facility 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 conclusion with regard to archaeological resources is that the on-site effects of the alternative facility would appear to be **somewhat greater than those of the proposed project**, and the off-site effects would appear to be **similar to HHSEGS**.

#### *Built-environment Resources*

With regard to the built-environment cultural resources, the development of a solar facility on the site of the Sandy Valley alternative would most likely have a **similar level of effect when compared to that of the proposed project**. Both have 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 would serve to better qualify this comparison.

#### *Ethnographic Resources*

Staff believes that the potential effect of the alternative facility on ethnographic resources in Sandy Valley, to the extent that staff presently understands those resources, would be **similar to the effects of the proposed project** on analogous resources in the Pahrump Valley. It appears that no feasible amount of mitigation would resolve the significant visual effects of either the alternative facility or the proposed project on local ethnographic resources. Two groups of viewsheds 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 has determined that the impacts on local services would be **similar to HHSEGS** 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. Coordination is continuing between the local fire district and the project applicant to resolve fire protection issues and determine mitigation measures (e.g., payment of fees) necessary to reduce the level of impacts related to fire protection. The FSA for the proposed HHSEGS project will include further information on the impact conclusions related to fire protection.

## 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 project 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. Staff did not identify any significant off-site impacts posed by hazardous materials use at the proposed HHSEGS facility. This determination would not change under this alternative. This impact 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. **Alternatives Table 3** lists property owners for the parcels 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 describes Inyo County requirements to ensure consistency of the proposed project with the Inyo County General Plan (Inyo County 2012b). 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 2012b).

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 if they are processed. Construction and operation of a 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[3] 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.

[3] 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.

### *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.

### *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 located 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.

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 the three parcels 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." Compliance of this alternative with the NEMO Plan would 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. Farming in the Mesquite Valley generally works because of low land values, an available groundwater supply, and a potential market for the crops that are produced (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, approximately 715 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, but staff can only make a conclusion about the degree of the impact after closely evaluating this alternative based on measured existing ambient noise levels in the area and a noise modeling analysis showing the expected project noise levels at the nearest noise-sensitive receptors.

### *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**. 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 boundaries 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 (Brightsource Energy 2012).

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 (BrightSource Energy 2012). 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 (BrightSource Energy 2012). 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 the alternative project.

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 which jurisdiction the project's buildings were located.

The beneficial impact through construction employment and increased taxes and fees would be the **same as 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 access routes 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 (BrightSource Energy 2012).

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 (2,744 daily trips are predicted for *peak month 14* under the proposed project) would have a significant impact on the structural integrity of Sandy Valley Road and Pahrump Road, and could pose a significant public hazard 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 reduce impacts to roadways and to ensure that potential hazards 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. 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 subsection, “Traffic and Transportation,” and Appendix TT 1, “Glint and Glare Safety Impact Assessment,” 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 being proposed to ensure that potential glint and glare effects are avoided.

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**) (BrightSource Energy 2012). 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 the 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 1.0 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 20 percent of the area in the study area is 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 may require remediation. (Refer to the discussion above under, "Potential Conversion of Agricultural Land," for details on agricultural land uses at the Sandy Valley Off-site Alternative site.) 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**. Conditions of certification would be required to reduce any potentially significant impacts to less than significant.

## Soil and Surface Water

Water resources staff participated in a brief 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 impacts on water supply to less than significant.

## 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).

Similar to 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 2012a). 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 (BrightSource Energy 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 2012a). **Alternatives Figure 7** shows an artist's rendering of a power tower project with molten-salt storage.

Several online news sources report on BrightSource Energy's plan to add energy storage to three of its power purchase agreements (PPAs) with Southern California Edison Company (SCE). The two sites under consideration are in the Mojave Desert; one site is south of Ludlow and the other is in Johnson Valley outside of a popular off-road vehicle recreation area (Press-Enterprise 2012b).

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 is developing RSEP on approximately 1,500 acres of private land in the Colorado Desert in eastern Riverside County. Construction is expected to start in late summer 2012.

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 2012a). 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.

Fossil fuels consisting of either propane or compressed natural gas 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 2010b). 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 2012a). 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 would meet the project objectives related to construction and operation of a utility-scale renewable electrical generation facility, which would lead to sales of renewable energy and contribute to achieving California's renewable energy goals. This alternative would also satisfy the project objectives addressing the requirement to comply with applicable LORS and avoid or minimize significant impacts to the greatest extent feasible. See the discussions below under, "Environmental Analysis," for general discussions of the environmental impacts and conclusions pertaining to this alternative.

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 relative to the proposed HHSEGS project. As shown in **Alternatives Table 4**, the SPT

with Energy Storage Alternative would provide the greatest operational flexibility of the renewable technologies listed in the table.

To accomplish the proposed electrical capacity of 500 MW, this alternative would 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. For BrightSource Energy's two proposed SPT projects without energy storage—HHSEGS and the Rio Mesa Solar Electric Generating Facility (SEGF)—land use efficiency is roughly 7.0 acres per MW. Land use efficiency would be reduced under this alternative. In other words, the SPT with Energy Storage Alternative would require more acres per MW of capacity. If this alternative was limited to the existing 3,277-acre site, total plant capacity would be reduced.

The SPT with Energy Storage Alternative could potentially satisfy five of the six project objectives. This alternative would satisfy the project objective addressing operational flexibility, and it would go further toward satisfying this project objective compared to the proposed project. The probable need to expand the 3,277-acre project site and gain site control and use of the additional acreage could result in a project schedule delay. 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.

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 MW. If the existing project was redesigned to include energy storage, the extent of the reduction in capacity is not known. Construction and operation of this alternative with no site expansion could potentially satisfy five of the six 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 be achieved.

## Potential Feasibility Issues

Staff's data requests to the project applicant included 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 (BrightSource Energy 2012). 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 applicant also responded to data requests on the expected benefits of adding storage capabilities to the project. The applicant’s responses state that “any potential benefits would be heavily outweighed by the costs, especially at this late stage in the development process. Average efficiency would be impaired rather than improved, energy costs would be increased rather than decreased, and the site footprint would be expanded (if that were possible)” (BrightSource Energy 2012).

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 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 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.

As discussed above, BrightSource Energy is proposing to add energy storage to three of its PPAs with SCE. The three solar thermal plants associated with these PPAs are expected to start generating electricity in 2016 and 2017. It is reported that BrightSource Energy plans to “add storage to plants that are not too far along in the government permitting process to make a design change…” (Press-Enterprise 2012a). In October 2011, BrightSource Energy 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. The planned development schedules for the proposed HHSEGS project and Rio Mesa SEGF overlap with the BrightSource Energy projects that are being planned under PPAs with SCE. Given the immensity and complexity of these renewable energy projects, it is assumed that BrightSource Energy’s strategic planning processes acknowledge 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 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 and possibly gain site control of the additional acreage 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

### 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 two small boilers for the initial melting, heating, and conditioning of the salt thermal storage medium (Energy Commission 2010b). RSEP requires no other natural gas 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 **less than 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. Construction-related emissions and impacts would be **similar to HHSEGS** for this alternative.

However, 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 MW. 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 produce the same electrical output. 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.”) Under this alternative, impacts on desert tortoise, special-status plant species, and habitats would be **greater than HHSEGS**. The size or configuration of a power tower project with added energy storage

is unknown; however, based on staff's field visit and review of maps showing blue line streams, impacts would 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 to less than significant. Because the proposed HHSEGS site is located in an area with very little slope and far from neighboring mountain ranges, drainages are very shallow and marginal, carrying little water. With a larger project site, impacts on special-status terrestrial species would be **greater than HHSEGS**, as impacts on individuals in regional populations are generally directly correlated to a project's size. Determining the efficacy of conditions of certification is a matter of speculation. If the site was expanded to include energy storage, additional specific data regarding the abundance and types of species and habitats present would be necessary. This additional information would be needed before a determination of significance could be made and conditions of certification could be proposed.

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 water use would likely be greater than what is proposed for the HHSEGS project, in order to service the water needs of a larger project site. Increased groundwater consumption would result in greater impacts on groundwater resources and, therefore, also **greater impacts on local groundwater dependant ecosystems**, and the many unique assemblages of plants and wildlife that they support. For the proposed HHSEGS project, feasible mitigation measures exist to reduce groundwater impacts below the level of significance. Similar conditions of certification would reduce impacts on groundwater dependent ecosystems to below a level of significance.

Impacts on avian species, including the state listed golden eagle and special-status bat species, would be the **same or somewhat greater than HHSEGS**, given that the zones of reflected solar flux could be measurably greater under this alternative. (Refer to the discussion above under the subsection, "Air Quality," for a general discussion of additional land needed for the heliostat array under this alternative.) The applicant has identified no means of mitigating or minimizing these impacts at the proposed HHSEGS site; therefore, impacts on avian species are significant. While additional information is anticipated from the applicant regarding measures to mitigate and minimize impacts related to reflected solar flux, avoidance of exposure to solar flux is not possible (i.e., no feasible on-site mitigation is possible). Off-site conditions of certification have not yet been identified. It is unknown if impacts could be mitigated to below a level of significance. The results of ongoing coordination with the Energy Commission, California Department of Fish and Game, and the U.S. Fish and Wildlife Service will be presented in the FSA, with related determinations of significance.

## Cultural Resources

Construction and operation of the SPT with Energy Storage Alternative at the proposed project site would most likely result in a **similar** extent of physical ground disturbance on the project site and a **similar** degree of visual intrusion on off-site resources relative to the proposed project, because the vertical profile of HHSEGS would remain

essentially unchanged. 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 presently known on the site of the proposed project." Therefore, the net effect of this alternative on cultural resources would most likely be **similar to that of HHSEGS**. Because the extent and location of the 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**. The FSA for the proposed HHSEGS project will include further information on the impact conclusions related to fire protection.

### 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 "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 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 and zoning for Charleston View. 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. This impact may or may not be significant; staff would have to evaluate the project using a revised noise modeling in order to make a determination. For this analysis, staff assumes that the impact would be **somewhat greater than HHSEGS**.

## 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**. No significant impacts would occur, and no conditions of certification would be required.

## Socioeconomic Resources

The beneficial impact through construction employment and increased taxes and fees would be the **same as HHSEGS**. Potential fiscal impacts to emergency medical and law enforcement services would be the **same as HHSEGS**.

## 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 pose a significant public hazard 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**.

## 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 the **same as 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 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 RECs. 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. This impact would be the **same as HHSEGS**.

The SPT with Energy Storage Alternative would require additional measureable acreage to provide the same energy generation. 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. This impact 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 Road), 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. Staff assumes water use would also likely be greater than currently proposed at the HHSEGS site, in order to service longer hours of operation. Increased groundwater consumption would result in 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 would increase proportionally with increased water usage. Impacts related to groundwater depletion would be **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, impacts on water supply and groundwater resources would be reduced to less than significant.

# SOLAR PHOTOVOLTAIC (PV) ALTERNATIVE

## Overview

This alternative would involve construction of 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 (BrightSource Energy 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 generates an 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. As discussed above, solar PV provides minimal flexible capacity (see **Alternatives Table 4**).

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 (BrightSource Energy 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's data requests to the project applicant included requests for additional information to compare the proposed HHSEGS project to an alternative using PV technology. In the corresponding data 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" (BrightSource Energy 2012). 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 MW or 58 MW.) **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 MW 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; **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 7.4 acres per MW, whereas average land use efficiency for BrightSource Energy's proposed HHSEGS and Rio Mesa SEGF projects is roughly 7.0 acres per MW. Based on a few project samples, land use efficiency is slightly lower for the PV projects.

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<br>Summary Descriptions of Four Approved Utility-Scale Solar Photovoltaic Projects in California | | | |
|---|---|---|---|
| **Project Name and Location** | **Major Project Equipment** | **Megawatts per Acre** | **Schedule** |
| AV Solar Ranch One Project, Antelope Valley area of northern Los Angeles County | • PV solar panels (First Solar thin-film PV modules)<br>• Single-axis trackers (to position PV panels with the sun's movement) on a portion of the facility, and some fixed-tilt supports<br>• Inverters to convert electricity from DC to AC<br>• Pad mounted transformers and circuit breakers | 230 MW on 1,955 acres (including the project site and transmission line route); about 8.5 acres per MW | Project approved December 2010 and will be fully operational at the end of 2013 |
| Desert Sunlight Solar Farm Project, Chuckwalla Valley of the Sonoran Desert in eastern Riverside County | • Main generation area – First Solar thin-film PV modules organized into arrays, combining switchgear, overhead lines, and access corridors<br>• Operations and maintenance facility<br>• PV arrays consisting of PV modules, a power conversion station, and a transformer<br>• On-site substation<br>• Solar energy visitor center | 550 MW on 3,800 acres (area of permanent ground disturbance); about 6.9 acres per MW | Project approved August 2011 and will be fully operational by the first quarter of 2015 |
| Topaz Solar Farm Project, Carrizo Plain in eastern San Luis Obispo County | • First Solar thin-film PV modules organized into arrays, combining switchgear, overhead lines, and access corridors<br>• Operations and maintenance facility<br>• PV arrays consisting of PV modules, a power conversion station, and a transformer<br>• On-site substation<br>• Solar energy learning center | 550 MW on 3,500 acres; about 6.4 acres per MW | Project approved summer 2011; construction began in late 2011 and will be finished in 2015 |

| Alternatives Table 5<br>Summary Descriptions of Four Approved Utility-Scale<br>Solar Photovoltaic Projects in California | | | |
|---|---|---|---|
| **Project Name and Location** | **Major Project Equipment** | **Megawatts per Acre** | **Schedule** |
| 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<br>• Invertors<br>• Electrical substation<br>• Operations and maintenance facilities<br>• Visitor center | 250 MW on 1,900 acres; about 7.6 acres per MW | Project approved April 2011 and will be fully operational by 2013 |
| Sources:<br>AV Solar Ranch One Project: <http://planning.lacounty.gov/case/view/project_no._r2009-02239_tract_map_no._tr071035_av_solar_ranch_one_project><br>Desert Sunlight Solar Farm Project: <http://www.blm.gov/ca/st/en/fo/palmsprings/Solar_Projects/Desert_Sunlight.html><br>Topaz Solar Farm Project: <http://www.slocounty.ca.gov/planning/environmental/EnvironmentalNotices/optisolar.htm><br>California Valley Solar Ranch Project: <http://www.slocounty.ca.gov/planning/environmental/EnvironmentalNotices/sunpower.htm> | | | |

## 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 would meet the project objectives related to construction and operation of a utility-scale renewable electrical generation facility, which would lead to sales of renewable energy and contribute to achieving California's renewable energy goals. This alternative would also satisfy the project objectives addressing the requirement to comply with applicable LORS and avoid or minimize significant impacts to the greatest extent feasible. See the discussions below under, "Environmental Analysis," for general analyses of the potential environmental impacts and mitigation measures pertaining to this alternative.

The Solar PV Alternative would likely satisfy four of the six project objectives. This alternative would have a lower ability to satisfy the project objective addressing operational flexibility (see **Alternatives Table 4**). 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. The possible need to reconfigure the 3,277-acre project site and gain site control and use of any additional acreage, if additional acreage was needed, could result in a project schedule delay. It is not known whether the objective to obtain site control and use within a reasonable period of time could be attained for this alternative.

## 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" (BrightSource Energy 2012). 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."

As discussed above, the PPAs for the proposed project were approved by CPUC in 2010. If the project technology at the HHSEGS site was changed to a PV technology, an advice letter would have to be filed with CPUC requesting amendments to the PPAs. The work required to redesign the project to use a PV technology would delay the project schedule, and it is not known whether CPUC would approve amendments to the PPAs allowing the technology change. It is also not known at what point a project schedule delay would affect project viability.

## Environmental Analysis

### 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. 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, no significant differences in potential impacts were identified. This discussion of potential impacts on biological resources from the Solar PV Alternative applies to both types of PV solar collectors. Assuming a project site with the same current boundaries as the proposed project, impacts on all special-status species and habitats, including waters of the state and waters of the U.S., would be **similar to HHSEGS**.

If reconfiguration of the proposed project site was needed to accommodate installation of parallel rows of PV modules, the extent of impacts on biological resources identified for the proposed project could change. Staff concludes that impacts on desert tortoise,

waters of the U.S., waters of the state, and other special-status plants and wildlife could be slightly more if the project boundary moved east or north. These impacts could be slightly less if the project boundary moved west.

Impacts on groundwater dependant plants and wildlife species would be **much less than HHSEGS**, given the very infrequent washings needed for PV solar panels, and these impacts could likely be mitigated to below a level of significance. Because this technology does not employ central collector towers (e.g., an SPT at the center of a heliostat array), no collision or singeing/burning impacts on avian species would occur. Impacts on raptors and avian species would occur through conversion of the project site from native vegetation to a solar farm, but the impacts are predicted to be **much less than HHSEGS**. Impacts on avian species stemming from habitat loss could be mitigated to below a level of significance.

## Cultural Resources

Construction and operation of the Solar PV Alternative at the proposed project site would most likely result in a **similar** extent of physical ground disturbance on the project site and a **much lesser** degree of visual intrusion on off-site resources relative to the proposed project, because the vertical profile of HHSEGS would dramatically change with the loss of the HHSEGS power towers. Staff would characterize the net effect of this alternative on cultural resources to be **much less than that of HHSEGS**.

## Fire Protection

The Solar PV Alternative would use photovoltaic cells to convert solar radiation directly into electrical current. This alternative would pose similar fire risks and impacts on local fire protection resources as those associated with the proposed project. This impact is **similar to the proposed HHSEGS project**. The FSA for the proposed HHSEGS project will include further information on the impact conclusions related to fire protection.

## Geology and Paleontology

Construction and operation of the Solar PV Alternative at the proposed project site could have significantly 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 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

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 off-site impacts from required use of hazardous materials at the site. Thus, this alternative would be similar to the proposed project in terms of posing an accidental release risk of hazardous materials. This impact is **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 and zoning for Charleston View. 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 potential impacts to less than significant.

### Public Health

The Solar PV alternative would not cause minor combustion-related boiler emissions. Due to very infrequent washings of PV panels, toxic air emissions related to mirror washings would be substantially reduced. 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**.

As discussed above, no significant impacts on public health would occur under the proposed project. Based on staff's analysis, there is no important difference in the level of impacts on public health under any project alternative. For the alternatives analyzed in this staff assessment, impacts on public health are less than significant.

### Socioeconomic Resources

The beneficial impact through construction employment and increased taxes and fees would be the **same as HHSEGS**. Potential fiscal impacts to emergency medical and law enforcement services would be the **same as HHSEGS**.

## 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 pose a significant public hazard 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 rather than reflect sunlight, impacts related to glint and glare would be **much lower than HHSEGS**. If potentially significant glint and glare impacts were identified under the Solar PV Alternative, conditions of certification would be necessary to reduce those impacts to less than significant. Mitigation measures could include screening the site perimeter.

## 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 be comparable 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 2011). 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…that would often be accentuated by a shiny or reflective appearance, and occasional bright reflective diffuse or specular reflections of the sun" (San Luis Obispo County 2011). 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 RECs. 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. 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. This impact would be **similar to HHSEGS**.

### 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 all receiver units directly generate electricity and thus do not require thermal cooling equipment or other facilities 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, so impacts related to sanitary waste would be the **same as 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 7.4 acres per MW. Higher land requirements for utility-scale PV power plants have also been stated in the range of about 9 acres per MW (REAT 2010). The probable need to reconfigure the proposed HHSEGS site for installation of either fixed-tilt or tracking PV

modules could require additional project acreage. Assuming a project with the same or similar net MW output as the proposed project, a PV alternative could require additional measureable acreage. Impacts related to soil erosion during construction would be **somewhat greater than HHSEGS**. Installation of the supports for the PV panels does not require significant site grading. Also, because traditional power plant facilities are not needed, a PV alternative would result in less soil disturbance for power plants (21 acres for the proposed HHSEGS project) and construction laydown and temporary parking (approximately 20 acres for the proposed HHSEGS project) to construct them. Impacts related to soil erosion during project operations would be **less than the proposed HHSEGS project**. Assuming additional dirt roads would be created throughout the potentially larger area for access and maintenance of the PV panels, the decrease in cleaning frequency would result in overall less dust creation from washer vehicles driving on these dirt roads.

Because of the HHSEGS fixed borders to the east (Nevada state line) and to the south (Old Spanish Trail Road), it is assumed that the additional acreage needed for the Solar PV 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 PV module 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

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 significantly less water for project operations, given the less frequent washings of PV solar panels. Impacts on the Pahrump groundwater basin and local well owners would be reduced relative to the proposed HHSEGS project. Given the much lower water use for this alternative, impacts on water supply would be **much 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 construction of 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** includes 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 MW. 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 MW. 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 7.0 acres per MW, which is comparable to an average land use efficiency of

approximately 7.0 acres per MW 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 would meet the project objectives related to construction and operation of a utility-scale renewable electrical generation facility, which would lead to sales of renewable energy and contribute to achieving California's renewable energy goals. This alternative would also satisfy the project objective to meet permitting requirements and comply with applicable LORS. The Parabolic Trough Alternative would 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 impacts and mitigation measures pertaining to the Parabolic Trough Alternative.

Like the proposed project, the Parabolic Trough Alternative does not include energy storage. As discussed above, relative flexibility for solar thermal without energy storage is considered low to medium (**Alternatives Table 4**).

Staff's data requests to the project applicant included 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…" (BrightSource Energy 2012).

The Parabolic Trough Alternative could potentially satisfy four of the six project objectives. This alternative would partially satisfy the project objective addressing operational flexibility. It is unlikely that the proposed 3,277-acre project site could be used for construction of a parabolic trough project that would achieve close to the 500-MW capacity of the proposed project. The probable need to reconfigure the 3,277-acre project site and gain site control and use of any additional acreage that would be needed for this alternative could result in a project schedule delay. 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

Changing the project technology at the HHSEGS site to a parabolic trough technology would require filing of an advice letter with CPUC requesting amendments to the PPAs. 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 technology change. It is not known at what point a project schedule delay would affect project viability.

## Environmental Analysis

### 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

Reconfiguration of the proposed project site to accommodate construction of the Parabolic Trough Alternative would probably require additional acreage. Under this alternative, impacts on all special-status species and habitats, and waters of the state and waters of the U.S., would be **somewhat greater than HHSEGS**. Assuming this alternative would use dry cooling, impacts on groundwater dependant plants and wildlife species would be **similar to HHSEGS**. Conditions of certification would be proposed to reduce the project's effects on groundwater dependant plants and wildlife species to below a level of significance.

Parabolic trough technology can cause significant glint and glare impacts. The analysis of glint and glare impacts for the Blythe Solar Power Project addressed the potential for pedestrians within approximately 60 feet of the solar field perimeter fencing to experience unsafe light intensity. (California Energy Commission 2010c). Assuming avian tolerance to light intensity to be roughly the same as human tolerance, this would result in impacts on avian species, albeit at a level of significance **much less than HHSEGS**. In comparison, the project operations for the proposed HHSEGS project would reflect solar energy, called flux. Reflected solar flux has the potential to burn or

singe skin, eyes, and plumage, and even to cause death. Avoiding these impacts would not be possible. Under the Parabolic Trough Alternative, the potential for avian species to collide with various structures in the solar field is **much less than the proposed HHSEGS project** because no SPT is associated with this alternative; therefore, no tower collision impacts would occur. Impacts on raptors and avian species would also occur through conversion of the project site from native vegetation to a solar farm. However, all impacts to avian species could be mitigated to below a level of significance.

### Cultural Resources

Construction and operation of the Parabolic Trough Alternative at the proposed project site would most likely result in a **similar** extent of physical ground disturbance on the project site and a **much lesser** degree of visual intrusion on off-site resources relative to the proposed project, because the vertical profile of HHSEGS would dramatically change with the loss of the HHSEGS power towers. Staff would characterize the net effect of this alternative on cultural resources to be **much less than that of HHSEGS**.

### 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 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. Traffic accidents that could potentially cause spillage of flammable materials would increase the need for emergency response services and potential impacts on local fire protection resources. This impact would be **much greater than HHSEGS**. The FSA for the proposed HHSEGS project will include further information on the impact conclusions related to fire protection.

### Geology and Paleontology

Construction and operation of the Parabolic Trough Alternative at the proposed project site could have significantly fewer impacts compared to the proposed HHSEGS project. Primarily, the Parabolic Trough 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 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

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.

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. 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 and zoning for Charleston View. 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 by **similar to HHSEGS** under this alternative.

### 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**. No significant impacts would occur, and no conditions of certification would be required.

### Socioeconomic Resources

The beneficial impact through construction employment and increased taxes and fees would be the **same as HHSEGS**. Potential fiscal impacts to emergency medical and law enforcement services would be the **same as HHSEGS**.

### 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 pose a significant public hazard due to the current and

predicted future conditions of the roadway pavement. This impact would be the **same as HHSEGS**.

### *Glint and Glare*

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 affected motorists on Old Spanish Trail Highway. It is assumed that potential impacts related to glint and glare would be **similar to the proposed HHSEGS project**. A condition of certification requiring mitigation in the form of physical screening (fencing, landscaping buffer or similar means) along the length of the project adjacent to Old Spanish Trail Highway would reduce this impact to less than significant. An additional mitigation measure would require preparation and implementation of a plan to reduce glint and glare, which would include continuous monitoring of the mirrors for malfunctions and to ensure that they remain properly aligned with the sun.

## 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, and some of the structures are very similar. For example, project components for the Genesis Solar Energy Project, which is under construction in east central Riverside County, include water treatment buildings and wet cooling towers with heights of approximately 150 feet and 140 feet, respectively. Other structures over 100 feet tall include the treated water tanks and pipe racks.

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 4, but the project's other taller structures could be partially visible

from this location. Conditions of certification, such as specifying the use of non-reflective surface finishes complementary to the desert landscape, would 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. 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 be 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. Implementation of feasible mitigation measures would not be sufficient to reduce the level of effects to less than significant, and construction-related visual impacts 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 four KOPs. Like the proposed project, 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**.

## 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 RECs. 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. This impact 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 are **somewhat greater than HHSEGS**. Domestic sanitary waste would still need a septic system for proper disposal, so these impacts would be the **same as 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 2.0 percent slope, and preferably less than 1.0 percent (BLM 2010). Land requirements for utility-scale parabolic trough power plants that have been reviewed by staff range from about 5.0 acres per MW to a little over 7.0 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; however, this alternative would likely require some additional acreage due to the probable need to reconfigure the proposed project site to accommodate installation of linear parabolic troughs in large, rectangular areas. The total footprint area for this alternative could be somewhat larger, and 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

The Parabolic Trough Alternative would probably require additional acreage due to the need to reconfigure the site to accommodate installation of parallel rows of the trough-shaped solar collectors. 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, impacts to the Pahrump groundwater basin and local well owners would be **similar to HHSEGS**. These impacts would be significant, and the proposed conditions of certification would be similar to those proposed for the HHSEGS project. Impacts on water supply would be mitigated to below a level of significance.

## 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-2** 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-2** is included at the end of this Alternatives 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 and the Parabolic Trough 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 760-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*[4] 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 and the additional acreage that would be required to incorporate the storage system and tanks.

## 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.

Using average annual daily radiation as a benchmark, **Alternatives Table 6** 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 6**, 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

[4] 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).

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 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[5].

PV systems can be switched off and on but do not provide ramping capability. This limits a PV facility's flexibility, as discussed above (see **Alternatives Table 4**).

**Alternatives Table 6**
**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 6**, 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].

[5] Since 3 percent is less than the plus or minus 9 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.

Note that the comparison of ideal collector performance (see **Alternatives Table 6**) 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.

## Conclusion

The comparison of ideal collector performance shown in **Alternatives Table 6** 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

*[This subsection will be published in the FSA for the proposed 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]).

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.

As discussed above, 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. Because no

construction is proposed under the No-Project Alternative, no further analysis of these predicted changes to resource conditions is required.

*[An analysis of the environmentally superior alternative will be published in the FSA for the proposed project.]*

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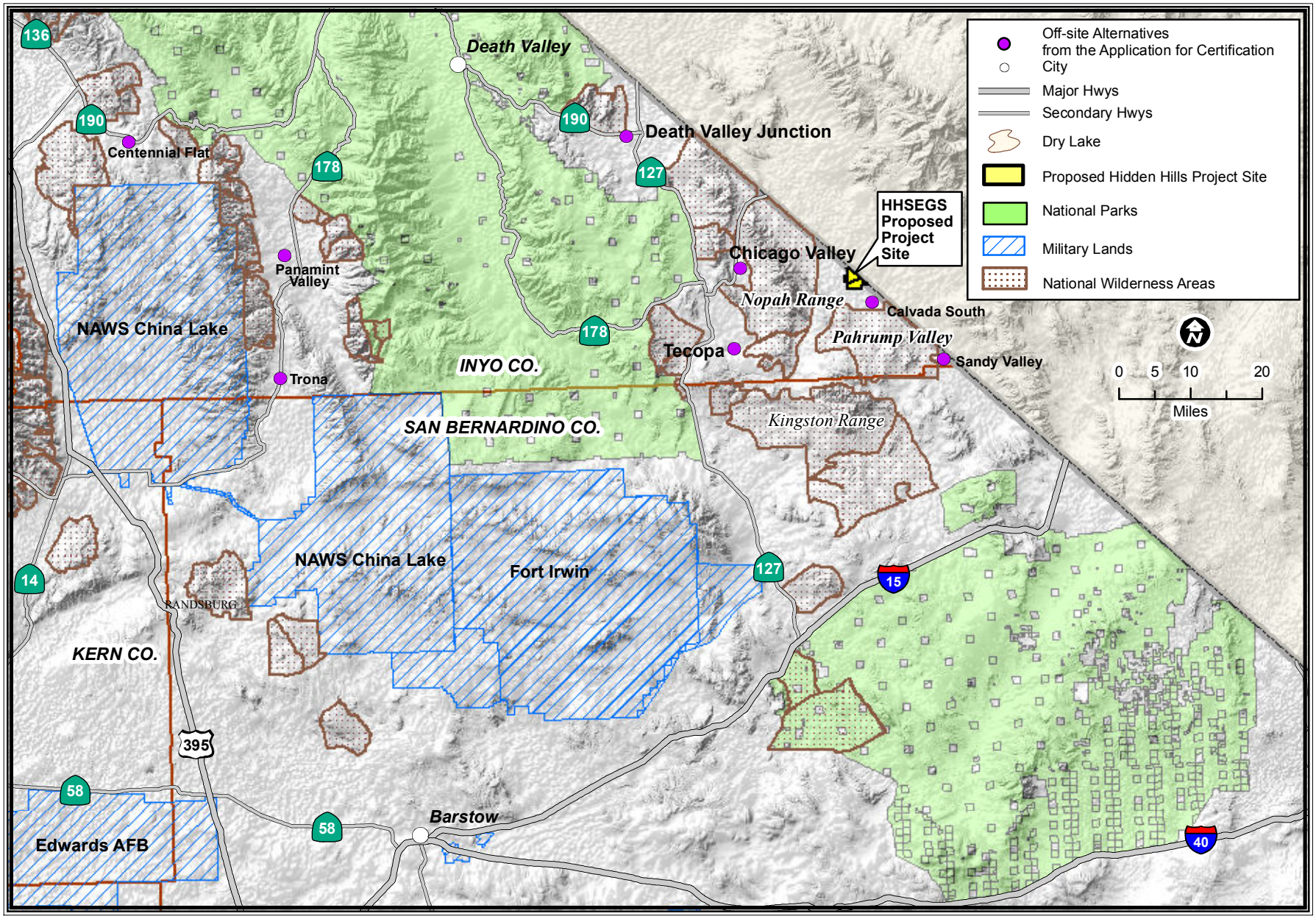
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**ALTERNATIVES - FIGURE 1**

Hidden Hills Solar Electric Generating System (HHSEGS) - Off-site Alternatives Evaluated in the Application for Certification



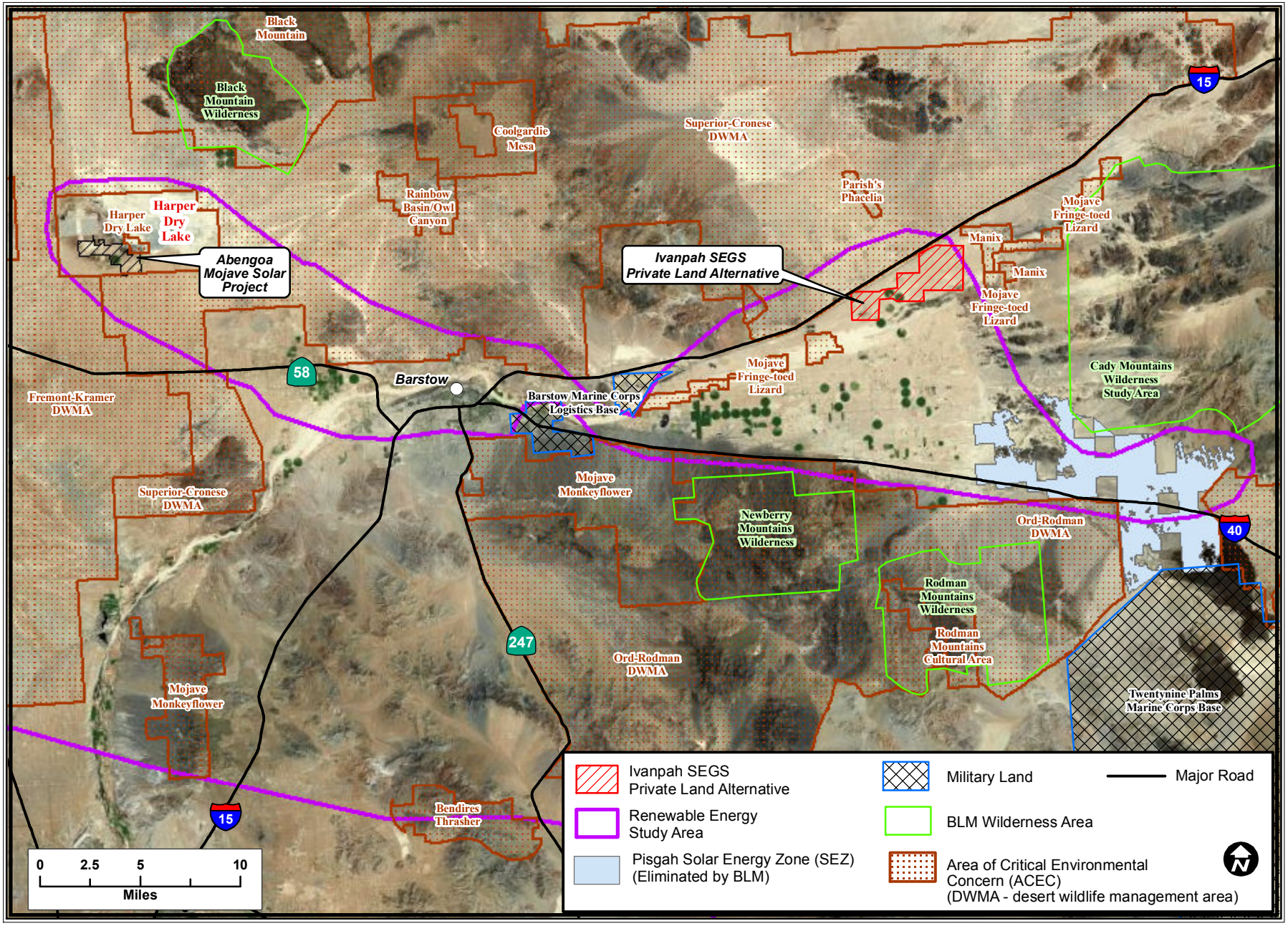

ALTERNATIVES

**CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: Adapted from BrightSource Energy 2011a

**ALTERNATIVES - FIGURE 2**

Hidden Hills Solar Electric Generating System (HHSEGS) - Barstow Renewable Energy Study Area



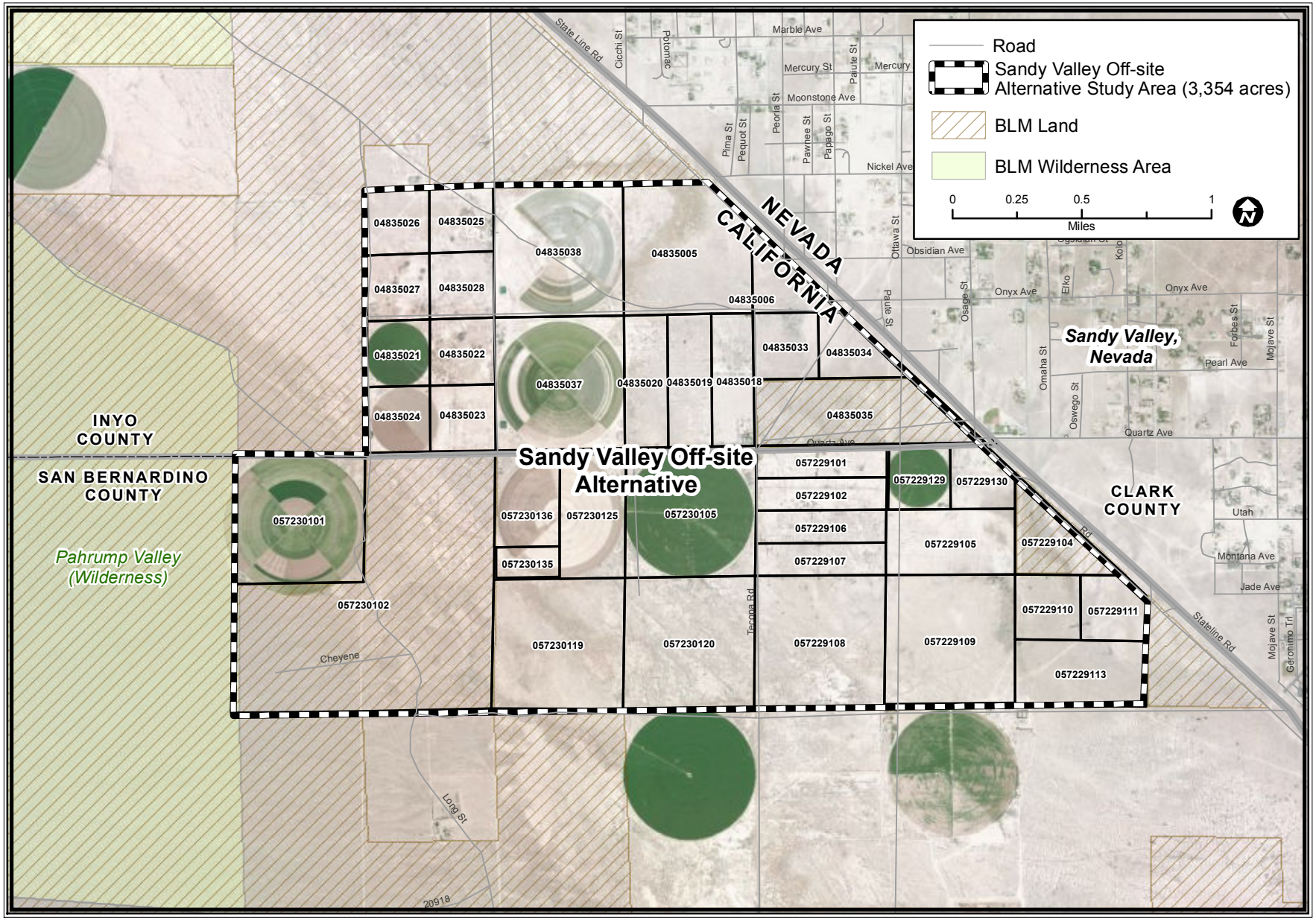

ALTERNATIVES

**CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

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



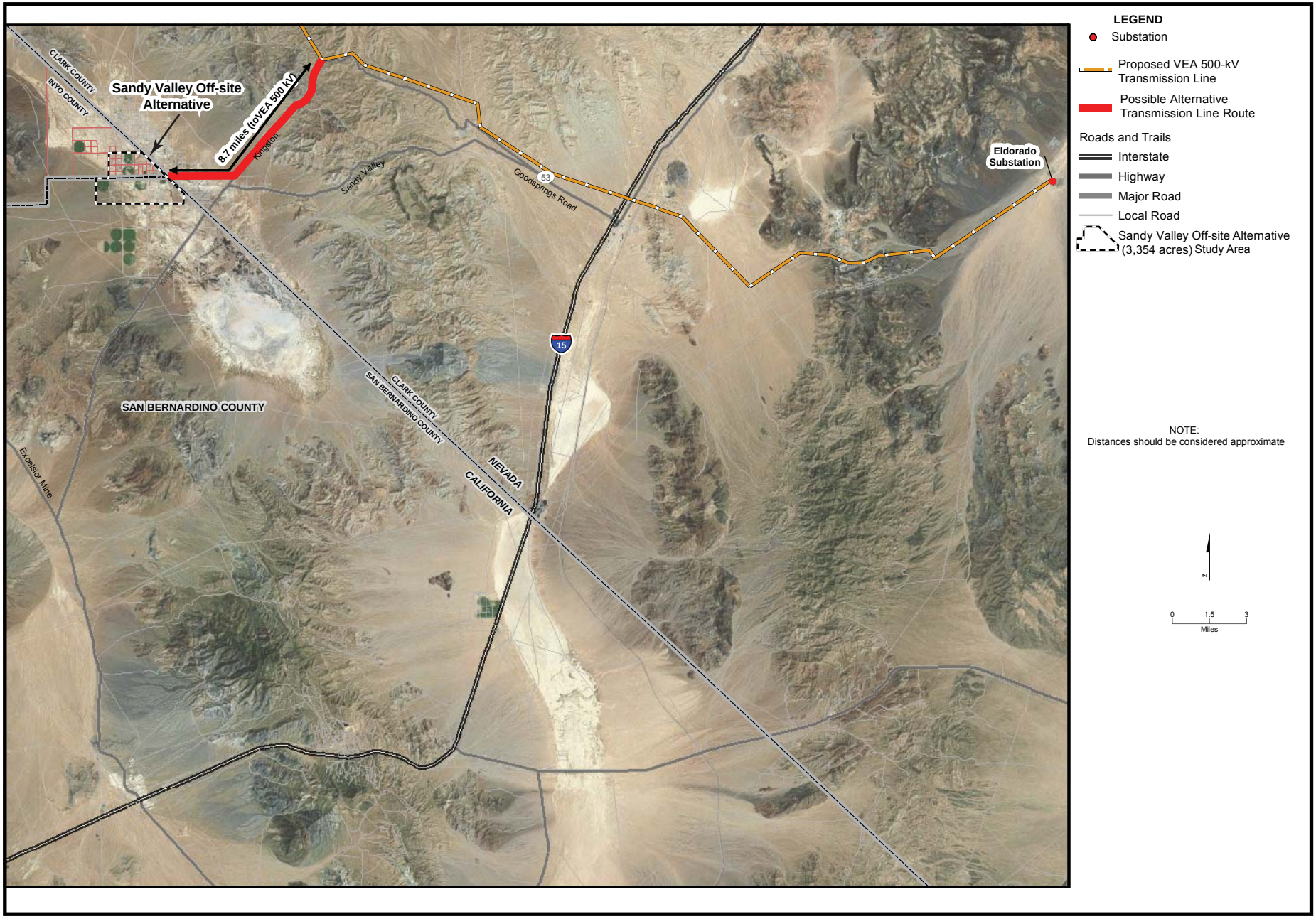

ALTERNATIVES

**CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

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

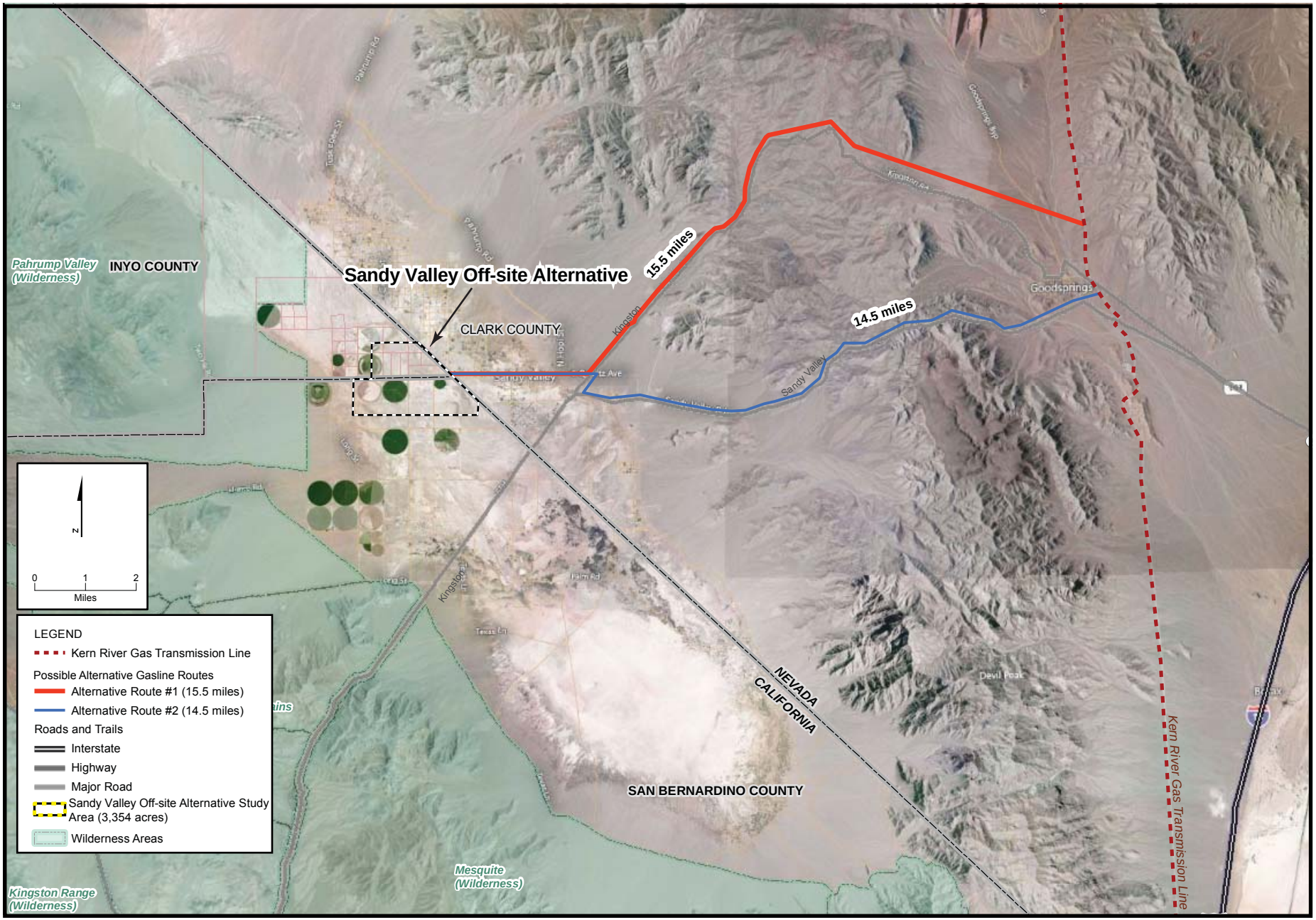



**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: Adapted from BrightSource Energy 2012

**ALTERNATIVES - FIGURE 5**

Hidden Hills Solar Electric Generating System (HHSEGS) - Potential Natural Gas Pipeline Alignments for the Sandy Valley Off-site Alternative




**CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION**

SOURCE: Adapted from BrightSource Energy 2012

**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

# APPENDIX ALTERNATIVES-1: 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 analysis of the staff assessment. Differentiating between the project alternatives and the other renewable technologies discussed in this appendix may be useful to decision makers, agency representatives, and other interested parties who wish to understand the scope of the alternatives analysis, which is focused on alternatives that were considered by staff, including those that were reviewed during development of the alternatives analysis and determined to be potentially infeasible. This summary of other renewable energy technologies may also assure reviewers that staff recognize and understand the importance of developing and employing various renewable technologies to achieve statewide mandated renewable energy goals. (See the discussion under, “Alternatives Screening,” in the alternatives analysis of the staff assessment.)

The renewable technologies discussed in this appendix include solar and non-solar technologies:

- Distributed generation
- Concentrated photovoltaic technology
- Dish/engine technology
- Linear Fresnel technology
- Wind
- Geothermal
- Biomass
- Small hydroelectric
- Wave and tidal
- Solid oxide fuel cell (e.g., Bloom Energy Servers™)

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 other parts of the state that are far removed from the location of the proposed project. Section 15126.6(f) of the California Environmental Quality Act (CEQA) Guidelines discusses how the “rule of reason” governs the selection of the range of alternatives for examination in an environmental impact report (EIR), stating that “[a]n EIR need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative” (14 Cal Code Regs., § 15126.6[f][3]). 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 that will foster informed decision making…” (14 Cal Code Regs., § 15126.6[a]). These regulations also

apply to the document used as a substitute for an EIR in a certified program (14 Cal. Code Regs., §§ 15251 and 15252).

A project proposed to use one of the technologies listed above would be required to comply with 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. 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.

The California Energy Commission (Energy Commission) certifies facilities and energy deliveries as eligible for the state's Renewables Portfolio Standard (RPS) program. California uses five primary renewable resource types represented by existing facilities (Energy Commission 2011a):

- Biomass – fuel derived from organic sources (not fossil fuels), including solid biomass, digester gas, landfill gas, and biodiesel
- Geothermal
- Small hydroelectric (30 megawatts [MW] or less)
- Solar – including solar thermal and solar photovoltaic (PV)
- Wind

## RENEWABLE SOLAR TECHNOLOGIES

In 2010, solar generation provided 3.0 percent of in-state renewable generation (0.4 percent of total in-state energy generation) (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 discussion below is focused primarily on photovoltaic applications of the technology.

## DISTRIBUTED GENERATION

### Overview

Governor Jerry Brown's Clean Energy Jobs Plan identifies a goal of installing 20,000 MW of new renewable capacity by 2020, including 12,000 MW of localized electricity

generation (i.e., distributed generation [DG])[1] (Energy Commission 2011a). 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 MW 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 MW; and (3) located within the low-voltage distribution grid or supplying power directly to a consumer" (Energy Commission 2012). As of 2011, a total of approximately 3,000 MW of renewable DG capacity has been installed; another 6,200 MW 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 2011a).

The California Public Utilities Commission (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 Pacific Gas & Electric Company (PG&E), San Diego Gas & Electric (SDG&E), and Southern California Edison (SCE) (CPUC 2010). 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 MW of solar energy systems on homes and businesses by 2016 (CPUC 2011). 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 2011a).

CPUC has implemented policies and programs related to procurement of utility-side DG (also called *wholesale* or *system-side generation*) (CPUC 2010). Under its investor-owned utility 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

[1] The total 20,000 MW from the Governor's Clean Energy Jobs Plan includes 8,000 MW of utility-scale renewable capacity from wind, solar, and geothermal projects.

decisions issued by CPUC in 2009 and 2010, these programs will yield up to 1,100 MW 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 goals.

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) recently relaunched its solar incentive program. As part of the program, LADWP staff are investigating options for making solar affordable for lower income households (Energy Commission 2012).

If existing state programs to support DG, including solar PV, are fully successful, the state could add approximately 6,000 MW 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 2011a).

**Decision to Eliminate the Technology from the Alternatives Analysis**

Comments received during the proceedings for previous siting cases for utility-scale (greater than 20 MW) renewable energy projects (e.g., Ivanpah Solar Electric Generating System [ISEGS]) have included requests that the review of project alternatives include a distributed generation photovoltaic (DGPV) project. Although both *concentrated* and *distributed* types of projects result in production of electricity from renewable sources (i.e., both use solar technologies), they are otherwise so dissimilar that a comparative discussion in the context of a CEQA alternatives analysis is not possible.

As discussed above, CEQA does not require consideration of "every conceivable alternative to a project…" (14 Cal Code Regs., § 15126.6[a]). CEQA does not require consideration of "an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative" (14 Cal Code Regs., § 15126.6[f][3]). Other reasons for staff's decision to eliminate the technology from the alternatives analysis are provided below:

- *Lack of Defined Projects with Sites* – Some renewable distributed generation projects are carried out by proponents and agencies at defined sites; however, the existence of renewable DG projects does not mean that the technology is, in fact, an alternative to a larger generation project such as the Hidden Hills Solar Electric Generating System (HHSEGS). The feasibility of a renewable DG alternative (or set of alternative projects) 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 had been installed as an alternative to the proposed HHSEGS project.

- *Potential Environmental Effects Are Incomparable* – Compared to a large project such as HHSEGS, a *renewable DG alternative* is amorphous and impossible to analyze. Too little specific information can be known about such an alternative that could avail itself of analysis. If a broad collection of potential sites for a DGPV alternative could be identified, the environments for the proposed project and a DGPV alternative would be entirely different; locations and environmental settings

could potentially be hundreds of miles apart; and the character and nature of impacts would be vastly different. Different analysis methods and significance thresholds for the two project types would not allow a meaningful evaluation, analysis, and comparison between the proposed project and a DGPV alternative. It cannot simply be assumed that a DG alternative would cause no environmental impacts.

- *No Oversight or Permitting Authority for a DGPV Alternative* – Project applicants and lead agencies for utility-scale renewable energy projects do not have the authority to oversee implementation of a collection of DGPV or other types of DG projects, which are generally initiated and installed or constructed by public utilities, California residents and business owners, and others.

- *Voluntary Participation in On-site Generation Programs* – Participation in the state's on-site generation incentive programs 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), it is apparent that 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.

## 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 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.

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 MW at six locations in California and Arizona. Several sites are also in development with capacities ranging from 200 kilowatts (kW) to 1.0 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 2011b). CPV projects in California, Arizona, Colorado, and New Mexico, both operational and under development, range from 1.0 MW, 5.0 MW, 30 MW and peaking at 50 MWs.

Imperial Solar Energy Center West in Imperial County has been approved for development with a capacity of up to 250 MW (Tenaska 2011). This project has been approved with the flexibility of using either CPV or PV technology. Staff contacted Tenaska Solar Ventures, the project developer, for information on the status of project development; as of May 2012, no final decision had been made on the choice of technology.

Companies with international development of CPV projects are SolFocus and Amonix. SolFocus has developed two pilot projects in Chile (8.8 kW each), a pilot project in South Africa (8.4 kW), two projects in Spain (200 kW, 300 kW), one project in Italy (8.4 kW), a pilot project in Malta (8.4 kW), a combined 1.28 MW for multiple customers in Greece, one project in Saudi Arabia (132 kW), one project in Malaysia (8.4 kW), and one project in Australia (235 kW) (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 kW and 7.8 MW), 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 MW 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

As discussed above, CEQA's general guidance on preparation of an alternatives analysis describes how selection of the range of alternatives for examination in an EIR is governed by the "rule of reason." CEQA does not require consideration of "an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative" (14 Cal Code Regs., §§ 15126.6[f], 15126.6[f][3]).

Staff's decision to eliminate the technology from the alternatives analysis is also 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 utility scale (50 MW 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 2009a). 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 2011a).

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 2009a). 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. On the international stage, construction of Wizard Power's Big Dish 40-MW demonstration project in Australia is slated to begin

operations in 2013 with completion anticipated in 2015 (Recharge 2012a). This project includes a demonstration of SUperheated Steam – MOlten Salt (SUMO) energy storage (Wizard Power 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 2012b).

### 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 2009a). The linear Fresnel system uses flat mirrors, allowing more reflectors 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).

### Decision to Eliminate the Technologies from the Alternatives Analysis

As discussed above, CEQA describes how selection of the range of alternatives for examination in an EIR is governed by the "rule of reason." CEQA does not require consideration of "every conceivable alternative to a project…" (14 Cal Code Regs., §§ 15126.6[a], 15126.6[f]).

Staff's decision to eliminate the technology from the alternatives analysis is also 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 MW or greater). The linear Fresnel technology has not yet been proven at the utility scale.

## NON-SOLAR RENEWABLE POWER GENERATION

## WIND ENERGY

### Overview

Wind turbines, like windmills, are mounted on a tower to capture the most energy from the resource (NREL 2010a). 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, or be connected to a utility power grid or combined with a PV system. For utility-scale sources of wind energy, a large number of wind turbines are usually built in

various configurations in the same general area to form a wind power plant. Small wind systems have potential as distributed energy resources.

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 and reliability of a wind resource area are an important part of assessing the viability of a project site. In addition, the presence of large seasonal variations needs to be considered when selecting a project site (American Wind Energy Association 2003).

Wind resources provide 21 percent of the state's in-state renewable generation (3.0 percent of total in-state energy generation (Energy Commission 2010). 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 2011a). 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 MW, 600 MW, and 500 MW, respectively (Energy Commission 2011a).

### Decision to Eliminate the Technology from the Alternatives Analysis

In addition to CEQA requirements for consideration and discussion of alternatives (described above), 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[2], 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 not a feasible 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 2011). 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).

[2] 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.

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 1,601 MW of capacity (more than 60 percent of all geothermal capacity installed in California), Imperial County with 650 MW, and Inyo County with 302 MW (Energy Commission 2011a). Geothermal plants provide 42 percent of in-state renewable generation (6.2 percent of total in-state energy generation) (Energy Commission 2010). 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 2011a). Geothermal exploration is time-consuming because of the difficulty in establishing what, exactly, is in the subsurface.

In Santa Rosa, California, treated wastewater from this and other nearby communities is being pumped to The Geysers (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

In addition to CEQA requirements for consideration and discussion of alternatives (described above), 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 still the largest biomass energy resource today, but food crops, grassy and woody plants, residues from agriculture or forestry, oil-rich algae, and the organic component of municipal and industrial wastes can be used (NREL 2010b). Even the fumes from landfills (methane) can be used as a biomass energy source. 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 2010b). 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 2011a). 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 2011a). Biomass generation provides nearly 20 percent of in-state renewable generation (2.8 percent of total in-state energy generation) (Energy Commission 2010). Additional potential may be limited due to cost, air quality issues, and regulatory barriers.

### Decision to Eliminate the Technology from the Alternatives Analysis

In addition to CEQA requirements for consideration and discussion of alternatives (described above), 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 MW or less (Energy Commission 2011a). 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 2011a). 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, 2011a). The counties with the greatest small hydroelectric potential

include Siskiyou, Shasta, Plumas, Butte, Sierra, Amador, Calaveras, Stanislaus, Tuolumne, Madera, and Fresno (Energy Commission 2011a).

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 2011a).

### Decision to Eliminate the Technology from the Alternatives Analysis

In addition to CEQA requirements for consideration and discussion of alternatives (described above), 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

Wave energy relies 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 energy 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

In addition to CEQA requirements for consideration and discussion of alternatives (described above), this technology has technological and practical limitations. Wave and tidal technology is not ready for commercial use (Energy Commission 2011a). 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.

## OTHER RENEWABLE POWER GENERATION

## SOLID OXIDE FUEL CELLS

### Overview

Solid oxide fuel cells are combined to convert fuel into electricity. Bloom Energy Servers™ are a distributed power generation technology that use solid oxide fuel cells to generate electricity using a clean electro-chemical process (Bloomenergy 2012a). The fuel cells are capable of using both renewable and traditional fuels. Each fuel cell provides about 25 kW of power, and each energy server contains thousands of fuel cells enabling each Bloom Energy Server™ to provide 200 kW of power. More power can be added with additional energy servers. An energy server providing 100 kW of baseload, continuous power fits roughly within the footprint of a standard parking space (Bloomenergy 2011). Versa Power Systems is also developing solid oxide fuel cell technology, but it is in the demonstration phase of development and uses hydrogen combined with oxygen to produce electricity (Versa Power Systems 2012). Bloomenergy has installed Bloom Energy Servers™ at about twenty leading company sites, including Walmart, Kaiser Permanente, Safeway, Fireman's Fund, to name a few (Bloomenergy 2012b).

### Decision to Eliminate the Technology from the Alternatives Analysis

In addition to CEQA requirements for consideration and discussion of alternatives (described above), this technology has technological and practical limitations. Based on staff's research, solid oxide fuel cells are starting to be used at leading company sites. The technology is being used as a distributed generation application. There is no indication this technology is available or proven at the utility scale.

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| Alternatives Appendix-2<br>Summary Comparison of the Proposed Project's Impacts to the Project Alternatives and the No-Project Alternative | | | | | | |
|---|---|---|---|---|---|---|
| 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 |
| Air Quality | | | | | | |
| Construction-related emissions | 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) |
| Biological Resources | | | | | | |
| Impacts on special-status plant species and habitats | SM | Much less than HHSEGS | Much less than HHSEGS (SM) | Greater than HHSEGS (SM) | Similar to HHSEGS (SM) | Somewhat greater than HHSEGS (SM) |
| Impacts on waters of the U.S. and waters of the state | SM | Much less than HHSEGS | Much less than HHSEGS (SM) | Similar to or somewhat greater than HHSEGS (SM) | Similar to HHSEGS (SM) | Somewhat greater than HHSEGS (SM) |
| Impacts on desert tortoise | SM | Much less than HHSEGS | Much less than HHSEGS (SM) | Greater than HHSEGS (SM) | Similar to HHSEGS (SM) | Somewhat greater than HHSEGS (SM) |
| Impacts on special-status terrestrial wildlife species (other than desert tortoise) | SM | Much less than HHSEGS | Much less than HHSEGS (SM) | Greater than HHSEGS (UNK) | Similar to HHSEGS (SM) | Somewhat greater than HHSEGS (SM) |
| Impacts on avian species, including raptors | SU | Much less than HHSEGS | Similar to or slightly less than HHSEGS (SU) | Same or somewhat greater than HHSEGS (SU) | Much less than HHSEGS (SM) | Much less than HHSEGS (SM) |

| Alternatives Appendix-2<br>Summary Comparison of the Proposed Project's Impacts to the Project Alternatives and the No-Project Alternative | | | | | | |
|---|---|---|---|---|---|---|
| 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 |
| Cultural Resources | | | | | | |
| Potential to disturb, destroy, or visually degrade significant prehistoric and historical archaeological sites *on* the site (see note) | LS | — | Somewhat greater than HHSEGS (PSM) | Similar to HHSEGS (LS) | Similar to HHSEGS (LS) | Similar to HHSEGS (LS) |
| Potential to disturb, destroy, or visually degrade significant prehistoric and historical archaeological sites *beyond* the site | PSU | — | Similar to HHSEGS (PSU) | Similar to HHSEGS (PSU) | Much less than HHSEGS (PSM) | Much less than HHSEGS (PSM) |
| Potential impacts on significant built-environment cultural resources *on* the site | PSU | — | Similar to HHSEGS (LS) | Similar to HHSEGS (PSU) | Similar to HHSEGS (PSU) | Similar to HHSEGS (PSU) |
| Potential impacts on significant built-environment cultural resources *beyond* the site | PSU | — | Similar to HHSEGS (PSU) | Similar to HHSEGS (PSU) | Much less than HHSEGS (PSM) | Somewhat less than HHSEGS (PSM) |
| Potential to disturb, destroy, or visually degrade significant ethnographic resources *on* the site | SU | — | Similar to HHSEGS (SU) | Similar to HHSEGS (SU) | Similar to HHSEGS (PSU) | Similar to HHSEGS (PSU) |
| Potential to disturb, destroy, or visually degrade significant ethnographic resources *beyond* the site | SU | — | Similar to HHSEGS (SU) | Similar to HHSEGS (SU) | Somewhat less HHSEGS (PSU) | 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 | UNK | — | Similar to HHSEGS (UNK) | Similar to HHSEGS (UNK) | Similar to HHSEGS (UNK) | Much greater than HHSEGS (UNK) |

| Alternatives Appendix-2<br>Summary Comparison of the Proposed Project's Impacts to the Project Alternatives and the No-Project Alternative | | | | | | |
|---|---|---|---|---|---|---|
| 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 |
| Potential impacts on emergency response services | UNK | — | Similar to HHSEGS (UNK) | Similar to HHSEGS (UNK) | Similar to HHSEGS (UNK) | Much greater than HHSEGS (UNK) |
| 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) |
| 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) |
| Potential impacts on paleontological resources | SM | — | Similar to HHSEGS (PSM) | Same as HHSEGS (SM) | Much 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) |
| 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) |
| Potential for release of hazardous materials to occur off-site | SM | — | Similar to HHSEGS (PSM) | Similar to HHSEGS (SM) | Similar to HHSEGS 9SM) | Somewhat greater than HHSEGS (SM) |
| 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) |

| Alternatives Appendix-2<br>Summary Comparison of the Proposed Project's Impacts to the Project Alternatives and the No-Project Alternative | | | | | | |
|---|---|---|---|---|---|---|
| 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 |
| Conversion of agricultural land | — | — | Much greater than HHSEGS (SM) | — | — | — |
| Noise and Vibration | | | | | | |
| Potential for noise to impact noise-sensitive receptors | SM | — | Somewhat greater than HHSEGS (SM) | Somewhat greater than HHSEGS (PSM) | Much less than HHSEGS (PSM) | Similar to HHSEGS (SM) |
| Public Health | | | | | | |
| 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) |
| Socioeconomic Resources | | | | | | |
| Construction employment and increased taxes and fees | 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 (LTS) | — | — | — |
| Potential impacts to emergency medical and law enforcement services | 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) |
| Potential for glint and glare to cause safety hazards from an operator control perspective | SM | — | Similar to HHSEGS (SM) | Same as HHSEGS (SM) | Much lower than HHSEGS (PSM) | Similar to HHSEGS (SM) |

| Alternatives Appendix-2<br>Summary Comparison of the Proposed Project's Impacts to the Project Alternatives and the No-Project Alternative | | | | | | |
|---|---|---|---|---|---|---|
| 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 |
| (i.e., vehicle drivers and aircraft pilots) | | | | | | |
| 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) |
| 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) |
| 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 (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) |
| 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 (PSM) |

| Alternatives Appendix-2<br>Summary Comparison of the Proposed Project's Impacts to the Project Alternatives and the No-Project Alternative | | | | | | |
|---|---|---|---|---|---|---|
| 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 |
| 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) |
| Potential for impacts on human health and the environment related to past or present soil or water contamination | PSM | — | Somewhat greater than HHSEGS (PSM) | Same as HHSEGS (PSM) | Same as HHSEGS (PSM) | Same as 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 greater than HHSEGS (SM) | Much greater 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) |
| 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) |
| Water quality impacts from storm damage | PSM | — | Similar to HHSEGS (PSM) | Similar to HHSEGS (PSM) | Similar to HHSEGS (PSM) | Greater 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) |
| Water quality impacts from sanitary waste | SM | — | Same as HHSEGS (SM) | Same as HHSEGS (SM) | Same as HHSEGS (SM) | Same as HHSEGS (SM) |

**Alternatives Appendix-2**
**Summary Comparison of the Proposed Project's Impacts to the Project Alternatives and the No-Project Alternative**

| 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 |
|---|---|---|---|---|---|---|
| Potential impacts from on-site and off-site flooding | LS | — | Similar to HHSEGS (LS) | Similar to HHSEGS (LS) | Similar to HHSEGS (LS) | Much less than HHSEGS (LS) |
| Potential to impede or redirect 100-year flood flows, as shown on Federal Emergency Management Agency maps | LS | — | Similar to HHSEGS (LS) | Similar to HHSEGS (LS) | Similar to HHSEGS (LS) | Similar to HHSEGS (LS) |
| Water Supply | | | | | | |
| Potential impacts on local wells | PSM | Much less than HHSEGS (LS) | Similar to HHSEGS (PSM) | Greater than HHSEGS (PSM) | Much less than HHSEGS (PSM) | Similar to HHSEGS (PSM) |
| Potential impacts on groundwater basin balance | PSM | Much less than HHSEGS (LS) | Similar to HHSEGS (PSM) | Greater than HHSEGS (PSM) | Much less than HHSEGS (PSM) | Similar to HHSEGS (PSM) |

Notes: — = no impact
UNK = significance of impact is unknown
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

# APPENDIX ALTERNATIVES-3: 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 | Carolyn Chainey-Davis<br>Carol Watson |
| Cultural Resources | Michael D. McGuirt, RPA<br>Thomas M. Gates, Ph.D.<br>Amber Grady |
| Fire Protection | Geoff Lesh |
| Geology and Paleontology | Casey Weaver |
| Hazardous Materials Management | Geoff Lesh |
| Land Use | John Hope, 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 Hydrology | Marylou Taylor, P.E. |
| Water Supply | Mike Conway |

# GENERAL CONDITIONS
# INCLUDING
# COMPLIANCE MONITORING AND CLOSURE PLAN

Joseph Douglas

## INTRODUCTION

The Hidden Hills Solar Electric Generating Station (HHSEGS) 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 HHSEGS 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 decision on the Application for Certification 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 any and all potential 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.

## DEFINITIONS

The following terms and definitions are used to establish when Conditions of Certification are implemented.

## PRE-CONSTRUCTION SITE MOBILIZATION

Site mobilization is limited preconstruction activities at the site to allow for the installation of fencing, construction trailers, construction trailer utilities, and construction trailer parking at the site. Limited ground disturbance, grading, and trenching associated with the above mentioned pre-construction activities is considered part of site

mobilization. Walking, driving or parking a passenger vehicle, pickup truck and/or light vehicles is allowable during site mobilization.

## CONSTRUCTION

Onsite work to install permanent equipment or structures for any facility.

## GROUND DISTURBANCE

Construction-related ground disturbance refers to activities that result in the removal of top soil or vegetation at the site beyond site mobilization needs, and for access roads and linear facilities.

## GRADING, BORING, AND TRENCHING

Construction-related grading, boring, and trenching refers to activities that result in subsurface soil work at the site and for access roads and linear facilities, e.g., alteration of the topographical features such as leveling, removal of hills or high spots, moving of soil from one area to another, and removal of soil.

Notwithstanding the definitions of ground disturbance, grading, boring, and trenching above, construction does **not** include the following:

1. the installation of environmental monitoring equipment;

2. a 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; and

5. any work to provide access to the site for any of the purposes specified in "Construction" 1, 2, 3, or 4 above.

## START OF COMMERCIAL OPERATION

For compliance monitoring purposes, "commercial operation" begins after the completion of start-up and commissioning, when the power plant has reached reliable steady-state production of electricity at the rated capacity. At the start of commercial operation, plant control is usually transferred from the construction manager to the plant operations manager.

## COMPLIANCE PROJECT MANAGER RESPONSIBILITIES

The Compliance Project Manager (CPM) shall oversee the compliance monitoring and is responsible for:

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 Decision;

2. resolving complaints;

3. processing post-certification changes to the conditions of certification, project description (petition to amend), and ownership or operational control (petition for change of ownership) (See instructions for filing petitions);

4. documenting and tracking compliance filings; and

5. ensuring that compliance files are maintained and accessible.

The CPM is the contact person for the Energy Commission and will consult with appropriate responsible agencies, Energy Commission, and staff when handling disputes, complaints, and amendments.

All project compliance submittals are submitted to the CPM for processing. Where a submittal required by a condition of certification requires CPM approval, the approval will involve all appropriate Energy Commission staff and management. All submittals must include searchable electronic versions (pdf or MS Word files).

## PRE-CONSTRUCTION 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 pre-construction 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 Energy Commission conditions will not delay the construction and operation of the plant due to oversight and to preclude any last minute, unforeseen issues from arising. Pre-construction 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 shall maintain the following documents and information as a public record, in either the Compliance file or Dockets file, 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 complaints of 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.

## PROJECT OWNER RESPONSIBILITIES

The project owner is responsible for ensuring that the compliance conditions of certification and all other conditions of certification that appear in the Commission 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 of the case and revocation of Energy Commission certification; an administrative fine; or other action as appropriate. A summary of the Compliance Conditions of Certification is included as **Compliance Table 1** at the conclusion of this section.

## COMPLIANCE CONDITIONS OF CERTIFICATION

### UNRESTRICTED ACCESS (COMPLIANCE-1)

The CPM, responsible Energy Commission staff, and delegated agencies or consultants shall be guaranteed and granted unrestricted access to the power plant site, related facilities, project-related staff, and the records maintained on-site for the purpose of conducting 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.

### Compliance Record (COMPLIANCE-2)

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.

### Compliance Verification Submittals (COMPLIANCE-3)

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 of compliance with the conditions of certification can be accomplished by the following:

1. monthly and/or annual compliance reports, filed by the project owner or authorized agent, reporting on work done and providing pertinent documentation, as required by the specific conditions of certification;

2. appropriate letters from delegate agencies verifying compliance;

3. energy Commission staff audits of project records; and/or

4. energy Commission staff inspections of work, or other evidence that the requirements are satisfied.

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 by condition number(s), and a brief description of the subject of the submittal**. 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." When submitting supplementary or corrected information, the project owner shall reference the date of the previous submittal and CEC submittal number.

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 hardcopy submittals shall be addressed as follows:

**Compliance Project Manager**
**(11-AFC-2C)**
**California Energy Commission**
**1516 Ninth Street (MS-2000)**
**Sacramento, CA 95814**

Those submittals shall be accompanied by a searchable electronic copy, on a CD or by e-mail, as agreed upon by the CPM.

If the project owner desires Energy Commission staff action by a specific date, that request shall be made in the submittal cover letter and shall include a detailed explanation of the effects on the project if that date is not met.

## Pre-Construction Matrix and Tasks Prior to Start of Construction (COMPLIANCE-4)

Prior to commencing 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 will be included with the project owner's first compliance submittal or prior to the first pre-construction meeting, whichever comes first. It will be submitted in the same format as the compliance matrix described below.

Construction shall not commence until the pre-construction matrix is submitted, all pre-construction conditions have been complied with, and the CPM has issued a letter to the project owner authorizing construction. Various lead times for submittal of

compliance verification documents to the CPM for conditions of certification 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 ensure that project construction may proceed according to schedule.

Failure to submit compliance documents within the specified lead-time may result in delays in authorization to commence various stages of project development.

If the project owner anticipates commencing project construction as soon as the project is certified, it may be necessary for the project owner to file compliance submittals prior to project certification. Compliance submittals should be completed in advance where the necessary lead time for a required compliance event extends beyond the date anticipated for start of construction. The project owner must understand that the submittal of compliance documents prior to project certification is at the owner's own risk. Any approval by Energy Commission staff is subject to change, based upon the Commission Decision.

## Compliance Reporting

There are two different 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 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.

## Compliance Matrix (COMPLIANCE-5)

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;

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., 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, the date of the amendment.

Satisfied conditions shall be placed at the end of the matrix.

## Monthly Compliance Report (COMPLIANCE-6)

The first Monthly Compliance Report is due one month following the Energy Commission business meeting date upon which the project was approved, 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 pre-construction and construction of the project, the project owner or authorized agent shall submit an original and an electronic searchable version of the Monthly Compliance Report within 10 working days after the end of each reporting month. Monthly Compliance Reports shall be clearly identified for the month being reported. The reports shall contain, at a minimum:

1. 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;

2. 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;

3. an initial, and thereafter updated, compliance matrix showing the status of all conditions of certification;

4. a list of conditions that have been satisfied during the reporting period, and a description or reference to the actions that satisfied the condition;

5. a list of any submittal deadlines that were missed, accompanied by an explanation and an estimate of when the information will be provided;

6. a cumulative listing of any approved changes to conditions of certification;

7. a listing of any filings submitted to, or permits issued by, other governmental agencies during the month;

8. 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;

9. a listing of the month's additions to the on-site compliance file; and

10. a listing of complaints, notices of violation, official warnings, and citations received during the month, a description of the resolution of the resolved actions, and the status of any unresolved actions.

All sections, exhibits, or addendums shall be separated by tabbed dividers or as acceptable by the CPM.

## Annual Compliance Report (COMPLIANCE-7)

After construction is complete, the project owner shall submit 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. Each Annual Compliance Report shall include the AFC number, identify the reporting period, and shall contain the following:

1. 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);

2. a summary of the current project operating status and an explanation of any significant changes to facility operations during the year;

3. 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;

4. a cumulative listing of all post-certification changes approved by the Energy Commission or cleared by the CPM;

5. an explanation for any submittal deadlines that were missed, accompanied by an estimate of when the information will be provided;

6. a listing of filings submitted to, or permits issued by, other governmental agencies during the year;

7. a projection of project compliance activities scheduled during the next year;

8. a listing of the year's additions to the on-site compliance file;

9. 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

10. a listing of complaints, notices of violation, official warnings, and citations received during the year, a description of the resolution of any resolved matters, and the status of any unresolved matters.

## Confidential Information (COMPLIANCE-8)

Any information that the project owner deems 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 that is determined to be confidential shall be kept confidential as provided for in Title 20, California Code of Regulations, section 2501, et. seq.

## Annual Energy Facility Compliance Fee (COMPLIANCE-9)

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. You may also contact the CPM for the current fee information. The initial payment is due on the date of the Business Meeting at which the Energy Commission adopts the final decision. All subsequent payments are due by July 1 of each year in which the facility retains its certification. The payment instrument shall be made payable to the California Energy Commission and mailed to: Accounting Office MS-02, California Energy Commission, 1516 9th St., Sacramento, CA 95814.

## Reporting of Complaints, Notices, and Citations (COMPLIANCE-10)

Prior to the start of construction, the project owner must send a letter to property owners living within one 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 24 hours per day, it shall include automatic answering with a date and time stamp recording. All recorded complaints shall be responded to within 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/power_plants_contacts.html.

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 10 days of receipt. Complaints shall be logged and numbered. Noise complaints shall be recorded on the form provided in the **NOISE** conditions of certification. All other complaints shall be recorded on the complaint form (Attachment A).

# FACILITY CLOSURE

At some point in the future, the project will cease operation and 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 situation and project setting that exist at the time of closure. Laws, Ordinances, Regulations, and Standards (LORS) pertaining to facility closure are identified in the sections dealing with each technical area. Facility closure will be consistent with LORS in effect at the time of closure.

There are at least three circumstances in which a facility closure can take place: planned closure, unplanned temporary closure, and unplanned permanent closure**.**

## CLOSURE DEFINITIONS

### PLANNED CLOSURE

A planned closure occurs when the facility is closed in an anticipated, orderly manner, at the end of its useful economic or mechanical life, or due to gradual obsolescence.

### UNPLANNED TEMPORARY 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.

### UNPLANNED PERMANENT CLOSURE

An unplanned permanent closure occurs if the project owner closes the facility suddenly and/or unexpectedly, on a permanent basis. This includes unplanned closure where the owner implements the on-site contingency plan. It can also include unplanned closure where the project owner fails to implement the contingency plan, and the project is essentially abandoned.

## COMPLIANCE CONDITIONS FOR FACILITY CLOSURE

### PLANNED CLOSURE (COMPLIANCE-11)

In order to ensure that a planned facility closure does not create adverse impacts, a closure process that provides for careful consideration of available options and applicable laws, ordinances, regulations, standards, and local/regional plans in existence at the time of closure will be undertaken. To ensure adequate review of a planned project closure, the project owner shall submit a proposed facility closure plan to the Energy Commission for review and approval at least 12 months (or other period of time agreed to by the CPM) prior to the commencement of closure activities. The project owner shall file 120 copies (or other number of copies agreed upon by the CPM) of a proposed facility closure plan with the Energy Commission.

The plan shall:

1. identify and discuss any impacts and mitigation to address significant adverse impacts associated with proposed closure activities and to address facilities, equipment, or other project related remnants that will remain at the site;

2. identify a schedule of activities for closure of the power plant site, transmission line corridor, and all other appurtenant facilities constructed as part of the project;

3. identify any facilities or equipment intended to remain on site after closure, the reason, and any future use; and

4. address conformance of the plan with all applicable laws, ordinances, regulations, standards, and local/regional plans in existence at the time of facility closure, and applicable conditions of certification.

Prior to submittal of the proposed facility closure plan, a meeting shall be held between the project owner and the Energy Commission CPM for the purpose of discussing the specific contents of the plan.

In the event that there are significant issues associated with the proposed facility closure plan's approval, or if the desires of local officials or interested parties are inconsistent with the plan, the CPM shall hold one or more workshops and/or the Energy Commission may hold public hearings as part of its approval procedure.

As necessary, prior to or during the closure plan process, the project owner shall take appropriate steps to eliminate any immediate threats to public health and safety and the environment, but shall not commence any other closure activities until the Energy Commission approves the facility closure plan.

## UNPLANNED TEMPORARY CLOSURE/ON-SITE CONTINGENCY PLAN (COMPLIANCE-12)

In order to ensure that public health and safety and the environment are protected in the event of an unplanned temporary facility closure, it is essential to have an on-site contingency plan in place. The on-site contingency plan will help to ensure that all necessary steps to mitigate public health and safety impacts and environmental impacts are taken in a timely manner.

The project owner shall submit an on-site contingency plan for CPM review and approval. The plan shall be submitted no less than 60 days (or other time agreed to by the CPM) prior to commencement of commercial operation. The approved plan must be in place prior to commercial operation of the facility and shall be kept at the site at all times.

The project owner, in consultation with the CPM, will update the on-site contingency plan as necessary. The CPM may require revisions to the on-site contingency plan over the life of the project. In the annual compliance reports submitted to the Energy Commission, the project owner will review the on-site contingency plan, and recommend changes to bring the plan up to date. Any changes to the plan must be approved by the CPM.

The on-site contingency plan shall provide for taking immediate steps to secure the facility from trespassing or encroachment. In addition, for closures of more than 90 days, unless other arrangements are agreed to by the CPM, the 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**)

In addition, consistent with requirements under unplanned permanent closure addressed below, the nature and extent of insurance coverage, and major equipment warranties must also be included in the on-site contingency plan. In addition, the status of the insurance coverage and major equipment warranties must be updated in the annual compliance reports.

In the event of an unplanned temporary closure, the project owner shall notify the CPM, as well as other responsible agencies, by telephone, fax, or e-mail, within 24 hours and shall take all necessary steps to implement the on-site contingency plan. The project owner shall keep the CPM informed of the circumstances and expected duration of the closure.

If the CPM determines that an unplanned temporary closure is likely to be permanent, or for a duration of more than 12 months, a closure plan consistent with the requirements for a planned closure shall be developed and submitted to the CPM within 90 days of the CPM's determination (or other period of time agreed to by the CPM).

## UNPLANNED PERMANENT CLOSURE/ON-SITE CONTINGENCY PLAN (COMPLIANCE-13)

The on-site contingency plan required for unplanned temporary closure shall also cover unplanned permanent facility closure. All of the requirements specified for unplanned temporary closure shall also apply to unplanned permanent closure.

In addition, the on-site contingency plan shall address how the project owner will ensure that all required closure steps will be successfully undertaken in the event of abandonment.

In the event of an unplanned permanent closure, the project owner shall notify the CPM, as well as other responsible agencies, by telephone, fax, or e-mail within 24 hours and shall take all necessary steps to implement the on-site contingency plan. The project owner shall keep the CPM informed of the status of all closure activities.

A closure plan, consistent with the requirements for a planned closure, shall be developed and submitted to the CPM within 90 days of the permanent closure or another period of time agreed to by the CPM.

## POST CERTIFICATION CHANGES TO THE ENERGY COMMISSION DECISION: AMENDMENTS, OWNERSHIP CHANGES, STAFF APPROVED PROJECT MODIFICATIONS AND VERIFICATION CHANGES (COMPLIANCE-14)

The project owner must petition the Energy Commission pursuant to Title 20, California Code of Regulations, section 1769, in order to modify the project (including linear facilities) design, operation or performance requirements, and 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 enforcement action that could result in civil penalties in accordance with section 25534 of the Public Resources Code.

A petition is required for **amendments** and for **staff approved project modifications** as specified below. Both shall be filed as a "Petition to Amend." Staff will determine if the change is significant or insignificant. For verification changes, a letter from the project owner is sufficient. In all cases, the petition or letter requesting a change should be submitted to the CPM, who will file it with the Energy Commission's Dockets Unit in accordance with Title 20, California Code of Regulations, section 1209.

The criteria that determine which type of approval and the process that applies are explained below. They reflect the provisions of Section 1769 at the time this condition was drafted. If the Commission's rules regarding amendments are amended, the rules in effect at the time an amendment 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 (including linear facilities) design, operation, or performance requirements. If a proposed modification results in deletion or change of a condition of certification, or makes changes that would cause the project not to comply with any applicable laws, ordinances, regulations, or standards the petition will be processed as a formal amendment to the final decision, which requires public notice and review of the Energy Commission staff analysis and approval by the full Commission. The petition shall be in the form of a legal brief and fulfill the requirements of Section 1769(a). 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. The petition shall be in the form of a legal brief and fulfill the requirements of Section 1769(b). 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 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 staff files an intention to approve the proposed project modifications, any person may file an objection to staff's determination within 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 staff's determination, the petition must be processed as a formal amendment to the decision and must be approved by the full commission at a noticed business meeting or hearing.

## Verification Change

A verification may be modified by the CPM without requesting an amendment to the decision if the change does not conflict with the conditions of certification and provides an effective alternate means of verification.

## Notification to CPM of a Situation Requiring an Unplanned Response from an Emergency Services Agency (COMPLIANCE 15)

In the event of any incident that requires 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 notify the CPM within two hours of the initiation of the event by telephone, fax, or e-mail, to report the circumstances of the event, its current status, and its expected duration.

The project owner shall provide the CPM with all reports that have been prepared regarding any such incident within 10 days of preparation of those documents. This requirement covers any incident reports prepared by the project owner, as well as reports prepared by 3rd parties to which the project owner has access. Such reports shall be unredacted and in their original form.

# CBO DELEGATION AND AGENCY COOPERATION

In performing construction and operation monitoring of the project, 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 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 environmental protection when conducting project monitoring.

## ENFORCEMENT

The Energy Commission's legal authority to enforce the terms and conditions of its Decision is specified in Public Resources Code sections 25534 and 25900. The Energy Commission may amend or revoke the certification for any facility, and may impose a civil penalty for any significant failure to comply with the terms or conditions of the Energy Commission Decision. The specific action and amount of any fines the Energy Commission may impose would take into account the specific circumstances of the incident(s). This would include such factors as the previous compliance history, whether the cause of the incident involves willful disregard of LORS, oversight, unforeseeable events, and other factors the Energy Commission may consider.

## NONCOMPLIANCE COMPLAINT PROCEDURES

Any person or agency may file a complaint 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, but in many instances the noncompliance can be resolved by using the informal dispute resolution process. Both the informal and formal complaint procedure, as described in current State law and regulations, are described below. They shall be followed unless superseded by future law or regulations.

## INFORMAL DISPUTE RESOLUTION PROCESS

The following procedure is designed to informally resolve disputes concerning the interpretation of compliance with the requirements of this compliance plan. 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 substitute for, or prerequisite to it. This informal procedure may not be used to change the terms and conditions of certification as approved by the Energy Commission, although the agreed upon resolution may result in a project owner, or in some cases the Energy Commission staff, proposing an amendment.

The process encourages all parties involved in a dispute to discuss the matter and to reach an agreement resolving the dispute. If a dispute cannot be resolved, then the matter must be brought before the full Energy Commission for consideration via the complaint and investigation procedure.

### 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 terms and conditions of certification. All requests for informal investigations shall be made to the designated CPM.

Upon receipt of a request for an informal investigation, the CPM shall promptly notify the project owner of the allegation by telephone and letter. All known and relevant

information of the alleged noncompliance shall be provided to the project owner and to the Energy Commission staff. The CPM will evaluate the request and the information to determine if further investigation is necessary. If the CPM finds that further investigation is necessary, the project owner will be asked to promptly investigate the matter. Within seven working days of the CPM's request, provide a written report to the CPM of the results of the investigation, including corrective measures proposed or undertaken. Depending on the urgency of the noncompliance matter, the CPM may conduct a site visit and/or request the project owner to also provide an initial verbal report, within 48 hours.

## Request for Informal Meeting

In the event that either the party requesting an investigation or the 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. Such request shall be made within 14 days of the project owner's filing of its written report. 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;

4. After the conclusion of such a meeting, promptly prepare and distribute copies to all in attendance 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 has not been reached, the CPM shall inform the complainant of the formal complaint process and requirements provided under Title 20, California Code of Regulations, section 1230, et. seq.

## FORMAL DISPUTE RESOLUTION PROCEDURE-COMPLAINTS AND INVESTIGATIONS

Any person may file a complaint with the Energy Commission's Dockets Unit alleging noncompliance with a Commission decision adopted pursuant to Public Resources Code section 25500. Requirements for complaint filings and a description of how complaints are processed are in Title 20, California Code of Regulations, section 1237.

# KEY EVENTS LIST

PROJECT: _____

DOCKET #: _____

COMPLIANCE PROJECT MANAGER: _____

| EVENT DESCRIPTION | DATE |
|---|---|
| Certification Date | |
| Obtain Site Control | |
| Online Date | |
| **POWER PLANT SITE ACTIVITIES** | |
| Start Site Mobilization | |
| Start Ground Disturbance | |
| Start Grading | |
| Start 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 | |

| CONDITION NUMBER | SUBJECT | DESCRIPTION |
|---|---|---|

| | | |
|---|---|---|
| COMPLIANCE-1 | Unrestricted Access | The project owner shall grant Energy Commission staff and delegate agencies or consultants unrestricted access to the power plant site. |
| COMPLIANCE-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. |
| COMPLIANCE-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. |
| COMPLIANCE-4 | Pre-construction Matrix and Tasks Prior to Start of Constructio n | Construction shall not commence until the all of the following activities/submittals have been completed:<br>• property owners living within one mile of the project have been notified of a telephone number to contact for questions, complaints or concerns,<br>• a pre-construction matrix has been submitted identifying only those conditions that must be fulfilled before the start of construction,<br>• all pre-construction conditions have been complied with,<br>• the CPM has issued a letter to the project owner authorizing construction. |
| COMPLIANCE-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. |
| COMPLIANCE-6 | Monthly Compliance Report including a 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. |
| COMPLIANCE-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. |
| COMPLIANCE-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. |
| COMPLIANCE-9 | Annual fees | Payment of Annual Energy Facility Compliance Fee |

| | | |
|---|---|---|
| COMPLIANCE-10 | Reporting of Complaints, Notices and Citations | Within 10 days of receipt, the project owner shall report to the CPM, all notices, complaints, and citations. |
| COMPLIANCE-11 | Planned Facility Closure | The project owner shall submit a closure plan to the CPM at least 12 months prior to commencement of a planned closure. |
| COMPLIANCE-12 | Unplanned Temporary Facility Closure | To ensure that public health and safety and the environment are protected in the event of an unplanned temporary closure, the project owner shall submit an on-site contingency plan no less than 60 days prior to commencement of commercial operation. |
| COMPLIANCE-13 | Unplanned Permanent Facility Closure | To ensure that public health and safety and the environment are protected in the event of an unplanned permanent closure, the project owner shall submit an on-site contingency plan no less than 60 days prior to commencement of commercial operation. |
| COMPLIANCE-14 | Post-certification changes to the Decision | 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. |
| COMPLIANCE-15 | Notification to CPM of Unplanned Response from Emergency Services | The project owner shall notify the CPM within two hours to report the circumstances of the event. The project owner shall provide the CPM with all unredacted, original form reports that have been prepared regarding any such incident within 10 days of preparation of those documents. |

## 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 / Project Description ..... Mike Monasmith

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Cultural Resources .....

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Power Plant Reliability ..... Shahab Khoshmashrab

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Alternatives ..... Jeanine Hinde

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**BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA**
**1516 NINTH STREET, SACRAMENTO, CA 95814**
**1-800-822-6228 – WWW.ENERGY.CA.GOV**

**APPLICATION FOR CERTIFICATION**
**FOR THE *HIDDEN HILLS SOLAR ELECTRIC GENERATING SYSTEM***

DOCKET NO. 11-AFC-02

PROOF OF SERVICE
***(Revised 5/15/2012)***

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# DECLARATION OF SERVICE

I, Raquel Rodriguez, declare that on May 24, 2012, I served and filed copies of the attached, dated May 24, 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 Raquel Rodriguez