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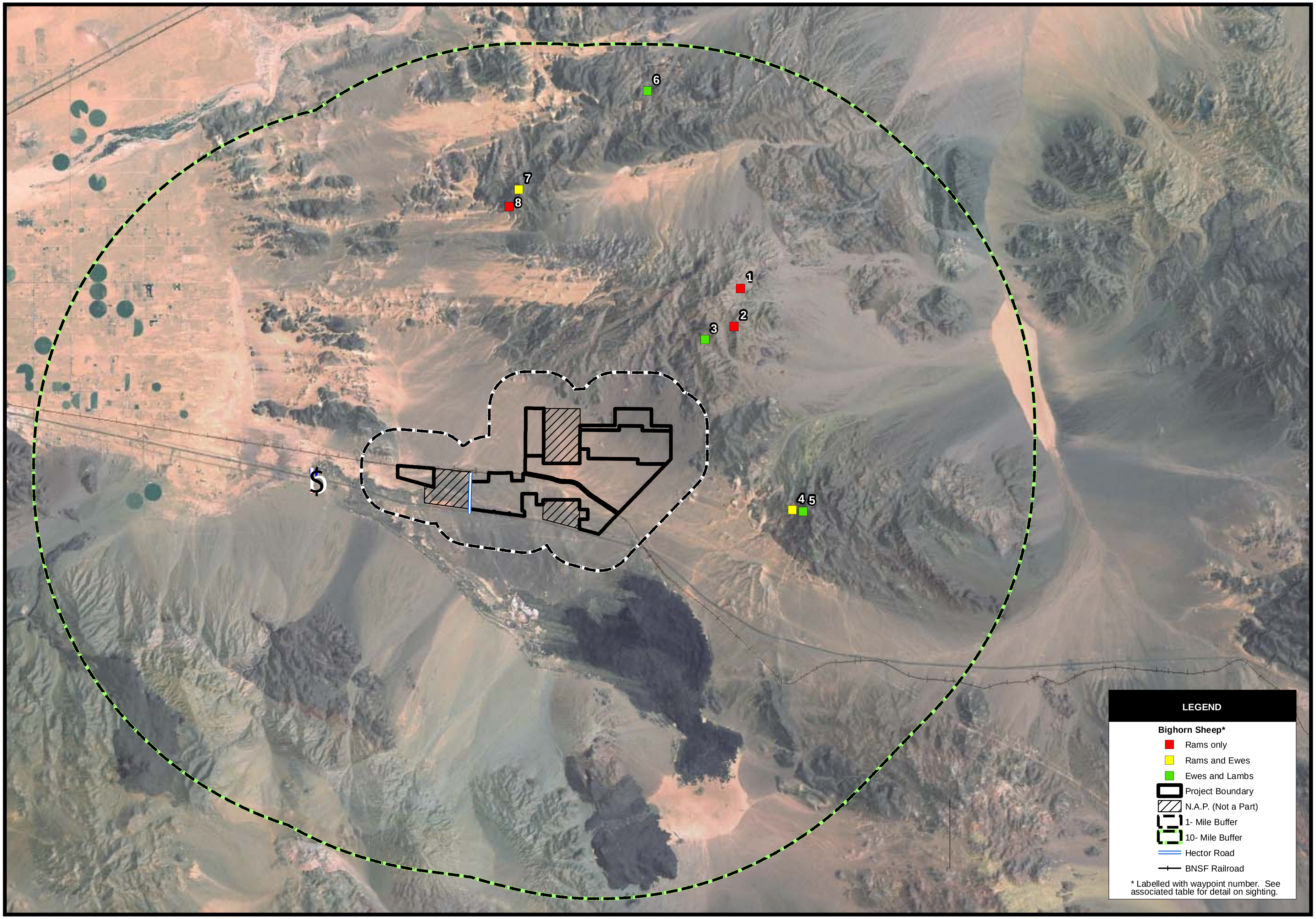
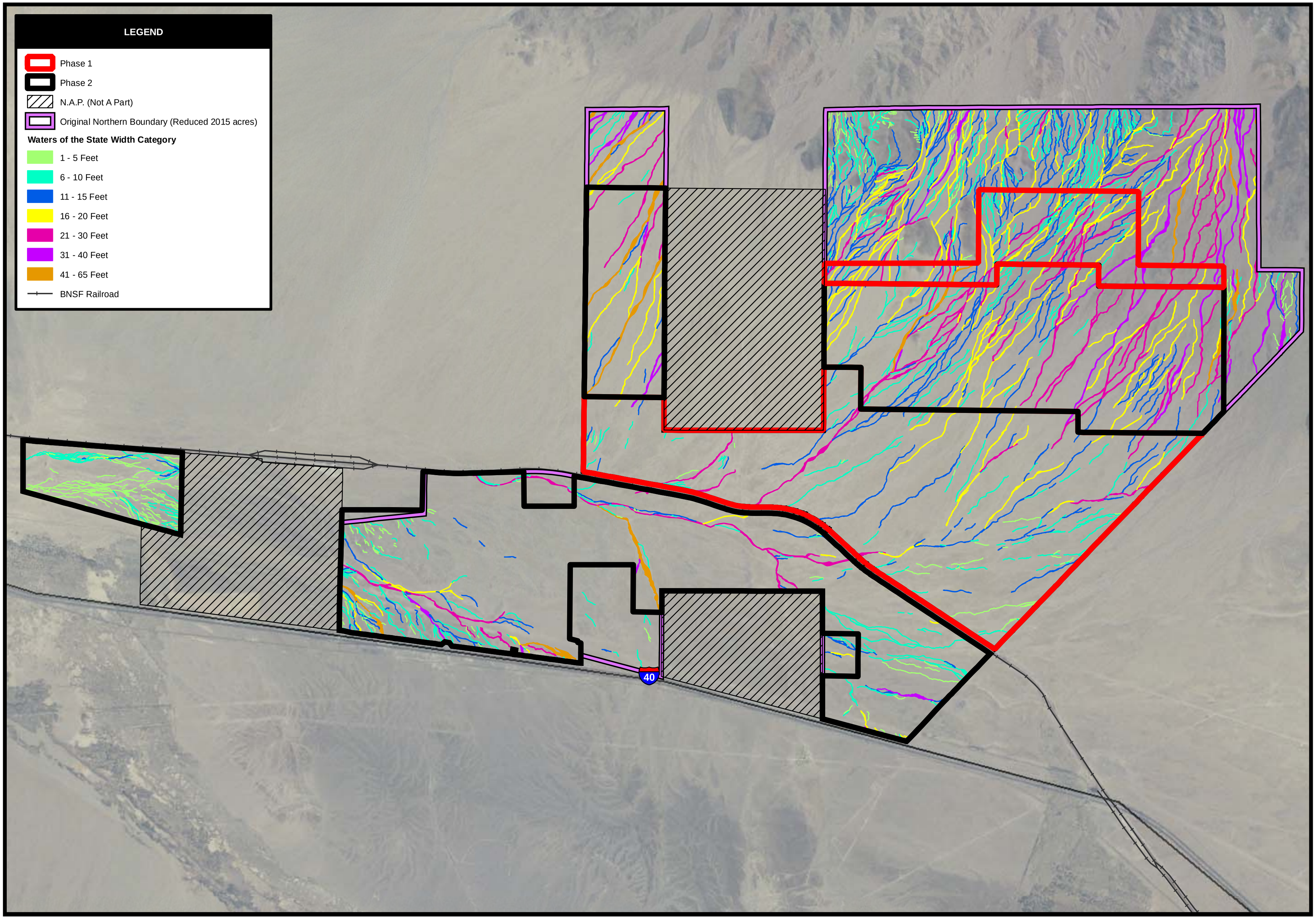
BIOLOGICAL RESOURCES - FIGURE 6
Calico Solar Project - Nelson's Bighorn Sheep Locations



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: URS

BIOLOGICAL RESOURCES - FIGURE 7

Calico Solar Project - State Jurisdictional Waters

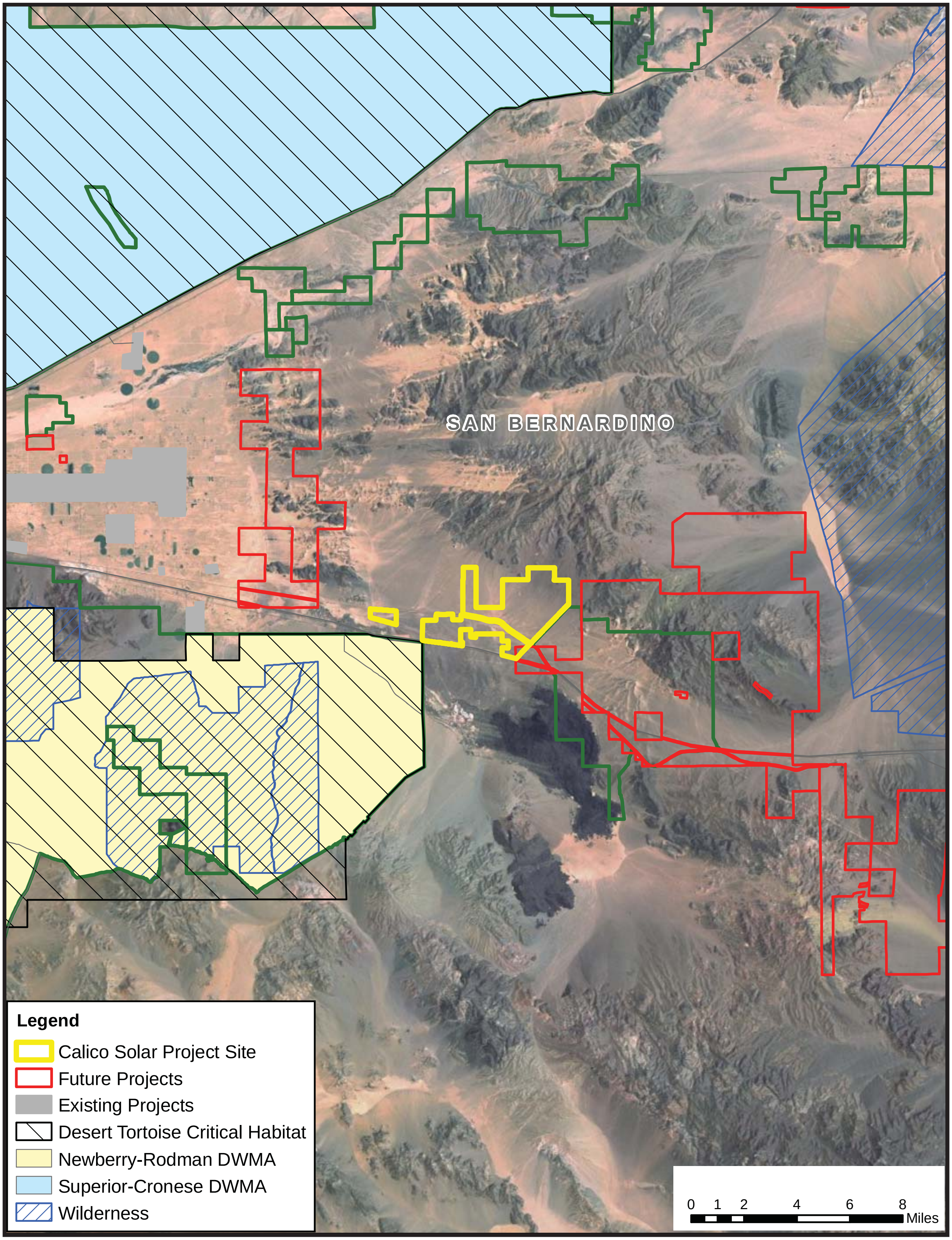


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: URS

BIOLOGICAL RESOURCES - FIGURE 8

Calico Solar Project - Existing Projects/Forseeable Future Projects

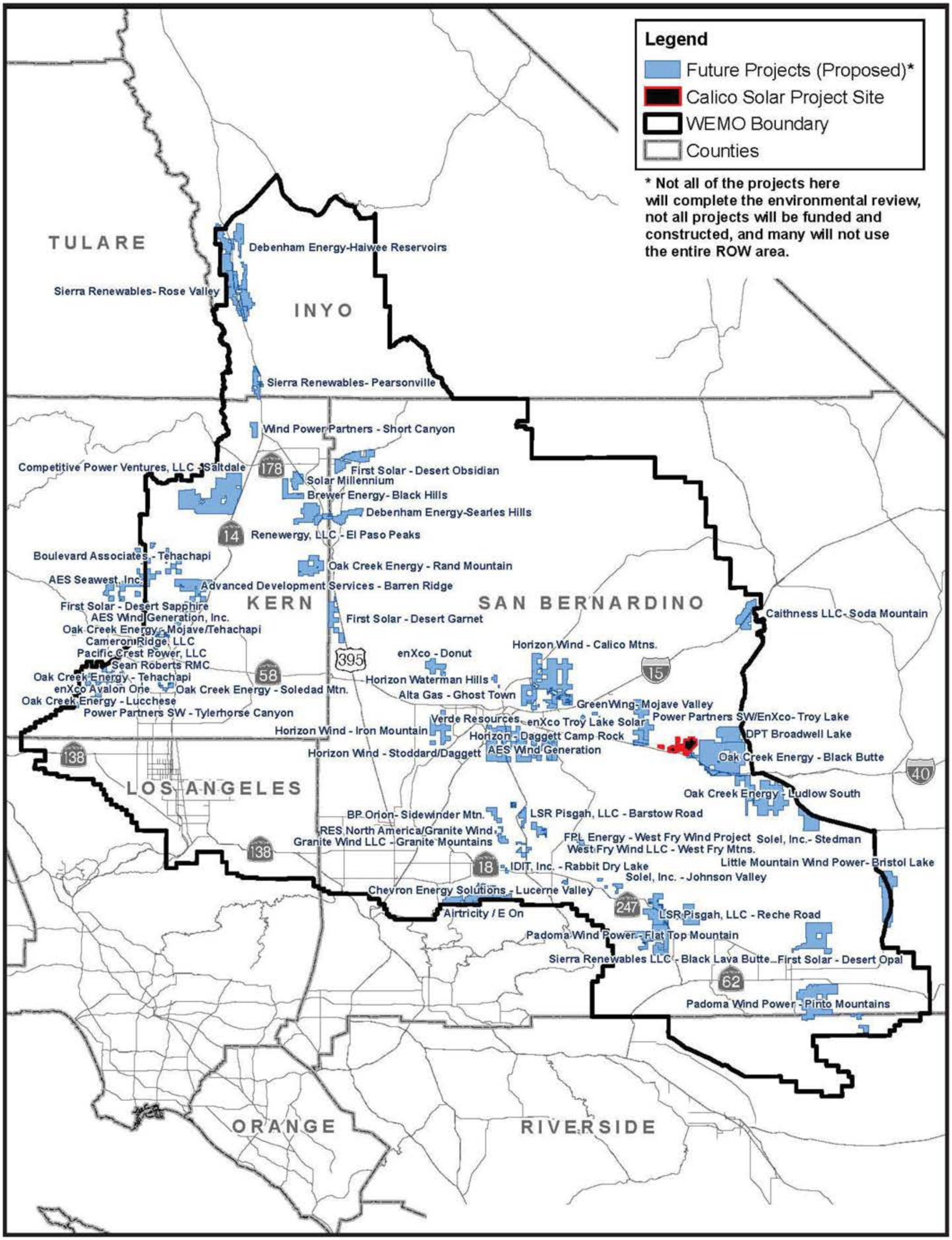


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: BLM, CEC

BIOLOGICAL RESOURCES - FIGURE 9

Calico Solar Project - Forseeable Future Projects (Proposed)

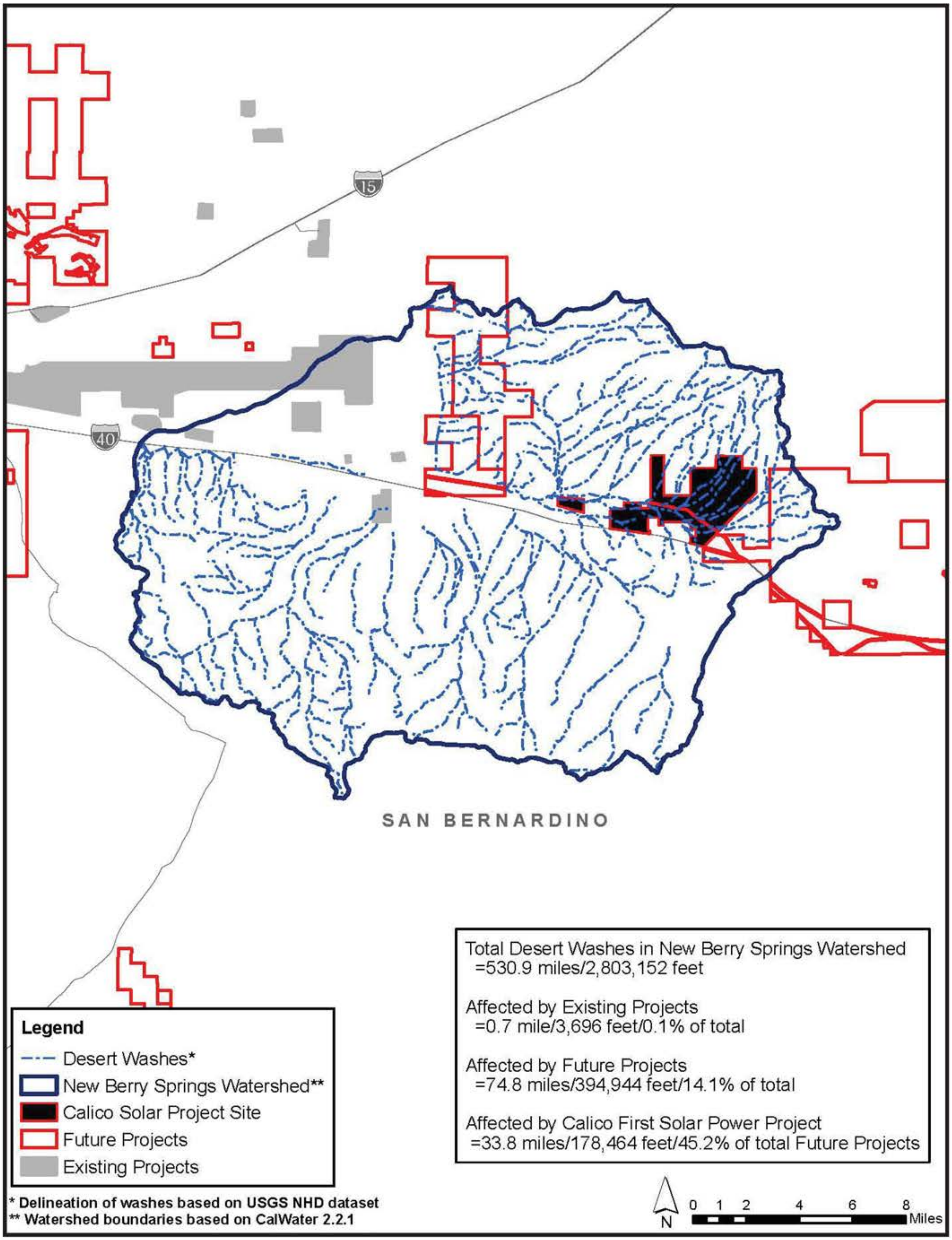


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: BLM, CEC

BIOLOGICAL RESOURCES - FIGURE 10

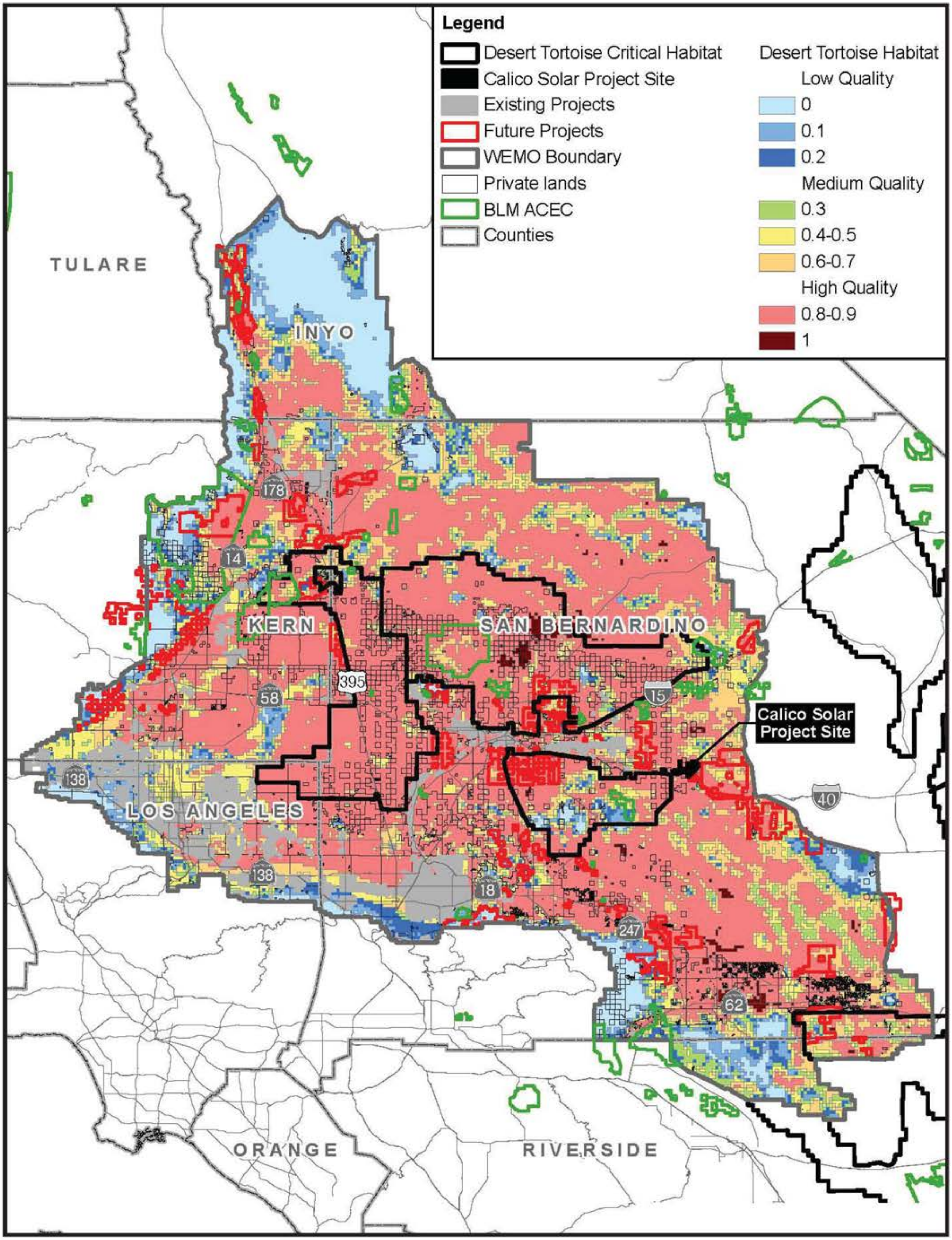
Calico Solar Project - Desert Washes - New Berry Springs Watershed



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: BLM, CEC

BIOLOGICAL RESOURCES - FIGURE 11

Calico Solar Project - Desert Tortoise - Habitat Quality and Critical Habitat

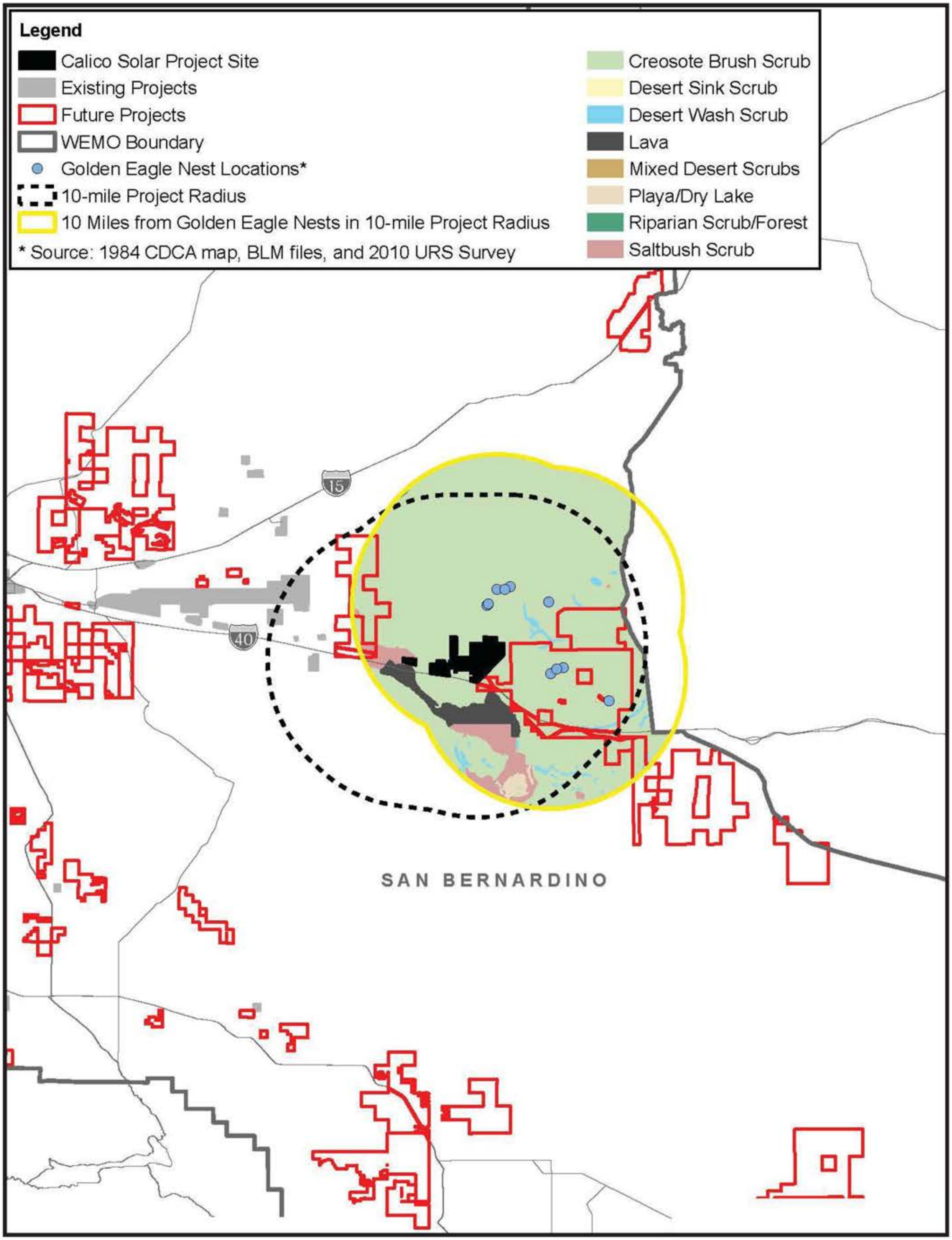


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: BLM, CEC

BIOLOGICAL RESOURCES - FIGURE 12

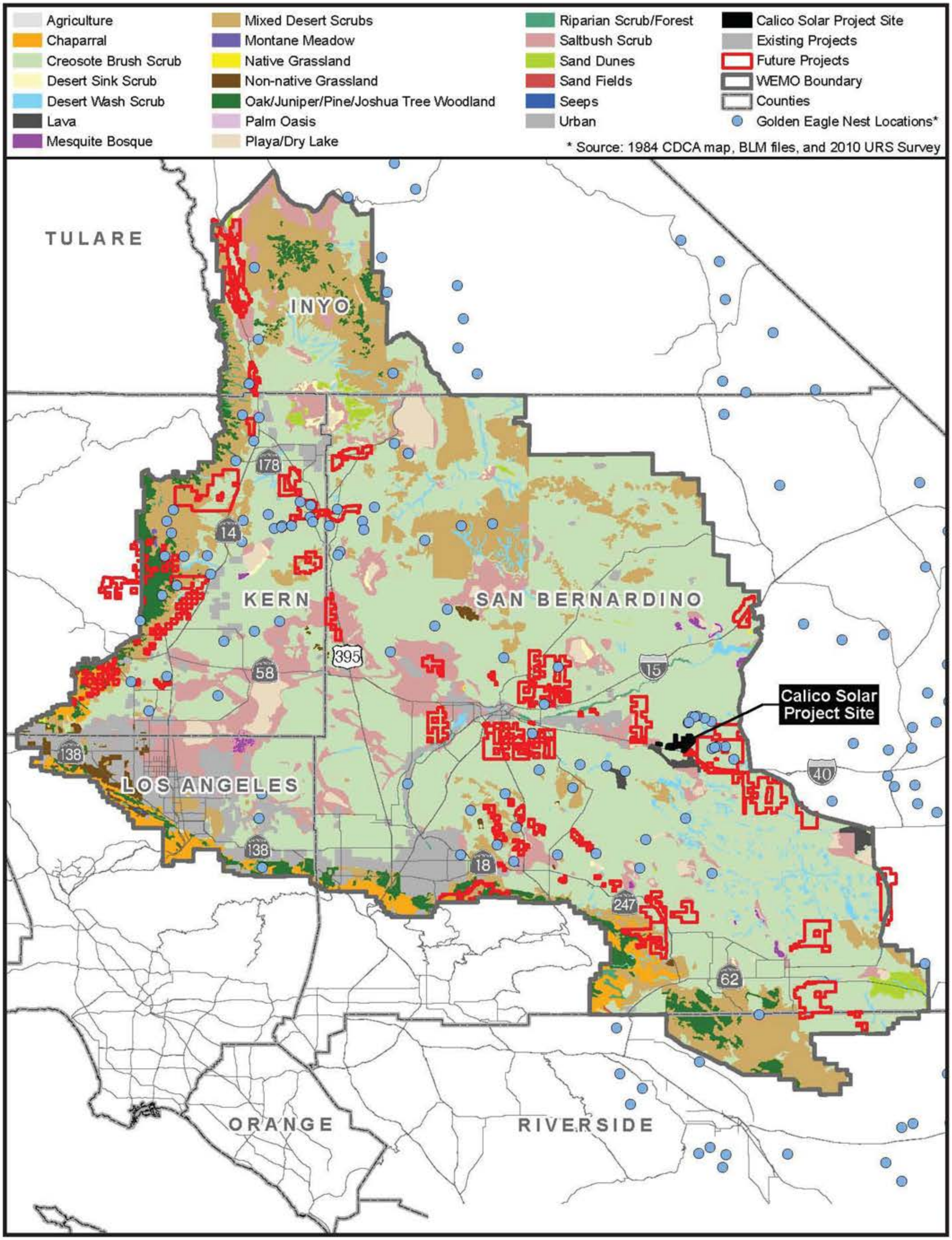
Calico Solar Project - Golden Eagle Foraging Habitat Within 10 Miles of Nests



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

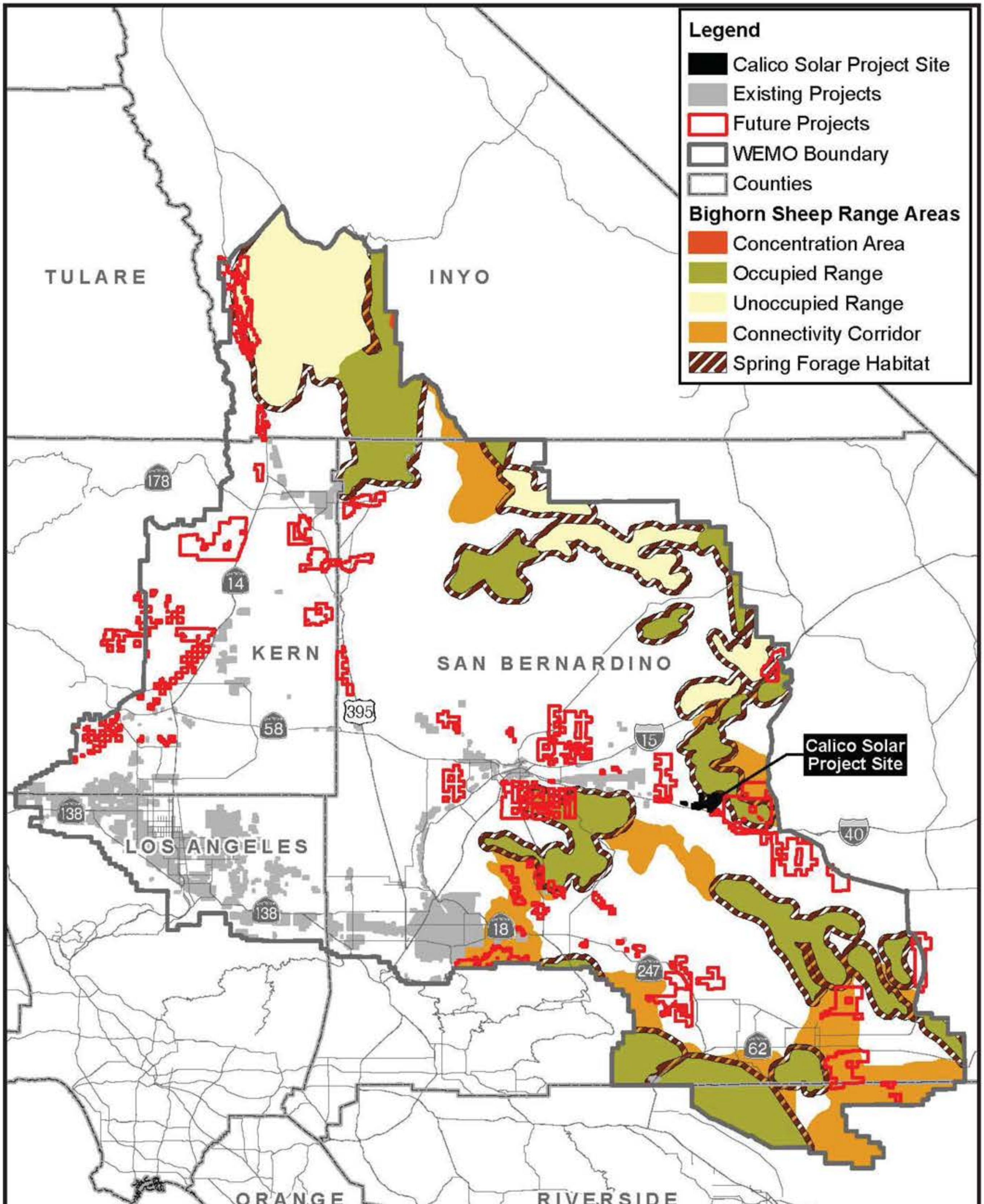
SOURCE: BLM, CEC

BIOLOGICAL RESOURCES - FIGURE 13
Calico Solar Project - Golden Eagle Nest Locations



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: BLM, CEC

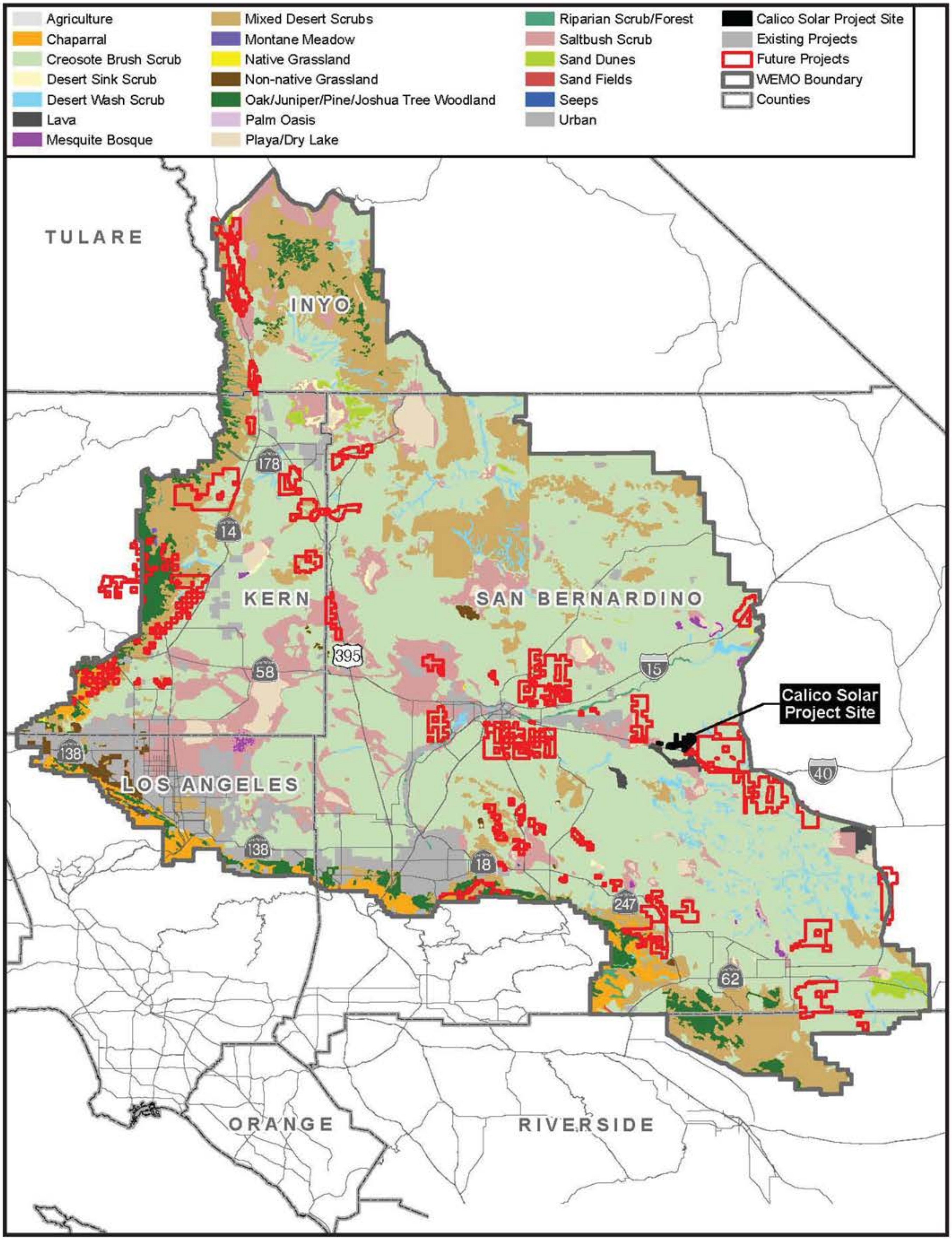
BIOLOGICAL RESOURCES - FIGURE 14
Calico Solar Project - Bighorn Sheep Habitat



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: BLM, CEC

BIOLOGICAL RESOURCES - FIGURE 15

Calico Solar Project - Plant Communities

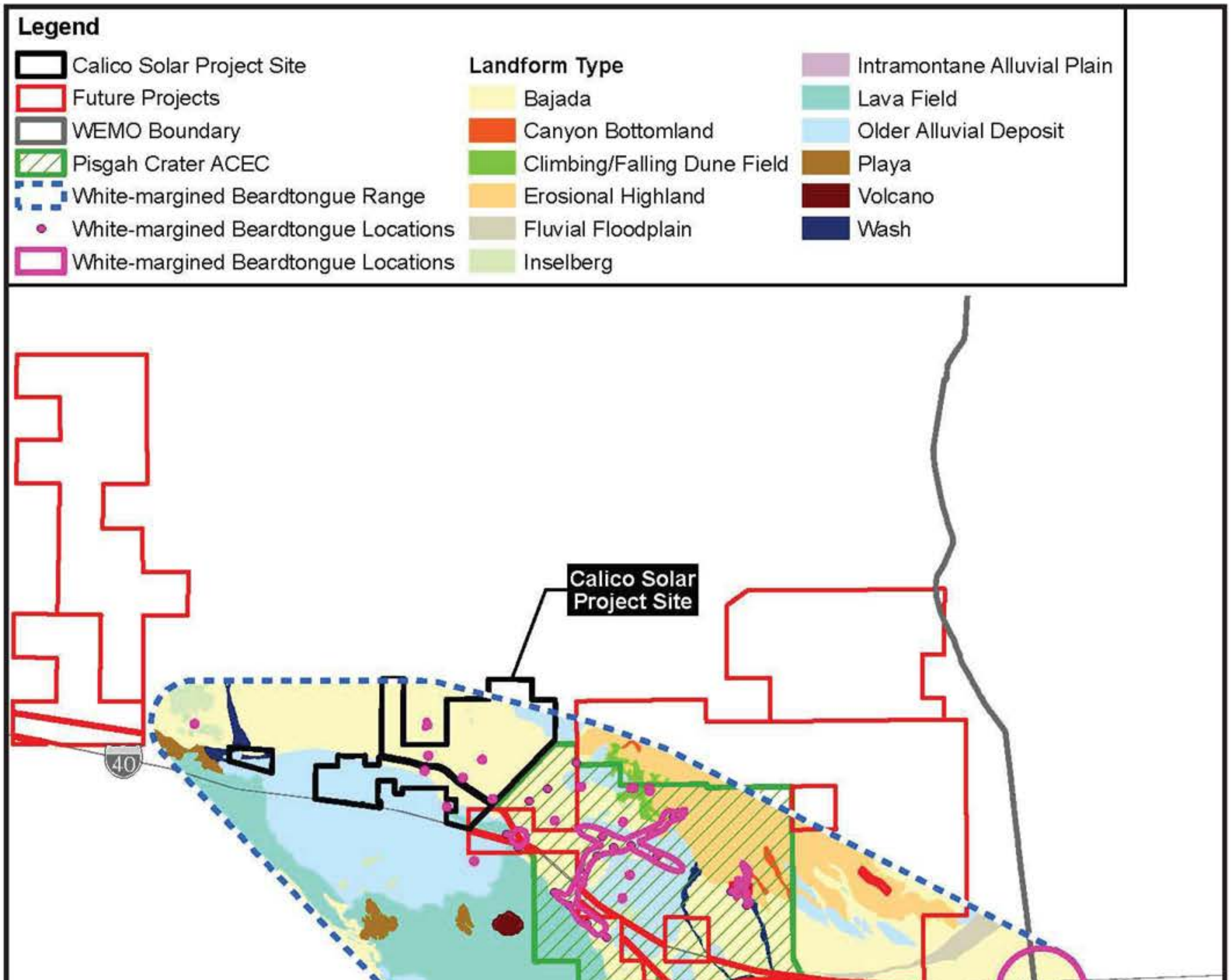


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: BLM, CEC

BIOLOGICAL RESOURCES - FIGURE 16

Calico Solar Project - White-Margined Beardtongue Range in California



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: BLM, CEC

C.3 - CULTURAL RESOURCES AND NATIVE AMERICAN VALUES

The Cultural Resources and Native American Values section of the Supplemental Staff Assessment will be filed subsequently and is not included in this document.

C.4 – GEOLOGY AND PALEONTOLOGY

Testimony of Dal Hunter, Ph.D., C.E.G.

C.4.1 SUMMARY OF CONCLUSIONS

The proposed Calico Solar Project (formerly the Stirling Energy Systems Solar One Project) site is located in an active geologic area of the north-central Mojave Desert Geomorphic Province in central San Bernardino County in south-central California. Because of its geologic setting, the site could be subject to intense levels of earthquake-related ground shaking. The effects of strong ground shaking would need to be mitigated, to the extent practical, through structural designs required by the California Building Code (CBC 2007) and the project geotechnical report. The CBC (2007) requires that structures be designed to resist seismic stresses from ground acceleration and, to a lesser extent, liquefaction. A geotechnical investigation has been performed and presents standard engineering design recommendations for mitigation of seismic shaking and site soil conditions. Proposed Conditions of Certification **GEO-1**, **GEO-2**, and **GEO-3** relate to evaluation of suspected on-site strike-slip faults and to design and construction of storm water detention ponds and dams.

There are no known viable geologic or mineralogical resources at the proposed Calico Solar Project site. Locally, paleontological resources have been documented within older Quaternary alluvium which underlies the younger Quaternary alluvium of the site surface. Potential impacts to paleontological resources 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 its independent research and review, California Energy Commission staff believes that the potential is low for significant adverse impacts to the proposed project from geologic hazards during its design life and to potential geologic, mineralogic, and paleontological resources from the construction, operation, and closure of the proposed project. It is staff's opinion that the Calico Solar Project can be designed and constructed in accordance with all applicable laws, ordinances, regulations, and standards and in a manner that both protects environmental quality and assures public safety, to the extent practical. Implementation and enforcement of the proposed conditions of certification should result in less than significant impacts to geology and paleontology.

C.4.2 INTRODUCTION

In this section, California Energy Commission (Energy Commission) staff discusses the potential impacts of geologic hazards on the proposed Calico Solar Project as well as the project's potential impacts on geologic, mineralogic, and paleontological resources. Staff's objective is to ensure that there would be no consequential adverse impacts to significant geological and paleontological resources during project construction, operation, and closure and 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 paleontological resources, with proposed conditions of certification.

C.4.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

Federal agencies are required to review major federal actions such as the Calico Solar Project under the National Environmental Policy Act (NEPA). The Federal Land Policy and Management Act of 1976 (FLPMA) establishes the agency's multiple-use mandate to serve present and future generations.

The CEQA Guidelines, Appendix G, provide a checklist of questions that lead agencies typically address.

- 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 geological hazards.
- Sections (X) (a) and (b) concern the project's effects on mineral resources.

The California Building Standards Code (CBSC) and CBC (2007) provide geotechnical and geological investigation and design guidelines, which engineers must follow when designing a facility. As a result, the criteria used to assess the significance of a geological hazard include evaluating each hazard's potential impact on the design and construction of the proposed facility. Geological hazards include faulting and seismicity, volcanic eruptions, liquefaction, dynamic compaction, hydrocompaction, subsidence, expansive soils, landslides, tsunamis, and seiches. Of these, dynamic compaction, hydrocompaction, subsidence, and expansive soils are geotechnical engineering issues but are not normally associated with concerns for public safety.

Staff has reviewed geological and mineral resource maps for the surrounding area, as well as site-specific information provided by the applicant, to determine if any geological and mineralogical resources exist in the area and to determine if operations could adversely affect such geological and mineralogical resources.

To evaluate whether the proposed project and alternatives would generate a potentially significant impact as defined by CEQA on mineral resources, the staff evaluated them against checklist questions posed in the 2006 CEQA Guidelines, Appendix G, Environmental Checklist established for Mineral Resources. These questions are:

A. Would the project result in the loss of availability of a known mineral resource that would be of value to the region and residents of the state?

B. Would the project result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?

Under NEPA, the impact of the proposed project and alternatives on mineral resources would be considered significant if they would directly or indirectly interfere with active mining claims or operations, or would result in reducing or eliminating the availability of important mineral resources. The staff's evaluation of the significance of the impact of the proposed project on mineral resources includes an assessment of the context and intensity of the impacts, as defined in the NEPA implementing regulations 40 CFR Part 1508.27.

Staff reviewed existing paleontological information and requested records searches from the San Diego Natural History Museum (SDNHM) and the Natural History Museum of Los Angeles County (LACM) for the site area. Site-specific information generated by the applicant for the Calico Solar Project was also reviewed. All research was conducted in accordance with accepted assessment protocol (SVP 1995) to determine whether any known paleontological resources exist in the general area. If present or likely to be present, conditions of certification which outline required procedures to mitigate impacts to potential resources are proposed as part of the project's approval.

The Antiquities Act of 1906 (16 United States Code [USC]) requires that objects of antiquity be taken into consideration for federal projects and the CEQA, Appendix G, also requires the consideration of paleontological resources. The Paleontological Resources Preservation Act of 2009 requires the Secretaries of the United States Department of the Interior and Agriculture to manage and protect paleontological resources on Federal land using scientific principles and expertise. The potential for discovery of significant paleontological resources or the impact of surface disturbing activities to such resources is assessed using the Potential Fossil Yield Classification (PFYC) system. The PFYC class ranges from Class 5 (very high) to Class 1 (very low) (USDI 2007). The formerly used system, replaced by the PFYC system in 2009, assigned one of three conditions: Condition 1 (areas known to contain vertebrate fossils), Condition 2 (areas with exposures of geological units or settings that have high potential to contain vertebrate fossils); and Condition 3 (areas that are very unlikely to produce vertebrate fossils); due to the recency of this change, information from the previous system is included in the analysis as well.

The proposed conditions of certification allow the Bureau of Land Management's (BLM) Authorized Officer, the Energy Commission's compliance project manager (CPM) and the applicant to adopt a compliance monitoring scheme ensuring compliance with laws, ordinances, regulations, and standards (LORS) applicable to geological hazards and the protection of geologic, mineralogic, and paleontological resources.

Based on the information below, it is staff's opinion that the potential for significant adverse impacts to the project from geological hazards, and to potential geologic, mineralogic, and paleontological resources from the proposed project is low.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Applicable LORS are listed in the application for certification (AFC) (SES 2008a). The following briefly describes the current LORS for both geologic hazards and resources and mineralogical and paleontological resources.

Geology and Paleontology Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
Antiquities Act of 1906 (16 USC, 431-433)	The proposed Calico Solar Project is located entirely on federal (BLM) land. Although there is no specific mention of natural or paleontological resources in the Act itself, or in the Act's uniform rules and regulations (Title 43 Part 3, Code of Federal Regulations [43 CFR Part 3], 'objects of antiquity' has been interpreted to include fossils by the Federal Highways Act of 1956, the National Park Service (NPS), the BLM, the Forest Service (USFS), and other Federal agencies. All design will also need to adhere to any applicable BLM design standards.
Antiquities Act of 1906 (16 USC, 431-433)	The proposed Calico Solar Project facility site is located entirely on land currently administered by the BLM. Although there is no specific mention of natural or paleontological resources in the Act itself, or in the Act's uniform rules and regulations (Title 43 Part 3, Code of Federal Regulations [43 CFR Part 3], 'objects of antiquity' has been interpreted to include fossils by the Federal Highways Act of 1956, the NPS, the BLM, the USFS, and other Federal agencies.
NEPA of 1970 (42 USC 4321, et. seq.)	Established the Council on Environmental Quality (CEQ), which is charged with preserving 'important historic, cultural, and natural aspects of our national heritage'.
FLPMA of 1976 (43 USC 1701-1784)	Authorizes the BLM to manage public lands to protect the quality scientific, scenic, historical, archeological, and other values, and to develop 'regulations and plans for the protection of public land areas of critical environmental concern', which include 'important historic, cultural or scenic values'. Also charged with the protection of 'life and safety from natural hazards'.
Paleontological Resources Preservation Act (PRPA) (Public Law [PL] 111-011)	Authorizes Departments of Interior and Agriculture Secretaries to manage the protection of paleontological resources on Federal lands.
State	
CBC (2007)	The CBC (2007) includes a series of standards that are used in project investigation, design, and construction (including grading and erosion control).
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. Portions of the site and proposed ancillary facilities are located within designated Alquist-Priolo Fault Zones. The proposed site layout places occupied structures outside of the 50-foot setback zone.
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.

Applicable Law	Description
PRC, Chapter 1.7, Sections 5097.5 and 30244	Regulates removal of paleontological resources from state lands, defines unauthorized removal of fossil resources as a misdemeanor, and requires mitigation of disturbed sites.
Warren-Alquist Act, PRC, Sections 25527 and 25550.5(i)	The Warren-Alquist Act requires the Energy Commission to "give the greatest consideration to the need for protecting areas of critical environmental concern, including, but not limited to, unique and irreplaceable scientific, scenic, and educational wildlife habitats; unique historical, archaeological, and cultural sites…" With respect to paleontological resources, the Energy Commission relies on guidelines from the Society of Vertebrate Paleontology, indicated below.
CEQA, PRC sections 15000 et seq., Appendix G	Mandates that public and private entities identify the potential impacts on the environment during proposed activities. Appendix G outlines the requirements for compliance with CEQA and provides a definition of significant impacts on a fossil site.
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.
Department of Water Resources, Division of Safety of Dams, Statutes and Regulations Pertaining to Supervision of Dams and Reservoirs (DWR)	Provides regulations for permitting, designing, and operation of all non-federal dams in the State of California.
Local	
San Bernardino County 2007 Development Code, Chapters 82.15, 82.20 and Safety Element	Chapter 82.15 requires that a geological study will be undertaken where roads and structures are to be constructed. Also requires that roads and utilities will be perpendicular to faults. Chapter 82.20 defines criteria for site evaluation for paleontological resources in the county, including preliminary field surveys, monitoring during construction, and specimen recovery; also defines qualifications for professional paleontologists. The Safety Element requires compliance with geological/geotechnical reports, the CBC, and other state agencies and regulations.

C.4.4 PROPOSED PROJECT

C.4.4.1 SETTING AND EXISTING CONDITIONS

The proposed Calico Solar Project would be constructed on 6,215 acres, along Hector Road, just north of Interstate Highway 40 (I-40) in San Bernardino County, California. The property is located entirely on public land managed by the BLM. The site is approximately 115 miles east of Los Angeles, 37 miles east of Barstow, 17 miles east of

Newberry Springs, and 57 miles northeast of Victorville. The historic mining town of Hector and the Hector Road interchange on I-40 are adjacent to the property (SES 2008a, Appendix E). The Burlington Northern Santa Fe railroad tracks parallel I-40 and cross the site, but the right-of-way (ROW) is excluded from the property.

The proposed Calico Solar Project would be a primary power generating facility capable of producing 850 megawatts (MW) of electricity, and would be constructed in two phases. The original Phase I called for construction of a 500-MW facility with Phase II generating an additional 350 MW(SES 2008a). However, the applicant subsequently revised the project to align the output of Phase I with the capacity of the Southern California Edison (SCE) transmission system prior to the completion of a 500-kilovolt (kV) upgrade to the Lugo-Pisgah Transmission line. Although the newly defined Phase I would not require the replacement of the existing 220-kV Lugo-Pisgah transmission line with a new 500-kV line, Phase I would require upgrades to the SCE Pisgah Substation and communication systems (SES 2010?). The new Phase I would be limited to 275 MW, with the remaining 575 MW as part of the newly defined Phase II.

Power would be generated by approximately 34,000 SunCatcher solar dish collectors which would be supported on individual metal pipe or drilled pier foundations. Each SunCatcher is capable of generating 25 kilowatts (kW) of grid-quality electricity and consists of a 38-foot by 40-foot dish array of mirrors that automatically focus sunlight onto a power conversion unit (PCU). The PCU consists of a heat exchanger and closed-cycle, high-efficiency Solar Stirling Engine that utilizes heated hydrogen gas to drive a rotary generator and produce electricity.

Supporting facilities would include an operations and administration building, a maintenance building, a new 230-kW substation, a satellite services complex and main services complex. Two construction laydown areas, totaling about 25 acres, are anticipated in the northern portion of Phase I, within the 52-acre area designated for the main services complex. Water for the project would be provided by an on-site well and demineralized for washing the mirrors. Waste water from this process would be disposed of by evaporation from two concrete-lined ponds that would have a combined capacity of 2 million gallons. Storm water would be intercepted on the north side of the site in approximately 12 detention basins excavated into the existing gently-sloping alluvial fan. The downslope sides of the detention basin will require an engineered embankment up to approximately 15 feet high and a spillway. Detention basins impounding 50 acre-feet or more of water will be considered dams and must be permitted through the State of California Department of Water Resources, Division of Safety of Dams, Statues and Regulations Pertaining to Supervision of Dams and Reservoirs (DWR Parts 1 and 2 of Division 3, Dams and Reservoirs; Chapter 1 of Division 2, Title 23 Waters). Embankments 6 feet high or less are excluded, regardless of storage capacity and embankments impounding less than 15 acre-feet of water are excluded, regardless of height. On-site ancillary facilities associated with the solar array would include buried water pipelines, and a roughly 2-mile-long 220-kV electrical transmission line connecting the new substation to the existing SCE Pisgah Substation just off the southern and eastern end of the site. The Pisgah Substation would require upgrades to accept power from the Calico Solar Project, and demolition and upgrade of 65 miles of the existing Lugo-Pisgah No. 2, 220-kV transmission line (SES 2010?). Off-site upgrades are not a part of the Calico Solar Project, but are addressed in **Section C.4.8** as reasonably foreseeable impacts.

Regional Setting

The proposed site is located in the central portion of the Mojave Desert physiographic province in Southern California. The Mojave Desert is a broad interior region of isolated mountain ranges which separate vast expanses of desert plains and interior drainage basins and occupies approximately 25,000 square miles in southeastern California and portions of Nevada, Utah, and Arizona. In California, its overall topography is dominated by southeast to northwest-trending faulting with a secondary east-to-west-trending alignment which is attributable to Transverse Range faulting.

Project Site Description

The proposed Calico Solar Project would be constructed on 8,230 acres north of Interstate Highway 40 (I-40) in San Bernardino County, California. The potential site is located within the structurally defined Eastern California Shear Zone (ECSZ). The property lies on the southwest flank of the Cady Mountains on federal land managed by the BLM. Overall the site slopes southwest toward the local topographic low at the normally dry Troy Lake.

Surface cover at the site consists of Quaternary alluvium and fanglomerate composed of sediments washed down from the Cady Mountains to the northeast. Small outcrops of Tertiary basalt, andesite, and volcanic breccia occur in the northernmost portion of the site. A small outcrop of basalt flow from the geologically recent Pisgah Crater eruption is present along the southernmost site boundary.

C.4.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

This section considers two types of impacts. The first is geologic hazards, which could impact the proper functioning of the proposed facility and create life/safety concerns. The second is the potential impacts the proposed facility could have on existing geologic, mineralogic, and paleontological resources in the area.

Direct/Indirect Impacts and Mitigation

Ground shaking represents the most probable geologic hazard at this site. The effect of this potential hazard on the project can be effectively mitigated through facility design by incorporating recommendations contained in the project geotechnical reports and the CBC (2007). Proposed Conditions of Certification **GEN-1, GEN-5,** and **CIVIL-1** in the **Facility Design** section should also mitigate these potential impacts to a less than significant level. There is some potential for ground rupture along two mapped active faults on this site. Proposed Condition of Certification **GEO-1** requires that the faults be located and evaluated so that occupied structures can be properly set back from the faults or their splays.

The proposed Calico Solar Project site is not located within an established Mineral Resource Zone (MRZ) and no economically viable mineral deposits are known to be present at the site.

Near-surface geology beneath the site consists primarily of Quaternary alluvium and fanglomerate overlying Quaternary older alluvium with minor outcrops of Tertiary volcanic rocks (Dibblee 2008). Staff reviewed correspondence from the NHMLA (McLeod 2009) and the project confidential paleontological resources technical report (SES 2008a, Appendix E) for information regarding known fossil localities and stratigraphic unit sensitivity within the project area. The LACM has recorded 2 fossil localities (camel and horse) within the Cady Mountains northeast of the project area and ancillary facilities. The project confidential paleontological resources technical report indicates the presence of 2 fossil collection sites (fossil types not stated) within the project boundaries. Also noted were the presence of silicified root masses and possible burrow structures. No major fossil finds have occurred within 2 miles of the project site.

Based on the recorded fossil finds, staff concludes the Quaternary alluvium and fanglomerate have low potential to produce fossils. Quaternary older alluvium has moderate paleontological resource sensitivity. Tertiary volcanic rocks also have a very low potential to produce fossils.

Overall, staff considers the probability for significant paleontological resources to be encountered during site construction activities to be low. However, if construction includes significant amounts of grading or deep foundation excavation and utility trenching the potential for exposure of paleontological resources will increase with depth of the excavations. This assessment is based on SVP criteria and the paleontological report appended to the AFC (SES 2008a). Low paleontological sensitivity roughly corresponds to PFYC Class 1 or 2 (Condition 3). Deeper excavations could potentially encounter a high sensitivity formation of PFYC Class 4 (Condition 2). Proposed Conditions of Certification **PAL-1** to **PAL-7** are designed to mitigate paleontological resource impacts, as discussed above, to less than significant levels. These conditions essentially require a worker education program in conjunction with the monitoring of earthwork activities by a qualified professional paleontologist (a paleontological resource specialist [PRS]).

The proposed conditions of certification allow the Energy Commission's CPM and the applicant to adopt a compliance monitoring scheme ensuring compliance with LORS applicable to geologic hazards and the protection of geologic, mineralogic, and paleontological resources.

Based on the information below, it is staff's opinion that the potential for significant adverse, direct or indirect impacts to the project, from geologic hazards, and to potential geologic, mineralogic, and paleontological resources, from the proposed project, is low.

Geological Hazards

The AFC provides documentation of potential geologic hazards at the proposed Calico Solar Project plant site, including limited site-specific subsurface information (SES 2008a). Review of the AFC, coupled with staff's independent research, indicates that the potential for geologic hazards to impact the proposed plant site during its practical design life is low if recommendations for mitigation of seismic shaking and potential ground rupture are followed. Geologic hazards related to seismic shaking are addressed in the project geotechnical report per CBC (2007) requirements (Terracon 2010).

Staff's independent research included the review of available geologic maps, reports, and related data of the Calico Solar Project site. Geological information was available from the California Geological Survey (CGS), California Division of Mines and Geology (CDMG, now known as CGS), the U.S. Geological Survey (USGS), the American Geophysical Union, the Geologic Society of America, and other organizations.

Faulting and Seismicity

Energy Commission staff reviewed numerous CDMG and USGS publications as well as informational websites in order to gather data on the location, recency, and type of faulting in the project area. Type A and B faults within 80 miles of the proposed Calico Solar Project site are listed in Table 2. Type A faults have slip-rates of $\geq$5 mm per year and are capable of producing an earthquake of magnitude 7.0 or greater. Type B faults have slip-rates of 2 to 5 mm per year and are capable of producing an earthquake of magnitude 6.5 to 7.0. The fault type, potential magnitude, and distance from the site are summarized in **Geology and Paleontology Table 2**. Because of the large size of the site the distances to faults are measured from the proposed control building location within the project boundaries.

Geology and Paleontology Table 2
Active Faults Relative to the Proposed Calico Solar Project Site

Fault Name	Distance From Site (miles)	Maximum Earthquake Magnitude (Mw)	Estimated Peak Site Acceleration (g)	Movement and Strike	Slip Rate mm/yr	Fault Type
Lavic Lake	0.0	7.1	N/A	Right-Lateral Strike Slip (Northwest)	0.2 - 1	B
Pisgah-Bullion Mtn. - Mesquite Lake	0.0	7.3	0.391	Right-Lateral Strike Slip (Northwest)	0.6	B
Calico - Hidalgo	11.4	7.3	0.210	Right-Lateral Strike Slip (Northwest)	0.6	B
Landers	18.8	7.3	0.146	Right-Lateral Strike Slip (Northwest)	0.6	B
Emerson South – Copper Mtn.	20.9	7.0	0.115	Right-Lateral Strike Slip (Northwest)	0.6	B
Johnson Valley (Northern)	24.4	6.7	0.087	Left-Lateral Strike Slip (Northwest)	0.6	B
Lenwood – Lockhart – Old Woman Springs	26.7	7.5	0.124	Right-Lateral Strike Slip (Northwest)	0.6	B
Gravel Hills – Harper Lake	29.9	7.1	0.092	Right-Lateral Strike Slip (Northwest)	0.6	B
Northern Frontal Fault Zone (East)	35.2	6.7	0.080	Reverse (South)	0.5	B
Blackwater	38.2	7.1	0.076	Right-Lateral Strike Slip (Northwest)	0.6	B
Northern Frontal Fault Zone (West)	39.7	7.2	0.095	Reverse (South)	1.0	B
Helendale – South Lockhart	40.1	7.3	0.082	Right-Lateral Strike Slip (Northwest)	0.6	B
Pinto Mountain	46.3	7.2	0.069	Left-Lateral Strike Slip (Northwest)	2.5	B
Burnt Mountain	47.4	6.5	0.047	Right-Lateral Strike Slip (Northwest)	0.6	B
Eureka Peak	47.4	6.4	0.045	Right-Lateral Strike Slip (Northwest)	0.6	B
Garlock (East)	53.9	7.5	0.072	Left-Lateral Strike Slip (Northeast)	7.0	B
Death Valley (South)	54.2	7.1	0.058	Right-Lateral Strike Slip (Northwest)	4.0	B
Cleghorn	58.4	6.5	0.040	Right-Lateral Strike Slip (Northwest)	0.6	B

Fault Name	Distance From Site (miles)	Maximum Earthquake Magnitude (Mw)	Estimated Peak Site Acceleration (g)	Movement and Strike	Slip Rate mm/yr	Fault Type
San Andreas – San Bernardino M-1	60.3	7.5	0.066	Right-Lateral Strike Slip (Northwest)	24.0	A
San Andreas – San Bernardino – Coachella M-1b-2	60.3	7.7	0.073	Right-Lateral Strike Slip (Northwest)	24.0	A
San Andreas – Whole M-1a	60.3	8.0	0.086	Right-Lateral Strike Slip (Northwest)	34.0	A
San Andreas – San Bernardino – Coachella M-2b	60.3	7.7	0.073	Right-Lateral Strike Slip (Northwest)	25.0	A
San Andreas – Coachella M-1c-5	61.4	7.2	0.056	Right-Lateral Strike Slip (Northwest)	25.0	A
Owl Lake	61.5	6.5	0.038	Left-Lateral Strike Slip (Northwest)	2.0	B
Panamint Valley	62.6	7.4	0.061	Right-Lateral, Normal, Oblique	2.5	B
San Andreas – Cholame – Mojave M-1b-1	72.0	7.8	0.067	Right-Lateral Strike Slip (Northwest)	34.0	A
San Andreas – Mojave M-1c-3	72.0	7.4	0.055	Right-Lateral Strike Slip (Northwest)	30.0	A
Cucamonga	72.2	6.9	0.051	Reverse (North)	5.0	B
San Jacinto – San Bernardino	72.3	6.7	0.038	Right-Lateral Strike Slip (Northwest)	12.0	A
San Jacinto – San Jacinto Valley	72.4	6.7	0.042	Right-Lateral Strike Slip (Northwest)	12.0	A
Tank Canyon	75.3	6.4	0.038	Normal (West)	1.0	B
San Jacinto - Anza	79.5	7.2	0.046	Right-Lateral Strike Slip (Northwest)	12.0	A

In addition to the Type A and B faults, two other faults systems which have potential to cause ground shaking at the proposed Calico Solar Project site are the Cady Fault and the Ludlow Fault. The Cady Fault is an east-west-trending left-lateral strike-slip fault within the Cady Mountains approximately 3 miles north of the northern site boundary. Quaternary movement has been documented on the Cady Fault where it offsets Older alluvium. Younger alluvium covers the eastern end of the Cady Fault suggesting no recent movement. The Ludlow Fault is a northwest-trending right-lateral strike-slip fault which extends to within approximately 12 miles of the eastern boundary of the proposed project site. Quaternary movement has been reported for the Ludlow Fault (SCEC 2009).

Other Type C and otherwise undifferentiated faults which are more than 20 miles from the proposed site are not discussed here because they are unlikely to undergo movement or generate seismicity which could affect the project.

The proposed site is located within a structural area variously referred to in literature as the Barstow-Bristol trough (Glazner, Bartley, and Sanner 2000), the Eastern California Shear Zone (Dokka and Travis 1990), and the Mojave Extensional Belt (Ross 1995). All refer, fully or in part, to an area of the Mojave Desert geomorphic province (the Mojave Desert block) which is characterized by northwest-trending right-lateral strike-slip faulting which has accounted for approximately 40 miles of extensional faulting within the region since the middle Miocene (roughly 15 million years ago).

Thirty-two Type A and B faults and fault segments were identified within 80 miles of the potential site (**Geology and Paleontology Table 2).** Of these, two are subparallel, right-lateral, strike-slip faults shown on Aliquist-Priolo mapping as lying with the boundaries of the proposed project. The Pisgah fault strikes northwest and appears to just catch the west end of the site in Section 8 (Township 9 North; Range 5 East). The Lavic Lake fault, which strikes north-northwest, intersects the south site border just east of site center. The fault is shown terminating near the north end of Section 12 (Township 9 North; Range 5 East) in the middle of the site but is queried at that point (CDMG, 2003). The current, preliminary, site layout does not show any occupied structures within 50 feet (the required minimum setback) of either fault and, in fact, occupied structures appear to be several thousand feet away from the mapped fault locations. Solar generating equipment is shown over the fault zones but there are no formal setbacks required for non-occupied structures. Proposed Condition of Certification **GEO-1** requires evaluation of the Pisgah and Lavic Lake faults by a qualified geologist.

The Hector Mine M_w 7.1 earthquake of October 16, 1999 occurred along the apparent strike of both of these faults approximately 18 miles south of the proposed Calico Solar Project area. This earthquake resulted in horizontal slip over an estimated 28 miles with a maximum displacement of approximately 17 feet (Trieman et al. 2002). An unnamed M_w 5.1 earthquake occurred within the proposed project boundaries near the northern end of the Pisgah-Bullion fault zone, approximately 1 mile west of the proposed control building site, on December 16, 2008 (SCEC 2009).

No movement along the faults was recorded within the proposed project area during the Hector Mine earthquake. However, damage did occur at Interstate Highway 40, and along the Burlington Northern and Santa Fe Railway, both of which parallel the southern site boundary. Highway damage was considered to be minor and primarily resulted from pounding of bridge decks against bridge barriers, abutments, and wingwalls (Yashinsky, et al. 2002). Railroad damage included derailment of an Amtrak passenger train, displacement of ballast from cribbing, and buckling of tracks (Byers 2000). The Pisgah fault shows some surface expression locally. The Lavic Lake fault is somewhat less defined, especially on the northern end.

The potential for actual fault-related ground rupture at the proposed Calico Solar Project is considered moderate since evidence of Holocene movement has been found on nearly every major fault in the ECSZ (Trieman et al. 2002) and the Pisgah and Lavic Lake faults are thought to underlie the site. There is good evidence for recurrent movement along the Lavic Lake fault which was trenched in 2000, 2001, and 2002 south of the site, on rupture traces from the 1999 Hector Mine earthquake. The trenching also suggested that recurrence intervals could be in the range of a thousand years or more but the work was not conclusive (USGS 2003). The probability of ground rupture during the life of the project is low, but real. Proposed Condition of Certification **GEO-1** requires that both faults be located and evaluated in the field so that proper setbacks can be assured for occupied structures.

Events such as the Hector Mine earthquake and the unnamed earthquake of December 16, 2008 show the proposed site could be subject to intense levels of earthquake-related ground shaking in the future. The effects of strong ground shaking would need to be mitigated through structural designs required by the CBC (2007) and the project geotechnical report. The CBC (2007) requires that structures be designed to resist seismic stresses from the design-level peak ground acceleration. A geotechnical investigation has been performed and presents standard engineering design recommendations for mitigation of seismic shaking and site soil conditions (SES 2008a, Appendix E). Based on measurement of shear-wave velocity, the soils profile beneath the proposed Calico Solar Project site, class is to be seismic Class C (Terracon 2010). The estimated peak horizontal ground acceleration for the power plant is 0.5 times the acceleration of gravity (0.5g) for bedrock acceleration based on 2 percent probability of exceedence in 50 years under 2007 CBC criteria.

Liquefaction

Liquefaction is a condition in which a saturated cohesionless soil may lose shear strength because of sudden increase in pore water pressure caused by an earthquake. However, the potential for liquefaction of strata deeper than approximately 40 feet below surface is considered negligible due to the increased confining pressure and because geologic strata at this depth are generally too compact to liquefy. The reported deep ground water table (greater than 300 feet) would indicate no potential for liquefaction. Soil characteristics reported in the project-specific geotechnical report (SES 2008a, Appendix E) indicate strata beneath the site are also generally too dense to liquefy and that ground water was not encountered to the 51.5-foot-maximum-depth of exploration. Liquefaction potential on the Calico Solar Project site was addressed in the preliminary project geotechnical report (SES 2008a, Appendix E) per CBC (2007) and proposed Condition of Certification **GEN-1** requirements.

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—that is, a nearby steep hillside or deeply eroded stream bank, etc.—but can also occur on gentle slopes such as are present at the project site. 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. Because the proposed Calico Solar Project site is not subject to liquefaction, there is no potential for lateral spreading during seismic events.

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. Site specific geotechnical investigation indicates the alluvial deposits in the site subsurface are generally too dense to allow significant dynamic compaction (SES 2008a, Appendix E).

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 flashflood. 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. Site specific geotechnical investigation indicates the subsurface alluvial deposits which underlie the site are generally too dense to experience significant hydrocompaction (SES 2008a, Appendix E).

Subsidence

Local subsidence or settlement may occur when areas containing compressible soils are subjected to foundation or fill loads. Site-specific geotechnical investigation indicates the alluvial deposits which underlie the site are generally at a medium-dense to very dense consistency and therefore are considered unlikely to cause excessive settlement (subsidence) due to foundation loading.

Regional ground subsidence is typically caused by petroleum or ground water withdrawal that increases the effective unit weight of the soil profile, which in turn increases the effective stress on the deeper soils. This results in consolidation or settlement of the underlying soils. No petroleum or natural gas withdrawals are taking place in the site vicinity and ground water pumping for day-to-day site operations would be low and unlikely to cause localized subsidence. Minor regional subsidence, likely due to ground water withdrawal in the Mojave River area, has been documented as far east as Troy Lake, immediately west of the proposed site. However, negative impacts to the project due to subsidence from tectonism or from petroleum, natural gas, or future ground water production are considered very unlikely.

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 alluvium and volcanic rocks which form most of the site subsurface are not considered to be expansive. Expansive clays encountered, at depth, in the soils borings (Terracon 2010), can be mitigated by standard engineering design.

Landslides

The proposed site slopes gently to the southwest at a gradient of approximately 2.5 percent. Due to the low site gradient and the absence of topographically high ground in the vicinity the potential for landslide impacts to the site is considered to be negligible.

Flooding

The proposed Calico Solar Project area has not been mapped by the Federal Emergency Management Agency (FEMA) for flood potential (FEMA 2009). Because the proposed site is topographically elevated above terrain to the south and west, it is staff's opinion that the potential for flooding at the site is limited to infrequent high volume (flashflood) events that may occur due to heavy rainfall in the adjacent Cady Mountains. Flash flooding, if it occurs, will primarily affect the established, entrenched drainages that cross the site from approximately northeast to southwest. The proposed detention basins along the northern (upslope) site border should minimize the potential for flashfloods damage to this project to a (CEQA) less than significant level. Additional discussion of flash flooding is presented under the **Soil and Water** section of this document.

Tsunamis and Seiches

The proposed Calico Solar Project and associated linear facilities are not located near any significant surface water bodies and therefore there is no potential for impacts due to tsunamis and seiches.

Volcanic Hazards

The proposed Calico Solar Project site is located immediately northwest of the Sleeping Beauty volcanic area, an approximately 36 square mile area of Miocene age dacitic to basaltic flows, pyroclastic rocks, and volcaniclastic sediments (Glazner 1980). The Sleeping Beauty area is considered to be part of the regional Amboy Crater – Lavic Lake volcanic hazard area, an approximately 6,000 square mile area within the Mojave Desert designated by the USGS because of the presence of Holocene lava flows, cinder cone formation, and tephra eruptions (Miller 1989). The Amboy Crater – Lavic Lake volcanic hazard area is considered to be subject to future formation of cinder cones, volcanic ash falls, lava flows, and phreatic explosions. The USGS indicates the proposed Calico Solar Project lies in an area which has been and will again be subjected to ash and cinder falls associated with nearby dormant basaltic or basaltic – andesitic vents. The recurrence interval for eruptions from vents in the Amboy Crater – Lavic Lake hazard area has not been predicted but is likely to be in the range of 1,000's of years or more. Therefore staff considers the likelihood of volcanic activity to significantly affect operation of the proposed Calico Solar Project to be low. Eruptive activity would likely be limited to ashfall which would have a minor, short-lived affect on the project. This would involve having to shut down and probably cover the generators to prevent damage from the abrasive ash and having to clean the mirrors once the eruption was over. Mirrors will need to be cleaned periodically as part of normal plant operation and maintenance.

Geological, Mineralogical, and Paleontological Resources

Energy Commission staff has reviewed applicable geologic maps, reports, and on-line resources for this area (Blake 2000; CDMG 1977; CDMG 1981; CDMG 1984; CDMG 1988; CDMG 1990; CDMG 1994; CDMG 1998; CDMG 1999; CDMG 2003; CGS 2002a and b; CGS 2007; Jennings and Saucedo 2002; SCEC 2009; USGS 2003; USGS 2008 and b). Staff did not identify any geological or mineralogical resources at the proposed energy facility location.

The proposed Calico Solar Project is not located within an established Mineral Resource Zone (MRZ) and no economically viable mineral deposits are known to be present (Kohler 2006). Several operating and closed mines and mineral prospects are present within 5 miles of the proposed project boundaries. These have produced a number of industrial minerals, primarily manganese, borates, clay, and talc. No active mines are known to have existed within the proposed project boundaries (USGS 2008b).

Energy Commission staff reviewed the paleontological resources assessment in Section 5.8 and Appendix H of the AFC (SES 2008a) and the confidential paleontological resources report (SES 2008a, Appendix E). Staff has also reviewed paleontological literature and records searches conducted by the Natural History Museum of Los Angeles County (McLeod 2009). These studies indicate the Quaternary alluvium, fanglomerate, and volcanic rocks within and near the proposed project site contain few fossils. Older Quaternary alluvium, which underlies the site at uncertain depth, may contain significant fossil vertebrates. Low paleontological sensitivity roughly corresponds to PFYC Class 1 or 2 (Condition 3). Deeper excavations could potentially encounter a high sensitivity formation of PFYC Class 4 (Condition 2).

This assessment is based on SVP criteria, the paleontological report appended to the AFC (PRC 2008), and the independent paleontological assessment of McLeod (2009). Proposed Conditions of Certification **PAL-1** to **PAL-7** are designed to mitigate paleontological resource impacts, as discussed above, to less than significant levels under both NEPA and CEQA. These conditions essentially require a worker education program in conjunction with the monitoring of earthwork activities by a qualified professional paleontologist (PRS).

The proposed conditions of certification allow the BLM Authorized Office, the Energy Commission's CPM, and the applicant to adopt a compliance monitoring scheme ensuring compliance with LORS applicable to geologic hazards and the protection of geologic, mineralogic, and paleontological resources.

Construction Impacts and Mitigation

The design-level geotechnical investigation, required for the project by the CBC (2007) and proposed Condition of Certification **GEN-1** should provide standard engineering design recommendations for mitigation of earthquake ground shaking and excessive settlement (see **PROPOSED CONDITIONS OF CERTIFICATION, FACILITY DESIGN**).

The probability of ground rupture during the life of the project is low, but real. Proposed Condition of Certification **GEO-1** requires that both faults be located and evaluated in the field so that proper setbacks can be assured for occupied structures. Proposed Conditions of Certification **GEO-1** and **GEO-3** are intended to assure that detention basins and detention dams (as defined by DWR) are designed in accordance with current regulations and standards.

As noted above, no viable geological or mineralogical resources are known to exist in the vicinity of the Calico Solar Project construction site. Construction of the proposed project will include grading, foundation excavation, and utility trenching. Based on the soils profile, SVP assessment criteria, and the depth of the potentially fossiliferous older alluvium beneath the site, staff considers the probability of encountering paleontological resources to be low.

Proposed Conditions of Certification **PAL-1** to **PAL-7** are designed to mitigate any paleontological resource impacts, as discussed above, to a less than significant level under NEPA and CEQA. Essentially, Conditions of Certification **PAL-1** to **PAL-7** require a worker education program in conjunction with monitoring of earthwork activities by qualified professional paleontologists (PRS). Earthwork is halted any time potential fossils are recognized by either the paleontologist or the worker. For finds deemed significant by the PRS, earthwork cannot restart until all fossils in that strata, including those below the design depth of the excavation, are collected. When properly implemented, the conditions of certification 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 is retained, for the project by the applicant, to produce a monitoring and mitigation plan, conduct the worker training, and provide the monitoring. During the monitoring, the PRS can and often does petition the Energy Commission for a change in the monitoring protocol. Most commonly, this is a request for lesser monitoring after sufficient monitoring has been performed to ascertain that there is little chance of finding significant fossils. In other cases, the PRS can propose increased monitoring due to unexpected fossil discoveries or in response to repeated out-of-compliance incidents by the earthwork contractor.

Based upon the literature and archives search, field surveys, and compliance documentation for the Calico Solar Project, the applicant has proposed monitoring and mitigation measures to be followed during the construction of the project. Energy Commission staff believes that the facility can be designed and constructed to minimize the effect of geologic hazards and impacts to potential paleontological resources at the site during project design life.

Operation Impacts and Mitigation

Operation of the proposed new solar energy generating facility should not have any adverse impact on geologic, mineralogic, or paleontological resources.

Facility Closure

The future decommissioning and closure of the proposed project should not negatively affect geologic, mineralogic, or paleontological resources since the ground disturbed during plant decommissioning and closure would have been already disturbed, and mitigated as required, during construction and operation of the project. Any storm water detention dam permitted through the DWR will have to be decommissioned in accordance with the requirements of that agency (Parts 1 and 2 of Division 3, Dams and Reservoirs; Chapter 1 of Division 2, Title 23 Waters).

C.4.4.3 CEQA LEVEL OF SIGNIFICANCE

California Environmental Quality Act 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" (Title 14 CCR §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 the wasteful, inefficient, and unnecessary consumption of energy (Title 14, CCR §15000 et seq., Appendix F).

Energy use, production, and efficiency are addressed in other sections of this document. Energy/efficiency factors affect geological hazards and geologic, mineralogic, and/or paleontological resources only when energy/efficiency concerns require changes to the size or location of the construction zone, as addressed below. Potential impacts to paleontological resources within the proposed project can be mitigated to a (CEQA) less than significant level by adopting and enforcing the proposed Conditions of Certification **PAL-1** through **PAL-7**.

C.4.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage alternative would essentially be a 275-MW solar facility located within the boundaries of the proposed 850-MW project. This alternative and alternative locations of the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 1**.

C.4.5.1 SETTING AND EXISTING CONDITIONS

The Reduced Acreage alternative would be a 275-MW solar facility within the Phase 2 boundaries of the proposed project (originally designed by Calico Solar to produce 350 MW). The environmental setting described in **Sections C.4.4.1** and **C.15.4.1** applies to this alternative.

The discussion of impacts to the proposed project, discussed in **Section C.4.4.2**, applies also to the Reduced Acreage alternative. As for the proposed project, two types of impacts are considered. The first is geological hazards, which could impact the proper functioning of the proposed facility and create life/safety concerns. The second is the potential impacts the proposed facility could have on existing geologic, mineralogic, and paleontological resources in the area.

Because the geological setting is the same as that of the proposed project, and the same types of facilities would be constructed in this alternative, the impacts would be the same as for the proposed project. The active geological setting means that the site could be subject to intense levels of earthquake-related ground shaking. The effects of strong ground shaking would need to be mitigated through structural designs required by the CBC (2007) and the project geotechnical report. The CBC (2007) requires that structures be designed to resist seismic stresses from ground acceleration and, to a lesser extent, liquefaction potential. A geotechnical investigation has been performed and presents standard engineering design recommendations for mitigation of seismic shaking and site soil conditions.

There are no known viable geological or mineralogical resources at the proposed Calico Solar Project site, so none exist on the Reduced Acreage alternative. Because the Reduced Acreage alternative is also located in geological formations with low to possibly high paleontological sensitivity (PFYC Class 1 or 2 [Condition 3]; PFYC Class 4 [Condition 2]), there is the potential for impacts to paleontological resources to occur; these would be mitigated through worker training and monitoring by qualified paleontologists, as required by Conditions of Certification, **PAL-1** through **PAL-7**. Since the Reduced Acreage plant would occupy substantially less overall area, its potential to encounter and positively or negatively impact significant fossils would be proportionately reduced.

C.4.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Since the Reduced Acreage plant would produce only 275 MW (32 percent of the proposed project's 850 MW), its impacts on the Southern California Edison grid would be proportionately less.

C.4.5.3 CEQA LEVEL OF SIGNIFICANCE

Like the proposed project, the potential is low for significant adverse impacts to the Reduced Acreage alternative from geological hazards during its design life and moderate to high paleontological resources from the construction, operation, and closure of the proposed project. It is staff's conclusion that the alternative will be designed and constructed in accordance with all applicable laws, ordinances, regulations, and standards and in a manner that both protects environmental quality and assures public safety. The CEQA level of significance would remain unchanged from the proposed project.

C.4.6 AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

Due to the reduction in project size and impacts associated with the northern portion of the originally proposed project layout, the Avoidance of Donated and Acquired Lands Alternative shown in **Alternatives Figure 2** will be addressed in the **Alternatives** section of this SSA.

C.4.7 NO PROJECT / NO ACTION ALTERNATIVE

There are three No Project / No Action Alternatives evaluated as follows:

NO PROJECT / NO ACTION ALTERNATIVE #1

No Action on the Calico Solar Project application and on CDCA land use plan amendment

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

The results of the No Project / No Action Alternative would be the following:

- Any potential impacts of the proposed project to geologic, mineralogic, or paleontological resources would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another renewable energy project.
- The benefits of the proposed project in displacing fossil fuel fired generation and reducing associated greenhouse gas emissions from gas-fired generation would not

occur. Both State and Federal law support the increased use of renewable power generation.

If the proposed project is not approved, renewable projects would likely be developed on other sites in San Bernardino County, the Mojave Desert, or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are dozens of other wind and solar projects that have applications pending with BLM in the California Desert District.

NO PROJECT / NO ACTION ALTERNATIVE #2

No Action on the Calico Solar Project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the project site.

Because the CDCA Plan would be amended, it is possible that the site would be developed with the same or a different solar technology. Different solar technologies require different amounts of construction and operations maintenance; however, it is expected that all the technologies would require the same geological hazard mitigation and would require the same safeguards to protect potential paleontological resources as the proposed project. The CEQA level of significance would remain unchanged from the proposed project.

NO PROJECT / NO ACTION ALTERNATIVE #3

No Action on the Calico Solar Project application and amend the CDCA land use plan to make the area unavailable for future solar development

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and the BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result, there would be no potential impacts on geologic, mineralogic, or paleontological resources. However, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar paleontological impacts in other locations.

C.4.8 PROJECT-RELATED FUTURE ACTIONS - GEOLOGY, PALEONTOLOGY AND MINERALS

This section examines the potential impacts of future transmission line construction, line removal, substation expansion, and other upgrades that may be required by Southern California Edison Company (SCE) as a result of the Calico Solar Project. The SCE upgrades are a reasonably foreseeable event if the Calico Solar Project is approved and constructed as proposed.

The SCE project will be fully evaluated in a future Environmental Impact Report (EIR)/EIS prepared by the BLM and the California Public Utilities Commission. Because no application has yet been submitted and the SCE project is still in the planning stages, the level of impact analysis presented is based on available information. The purpose of this analysis is to inform the Energy Commission and BLM, interested parties, and the general public of the potential environmental and public health effects that may result from other actions related to the Calico Solar Project.

The project components and construction activities associated with these future actions are described in detail in Section B.3 of this Staff Assessment/EIS. This analysis examines the construction and operational impacts of two upgrade scenarios

- The 275-MW Early Interconnection Option would include upgrades to the existing SCE system that would result in 275 MW of additional latent system capacity. Under the 275-MW Early Interconnection option, Pisgah Substation would be expanded adjacent to the existing substation, one to two new 220-kV structures would be constructed to support the gen-tie from the Calico Solar Project into Pisgah Substation, and new telecommunication facilities would be installed within existing SCE ROWs.
- The 850-MW Full Build-Out Option would include replacement of a 67-mile-long 220-kV SCE transmission line with a new 500-kV line, expansion of the Pisgah Substation at a new location and other telecommunication upgrades to allow for additional transmission system capacity to support the operation of the full Calico Solar Project.

C.4.8.1 ENVIRONMENTAL SETTING

The environmental setting described herein incorporates both the 275-MW Early Interconnection and the 850-MW Full Build-Out options. The setting for the 275-MW Early Interconnection upgrades at the Pisgah Substation and along the telecomm corridors is included within the larger setting for the project area under the 850-MW Full Build-Out option.

The SCE upgrades would be within the southern portion of the Mojave Desert Geomorphic Province of California. The Mojave Desert is bounded on the north and northwest by the Tehachapi Mountains, on the west by the Garlock fault, on the east by the Colorado River, and on the south and southwest by the San Andreas Fault. The Mojave Desert Province is characterized by broad alluvial basins of Cenozoic sedimentary and volcanic materials overlying older plutonic and metamorphic rocks

(SES 2008a). The plutonic and metamorphic rocks are exposed as eroded hills throughout the region. The alluvial basins are up to several thousand feet thick.

Structurally the transmission corridor traverses a series of large alluvial fans adjacent to metamorphosed sediments that have been intruded by masses of quartz monzonite. The surficial alluvial deposits are classified as Younger Alluvium and consist of interbedded sand and gravel with lesser amounts of silt and clay. The sand and gravel deposits are generally unconsolidated to weakly consolidated sediments. The alluvium was derived from erosion of the San Gabriel and San Bernardino Mountains to the south. The Mojave River channel and associated tributaries have dissected the alluvium and continue to deposit younger alluvium in active channels. The Younger Alluvium could be underlain at the subsurface by Older Alluvium.

<u>Geology</u>

The project area can be subdivided into three generalized geologic areas; the western, central, and northern areas. The western portion of the Lugo-Pisgah transmission line alignment in and around Hesperia can be characterized as high desert plains and foothills of the western Mojave Desert. This area is mostly alluvial plain and pediment, with relatively small areas of hills and low mountains. This subsection contains mainly Mesozoic granitic rocks and Quaternary alluvium and lacustrine deposits. Eolian sand deposits are common. There are small areas of Precambrian gneiss and schist and Miocene and Pliocene nonmarine sedimentary rocks.

This portion of the alignment is on mostly very gently to moderately sloping pediments and alluvial fans and nearly level basin floor and dry lake bed. There are a few moderately steep hills and steep slopes traversed (i.e., Fry Mountains). Pediments are quite extensive. The elevation range is mostly from about 2,000 to 3,000 feet. Fluvial erosion and deposition and eolian deflation and deposition are the main geomorphic processes.

The central portion of the Lugo-Pisgah alignment includes mountains, hills, pediments, and alluvial plain. The area of pediment and alluvial plain is greater than that of mountains and hills. The bedrock through the central portion of the alignment is mainly Mesozoic granitic rocks that are exposed at the surface in only a few areas in the vicinity of the Rodman Mountains and Lava beds Mountains. There is Precambrian metamorphic rock associated with slopes and hills crossed and some Mesozoic mafic plutonic and Paleozoic marine sedimentary rock immediately south of the corridor. Transported Quaternary deposits, mostly alluvium that include lacustrine deposits and eolian sand are the predominant geologic mapping unit in this central portion of the alignment and along the entire alignment.

There are some steep mountains and moderately steep hills in the central and in the northern portion of the corridor. The elevation range is from about 1,600 feet up to 4,000 feet in the Granite Mountains and Rodman Mountains. Mass wasting, fluvial erosion and deposition, and eolian deflation and deposition are the main geomorphic processes.

The northern portion of the transmission corridor and in the area of the Pisgah Substation is characterized by half upland terrain, including pediments, and half alluvial plain. There are many small mountain ranges and hills with many different orientation patterns. The Mesozoic plutonic rocks are mostly granitic, but include some mafic rocks. There are also areas of Quaternary volcanic, Tertiary nonmarine sedimentary, Pre-Cretaceous metamorphic, Paleozoic marine sedimentary and Precambrian metamorphic rocks.

The majority of the transmission alignment consists of generally flat terrain which is not prone to significant mass wasting or slope stability problems. Where the Lugo-Pisgah transmission ROW does traverse a hillside or slope, the parent material is predominantly granitic or volcanic thereby minimizing the risk of landslides.

Seismicity

The SCE upgrades would be located in a seismically active region that has experienced numerous earthquakes in the past. The Alquist-Priolo Special Studies Zones Act specifies that an area termed an "Earthquake Fault Zone" is to be delineated if surrounding faults that are deemed "sufficiently active" or "well defined" after a review of seismic records and geological studies. Cities and counties affected by the Earthquake Fault Zones must regulate certain existing and development projects within the zones by permitting and building code enforcement.

Fourteen (14) major faults would be crossed by the Lugo-Pisgah 500-kV transmission ROW. Most of these faults trend northwest to southeast. Movement along the faults is predominantly strike slip and/or dip slip. The major faults crossed by the 850-MW Full Build-Out transmission line and substation upgrades include the following crossings and ages (SES 2008a):

- Calico-Hidalgo fault zone, Calico section (age: <1,600,000 years)
- Helendale-South Lockhart fault zone, Helendale section (age: <15,000 years)
- Lenwood-Lockhart fault zone, Lenwood section (age: <130,000 years)
- North Frontal thrust system, Western section (age: <130,000 years)
- Johnson Valley fault zone, Northern Johnson Valley section (age: <15,000 years)
- Pisgah-Bullion fault zone, Pisgah section (age: <15,000 years)
- Lavic Lake fault (age: <15,000 years)
- Camp Rock-Emerson-Copper Mountain fault zone, Emerson section (age: <150 years)
- Lavic Lake fault (age: <150 years)
- Calico-Hidalgo fault zone, West Calico section (age: <15,000 years)
- Helendale-South Lockhart fault zone, Helendale section (age: <15,000 years)
- Camp Rock-Emerson-Copper Mountain fault zone, Camp Rock section (age: <150 years)
- Lenwood-Lockhart fault zone, Lenwood section (age: <15,000 years)
- North Frontal thrust system, Western section (age: <15,000 years)

Paleontology

The upgrades area is located in the western portion of the Mojave Desert geomorphic region. The Mojave Desert is bounded on the north and northwest by the Tehachapi Mountains, on the west by the Garlock fault, on the east by the Colorado River, and on the south and southwest by the San Andreas Fault. The Mojave Desert Province is characterized by broad alluvial basins of Cenozoic sedimentary and volcanic materials overlying older plutonic and metamorphic rocks (SES 2008a).

The project area traverses the Mojave Desert region, beginning at the Pisgah Volcano area and terminating on the outskirts of Hesperia, California. A variety of paleontological resources have the potential to be present within the project area. Known areas of paleontology resources present within the general vicinity of the project area have been identified by the San Bernardino County Museum (SBCM). The Victorville and Hesperia regions have Pliocene and Pleistocene age fossils present (SES 2008a). Deposits from these epochs have been identified as Irvingtonian and Blancan mammal. In the vicinity of Barstow, California, the Barstow Formation is known to contain a diversity of fossil resources, including Barstow Fauna and Tick Canyon Fauna.

Minerals

There are 92 mines within San Bernardino County. Major minerals extracted in the Mojave River project area include gold, silver, feldspar, uranium, copper, iron, tungsten, turquoise, zeolite, barite, and clay. Limestone, sand, and gravel for cement and aggregate used for road construction are found at several locations throughout the area.

C.4.8.2 ENVIRONMENTAL IMPACTS

Geology

Soils and rock testing should be conducted and analyzed by a professional, licensed geotechnical engineer or geologist to determine existing foundation conditions. Exploration in sufficient quantity to adequately gather variations in the foundation conditions should be conducted to collect samples for testing. The type of materials, shear strength, resistivity, and shrink-swell potential are among the items that should be considered. The results of the geotechnical investigation would then be applied to the project’s engineering design and this would ensure that potential impacts associated with problematic soils and slope instability are reduced to less than significant levels. Excavation and grading for structure foundations, work areas, access roads, and spur roads could loosen soil and accelerate erosion.

Construction-related impacts to the geologic environment primarily are related to terrain modification (cuts, fills, temporary access roads, and drainage diversion measures) and dust generation. Other than the Pisgah Crater, no major unique geologic or physical features have been identified along the proposed corridor for the 850-MW Full Build-Out. Construction would not require cut and fill activities at most foundation sites and grading would not require import or export of earthen materials to/from the site. Some grading could be necessary for access roads; although, these can often be minimized by use of helicopters to deliver and set the transmission line components. Thus, significant impacts are not expected from geologic hazards or geological/mineralogical resources during construction. No evidence of ground subsidence caused by ground water extraction has been noted at the existing substation sites or along the transmission corridor.

Regional and local geologic conditions would not be altered significantly by the long-term operation of the proposed upgrades. With the exception of the Pisgah Crater, no other major unique geologic or physical features would be directly affected by the transmission corridor. This potential impact however would be considered minor as the proposed transmission corridor would parallel other existing transmission lines across this feature. The transmission corridor and substation sites may be underlain by deposits of sand and gravel, and these resources could not be recovered and used during the active life of the project.

The project area is subject to ground shaking from nearby and distant earthquakes. Project structures would be designed to meet the seismic design standards of the CBC in effect at the time of design (currently 2007 edition). At least 14 faults have been identified along the proposed transmission corridor. More detailed investigations would identify whether ground rupture potential exists along the corridor; although, typically the lines are designed to span the fault zones. Due to the depth to ground water, liquefaction is not expected to occur. To ensure that collapse potential is minimized all foundations, structures, or substation facilities would be designed in accordance with subsequent geotechnical investigations.

In summary, identified potential geologic hazards associated with the proposed upgrade options would be ground shaking from earthquakes, possible ground rupture at fault crossings, and the potential for localized low-strength foundation sites.

Paleontology

Construction of the 500-kV transmission line and substation expansion could destroy or disturb significant paleontological resources located within the project area with construction-related ground disturbances, such as the building or improvement of access and spur roads, staging area clearing, borehole drilling, trenching, excavating, grading, and vegetation removal. The decommissioning and removal of the existing transmission may also require ground clearing activities for access road improvements and construction of staging areas for dismantling the tower structures. There may also be an increase in public travel within the project area if new access roads open a previously inaccessible area. Increased public access may increase fossil removal activities within the project area. Indirect impacts to paleontological resources may include erosion of features due to channeling of runoff or modification of drainage channels. Construction activities in the vicinity of fossil resources may also cause erosion or damage to outcrop areas, due to earth shaking activities associated with drilling activities.

Minerals

Although no known mining operations have been identified in the project area, construction of the SCE upgrades could potentially interfere with daily ongoing or planned mining operations in the event that the project is constructed on or near a an active mine or a significant mineral resource.

C.4.8.3 MITIGATION

Site-specific geotechnical and seismic conditions would be appropriately addressed in the detailed engineering design and construction of towers and facilities. The following mitigation measures are included in Appendix EE of the Calico Solar Project AFC and recommended in this Staff Assessment/EIS to reduce impacts:

- Transmission structures and substation facilities should be designed in accordance with current CBC seismic and the design requirements and methodology of the Electrical Power Research Institute (EPRI).
- Transmission structures and substation facilities should be designed in accordance with recommendations provided in preliminary geotechnical reports and as amended by future geotechnical investigations with respect to collapsible.

In addition, implementation of mitigation measures discussed under **Soils and Water** section in this Staff Assessment/EIS would reduce the amount of erosion that would result from construction. In addition, compliance with a Storm Water Pollution Prevention Plan (SWPPP) would limit erosion from the construction site. With implementation of measures and best management practices that would ensure proper re-vegetation, erosion control, drainage, seismic design, among other requirements, SCE's project upgrades would create a less than significant impact to geology and paleontology.

Impacts to paleontological resources that may exist would be potentially significant. Recommended mitigation should provide for a paleontological resources inventory after final project design, pre-construction planning for monitoring and treatment of paleontological resources, and for monitoring during construction. The mitigation should require a qualified paleontological monitor and qualified paleontologist to monitor for significant subsurface fossils and then collect, analyze and curate any significant fossils found. In addition, the following mitigation measures are recommended for paleontological resources by SES in Appendix EE of the AFC:

- Prior to initiation of project construction activities the project area ROW and proposed and existing access roads should be surveyed by a Qualified Paleontologist.
- Based on the results of the paleontology resource survey, a paleontology resource management plan should be prepared and submitted to the Energy Commission and BLM for review and approval.
- All project construction staff should be trained in the importance of paleontological resources and the routine identification of fossil resources.

Implementation of this suggested paleontological mitigation would reduce project impacts to paleontological resources to a less than significant level.

If the project may potentially impact any planned or active mineral extraction operations, then SCE should coordinate with operations and management personnel, and with BLM, to determine status of and plans for active mining operations adjacent to or crossed by project alignments. SCE should develop a plan to avoid or minimize interference with mining operations in conjunction with mine/quarry operators prior to construction.

C.4.8.4 CONCLUSION

Southern California Edison would comply with applicable LORS as related to the identified upgrades project. No significant geological, paleontological or mineral resources have been identified in the project area; however, technical investigations/surveys have not yet been performed. The upgraded lines and substation equipment would be designed and constructed in accordance seismic requirements of SCE's Construction Standards and CPUC General Order 95 and EPRI. The project would have minimal potential to impact geological, paleontological or mineral resources if it implements the recommended mitigation and complies with applicable LORS.

C.4.9 CUMULATIVE IMPACT ANALYSIS

Section B.3, Cumulative Scenario, provides detailed information on the potential cumulative solar and other development projects in the project area. Together, these projects comprise the cumulative scenario which forms the basis of the cumulative impact analysis for the proposed project. In summary, these projects are:

- Renewable energy projects on BLM, State, and private lands, as shown on Cumulative Impacts Figures 1 and 2 and in Cumulative Tables 1A and 1B. Although not all of those projects are expected to complete the environmental review processes, or be funded and constructed, the list is indicative of the large number of renewable projects currently proposed in California.
- Foreseeable future projects in the immediate Newberg Springs/Ludlow area, as shown on Cumulative Impacts Figure 3, Newberg Springs/Ludlow Area Existing and Future/Foreseeable Projects, and Cumulative Tables 2 and 3. Table 2 presents existing projects in this area and Table 3 presents future foreseeable projects in the area. Both tables indicate project name and project type, its location and its status.

These projects are defined within a geographic area that has been identified by the Energy Commission and BLM as covering an area large enough to provide a reasonable basis for evaluating cumulative impacts for all resource elements or environmental parameters. Most of these projects have, are, or will be required to undergo their own independent environmental review under CEQA and/or NEPA. Even if the cumulative projects described in Section B.3 have not yet completed the required environmental processes, they were considered in the cumulative impacts analyses in this SA/Draft EIS.

C.4.9.1 GEOGRAPHIC SCOPE OF ANALYSIS

The geographic area considered for cumulative impacts on geology and paleontology is the central portion of the Mojave Desert geomorphic province of south-central California (Norris and Webb 1990). More specifically, the area includes most of San Bernardino and Riverside Counties. The potential impacts are limited to those involving paleontological resources since no geological or mineralogical resources have been identified within the boundaries of the proposed project. There are no geological hazards with potential cumulative effects, other than regional subsidence from ground water withdrawal. Significant ground water withdrawal is not part of the proposed project.

C.4.9.2 EFFECTS OF PAST AND PRESENT PROJECTS

Any previously completed project involving subsurface excavation with paleontological monitoring could already have had a detrimental effect on paleontological resources in the area defined above under **Geographic Scope of Analysis**. Given the general scarcity of fossils, even within known fossil bearing strata, the likelihood of prior damage is modest but unavoidable, after the fact.

The existing projects most likely to have damaged paleontological resources in geological formation similar to those of the proposed Calico Solar Project site include, by virtue of size and location:

- Twenty-Nine Palms Marine Corps Air-Guard Combat Center
- SEGS I and II Solar Generating Facilities

C.4.9.3 EFFECTS OF REASONABLY FORESEEABLE FUTURE PROJECTS

As shown in **Section B.3, Cumulative Scenario Table 1A**, the Barstow office of the BLM is aware of 18 solar energy and 25 wind energy potential projects totaling 304,120 acres of land under their jurisdiction. All energy projects on BLM land would be subject to paleontological monitoring and mitigation during construction. When properly implemented and enforced, these safeguards would provide adequate protection of paleontological resources, reducing potential impacts to a (CEQA) less than significant level.

In addition to potential renewable energy projects on BLM land, a large number of renewable energy, residential, and public works projects are proposed for the Mojave and Colorado Desert regions of Southern California on State and private lands. These projects are summarized in **Table 1B** of **Section B.3, Cumulative Scenario**. Of these, the following projects have the greatest potential to affect paleontological resources within the geographic scope of this analysis:

- Abengoa Mojave Solar Power Project
- Alta-Oak Creek Mojave (Wind) Project
- Rice Solar Energy Project

These projects would be subject to Energy Commission and/or CEQA environmental review which would include requirements for construction monitoring and mitigation of potential paleontological resources. When properly implemented and enforced, these safeguards should provide adequate protection of paleontological resources, reducing potential impacts to a (CEQA) less than significant level.

Contribution of the Calico Solar Project to Cumulative Impacts

Construction of the proposed Calico Solar Project would require localized excavation or ground disturbance over a very large area. Because the project area lies within geologic units with moderate to high paleontological sensitivity, the required excavation could, potentially, damage paleontological resources. Any damage could be cumulative to damage from other projects within the same geological formations. Implementation and enforcement of a properly designed Paleontological Resource Monitoring and Mitigation Plan (PRMMP) at this Calico Solar Project site should result in a net gain to the science of paleontology by allowing fossils that would not otherwise have been found to be recovered, identified, studied, and preserved. Cumulative impacts from Calico Solar Project, in consideration with other nearby similar projects, should therefore be either neutral (no fossils encountered) or positive (fossils encountered, preserved, and identified).

Operation. The operation of the Calico Solar Project would not present additional risk to geological resources (none identified) or paleontological resources. Once ground disturbing activity is complete plant operation has no real potential to further affect paleontological resources. Therefore, routine plant operation would not increase potential cumulative effects on paleontological resources. The longer the plant operates, however, the more likely it is to be damaged by hazards, primarily earthquake-related ground shaking. Construction and operation of the plant does not increase the potential of geological hazards at the site, just their potential to damage civil improvements.

Decommissioning. The decommissioning of the Calico Solar Project is expected to result in no adverse impacts related to geology or paleontology. Any potential impact to geological resources (none identified) or paleontological resources would have occurred and been completed during the ground disturbing phase of project construction.

C.4.10 COMPLIANCE WITH LORS

Federal, state, or local/county LORS applicable to this project or alternatives other than the No Project / No Action alternative, were detailed in **Geology and Paleontology Table 1**. Staff anticipates that the project will be able to comply with applicable LORS.

C.4.11 NOTEWORTHY PUBLIC BENEFITS

The science of paleontology is advanced by the discovery, study and curation of new fossils. These fossils can be significant if they represent a new species, verify a known species in a new location and/or if they include structures of similar specimens that had not previously been found preserved. In general, most fossil discoveries are the result of excavations, either purposeful in known or suspected fossil localities or as the result of excavations made during earthwork for civil improvements or mineral extraction. Proper monitoring of excavations at the proposed Calico Solar Power facility, in accordance with an approved Paleontological Resources Monitoring and Mitigation Plan, could result in a benefit to the science of paleontology and should minimize the potential to damage a significant paleontological resource.

C.4.12 RESPONSE TO PUBLIC COMMENTS

One public comment was received relating to Geology or Paleontology.

Commenter	**Comments**

County of San Bernardino, Land Use Service Department	Regarding geologic and seismic considerations, we note that the Lavic Lake fault partially underlies this site (Sections 12 and 15). The fault experienced surface ground rupture during the 1999 Hector Mine earthquake and was subsequently evaluated by the California Geologic Survey and has been included within an Alquist-Priolo Earthquake Fault Zone. However, we do not see an adequate discussion of on-site faulting in the SA/DEIS. Structural and safety requirements may be needed and should be analyzed further.

Staff Response: The discussion on the Lavic Lake and Pisgah faults, both of which may extend on to the site, has been improved. Proposed Condition of Certification **GEO-1** requires detailed geologic and field evaluation of both faults.

C.4.13 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

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 specific geological and paleontological conditions of certification follow. It is staff's opinion that the likelihood of encountering paleontological resources is low at the plant site.

GEO-1 The two Alquist-Priolo faults (Pisgah fault and the Lavic Lake fault) shall be located (if actually present) by trenching or suitable geophysical methods with sufficient accuracy and confidence to assure that no occupied structures are placed within 50 feet, either side, of an established fault trace or any identified splays. Other structures deemed critical to the project, by the owner, may also be set back, as practical, imprudent and appropriate.

Verification: At least 90 days prior to ground breaking (prior to final project design) the project owner shall submit a fault evaluation report signed and stamped by a geologist licensed in the state of California. The evaluation shall include sufficient field exploration to establish whether or not either or both faults (or their splays) extend onto the project site. Surveyed locations shall be obtained for any faults encountered and a map showing the fault locations in relation to project structures shall be provided. On-site faults shall be considered active unless conclusive field evidence shows otherwise.

GEO-2 Because of the embankments on the downhill side, the proposed storm water detention basins constitute detention dams, some of which may be large enough to be under the jurisdiction of the State of California, Department of Water Resources, Division of Safety of Dams. Each detention dam site shall be characterized in a geotechnical investigation to establish foundation conditions and assess geologic hazards that affect embankment design. Appropriate geotechnical recommendations shall be provided for use in design and construction of the embankments and the associated storage area. All dams must be designed by a California licensed geotechnical or civil engineer familiar with design of small dams.

Verification: At least 60 days prior to ground breaking for the detention basins, the project owner shall submit a geotechnical investigation report covering each proposed detention basin. Appropriate geotechnical recommendations and specifications shall be provided for use in design and construction of the embankments and the associated storage area. All detention facilities can be included in a single report or in the overall final project geotechnical report. One set of stamped design drawings, typical of the detention dams, must be submitted by the project owner, prior to starting detention dam construction.

GEO-3 The California Department of Water Resources, Division of Safety of Dams has jurisdiction over proposed and existing dams that impound 50 acre-feet of water or more. Embankments 6 feet high or less are excluded, regardless of storage capacity and embankments impounding less than 15 acre-feet of water are excluded, regardless of height. Any detention basin meeting the Division of Safety of Dams jurisdictional criteria for a dam shall be permitted through that agency.

Verification: If final detention basin design results in no jurisdictional dams, the project owner shall submit a letter of verification from the design engineer. If one or more detention basins fall within the jurisdiction of the Division of Safety of Dams, the project owner shall submit copies of the permit application(s) to the Division of Dams Safety of Dams. Upon completion of construction of jurisdictional dams, the project owner shall submit copies of acceptance documents from the Division of Safety of Dams.

PAL-1 The project owner shall provide the CPM with the resume and qualifications of its 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.

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 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 3 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. Paleontological resource monitors 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 4 years' experience monitoring in California; or
- Enrollment in upper division classes pursuing a degree in the fields of geology or paleontology and 2 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. If the footprint of the project or its linear facilities changes, 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: (1) 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.

(2) 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.

(3) 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 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 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. 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 paleontological 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; and
7. A sticker that shall be placed on hard hats indicating that environmental training has been completed.

Verification: (1) At least 30 days prior to ground disturbance, the project owner shall submit the proposed WEAP, including the brochure, with the set of reporting procedures for workers to follow.

(2) 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.

(3) 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.

(4) 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 paleontological 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 3 years after project completion and approval of the CPM-approved paleontological resource report (see Condition of Certification **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.

C.4.14 CONCLUSIONS

The proposed Calico Solar Project site is located in an active geologic area of the north-central Mojave Desert Geomorphic Province in central San Bernardino County in south-central California. Because of its geologic setting, the site could be subject to intense levels of earthquake-related ground shaking. The effects of strong ground shaking would need to be mitigated, to the extent practical, through structural designs required by the CBC (2007) and the project geotechnical report. The CBC (2007) requires that structures be designed to resist seismic stresses from ground acceleration and, to a lesser extent, liquefaction. A geotechnical investigation has been performed and presents standard engineering design recommendations for mitigation of seismic shaking and site soil conditions.

There are no known viable geologic or mineralogical resources at the proposed Calico Solar Project site. Locally, paleontological resources have been documented within older Quaternary alluvium which underlies the younger Quaternary alluvium of the site surface. Potential impacts to paleontological resources would be mitigated through worker training and monitoring by qualified paleontologists, as required by Conditions of Certification, **PAL-1** through **PAL-7**.

Based on its independent research and review, Energy Commission staff believes that the potential is low for significant adverse impacts to the proposed project from geologic hazards during its design life and to potential geologic, mineralogic, and paleontological resources from the construction, operation, and closure of the proposed project. It is staff’s opinion that the Calico Solar Project could be designed and constructed in accordance with all applicable laws, ordinances, regulations, and standards and in a manner that both protects environmental quality and assures public safety, to the extent practical.

Certification of Completion

Worker Environmental Awareness Program

Calico Solar Project (08-AFC-13)

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
1.			
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Cultural Trainer: _____________ Signature:__________________ Date: ___/___/____

PaleoTrainer: ______________ Signature:__________________ Date: ___/___/____

Biological Trainer: _____________Signature:_______________ Date:___/___/__

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C.5 – HAZARDOUS MATERIALS MANAGEMENT

Testimony of Rick Tyler and Alvin Greenberg, Ph.D.

C.5.1 SUMMARY OF CONCLUSIONS

Energy Commission staff's evaluation of the proposed project, along with staff's proposed mitigation measures, indicate that hazardous materials use at the proposed Calico Solar Project (formerly the Stirling Energy Systems Solar One Project) would not present a significant impact [pursuant to the California Environmental Quality Act (CEQA) to the public. With adoption of the proposed conditions of certification, the proposed project would comply with all applicable laws, ordinances, regulations, and standards.

C.5.2 INTRODUCTION

The purpose of this **Hazardous Materials Management** section of this Supplemental Staff Assessment (SSA) is to determine if the proposed Calico Solar Project could potentially cause significant impacts (pursuant to the CEQA) to the public from the use, handling, storage, or transportation of hazardous materials at the proposed project site. If significant adverse impacts to 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 potential impacts and risk to local populations are significant (pursuant to CEQA). 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 would not be significant off-site impacts to the public. These measures seek to minimize 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 liquids, and that volatile chemicals would have a restricted release 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. 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 chemicals regulated as extremely hazardous materials would be used on-site during construction. None of the materials proposed for use 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.

The Calico Solar Project 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.

C.5.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

LAWS, ORDINANCES, REGULATION, AND STANDARDS

The following federal, state, and local laws and policies apply to the protection of public health and hazardous materials management. Staff's analysis examines the project's compliance with these requirements.

Hazardous Materials Management Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
The Superfund Amendments and Reauthorization Act of 1986 (42 USC §9601 et seq.)	Contains the Emergency Planning and Community Right To Know Act (also known as SARA Title III).
The Clean Air Act (CAA) of 1990 (42 USC 7401 et seq. as amended)	Establishes a nationwide emergency planning and response program, and imposes reporting requirements for businesses that store, handle, or produce significant quantities of extremely hazardous materials.
The CAA Section on Risk Management Plans (42 USC §112(r)	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.
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.

Applicable Law	Description
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.
Title 49, Code of Federal Regulations, Part 190	Outlines gas pipeline safety program procedures.
Title 49, Code of Federal Regulations, Part 191	Addresses the transportation of natural and other gases by pipeline. Requires preparation of annual reports, incident reports, and safety-related condition reports. Also requires operators of pipeline systems to notify the U.S. Department of Transportation DOT) of any reportable incident by telephone and submit a follow-up written report within 30 days.
Title 49, Code of Federal Regulations, Part 192	Addresses transportation of natural and other gases by pipeline: Requires minimum federal safety standards, specifies minimum safety requirements for pipelines, and includes material selection, design requirements, and corrosion protection. The safety requirements for pipeline construction vary according to the population density and land use that characterize the surrounding land. This part also contains regulations governing pipeline construction, which must be followed for Class 2 and Class 3 pipelines, and requirements for preparing a pipeline integrity management program.
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) requires the preparation of a Risk Management Plan (RMP) and Off-site Consequence Analysis (OCA) and submittal to the local Certified Unified Program Agency (CUPA) for approval.

Applicable Law	Description
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 Health and Safety Code Sections 25270 through 25270.13	Requires the preparation of a Spill Prevention, Control, and Countermeasures (SPCC) Plan if 10,000 gallons or more of petroleum is stored on-site. The above regulations would also require the immediate reporting of a spill or release of 42 gallons or more to the California Office of Emergency Services and the Certified Unified Program Agency (CUPA).
Process Safety Management: Title 8 California Code of Regulations Section 5189	Requires facility owners to develop and implement effective process safety management plans when toxic, reactive, flammable, or explosive chemicals are maintained on site in quantities that exceed regulatory thresholds.
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	
2007 California Fire Code Title 24, Part 9	Adopts the California Fire Code, 2007 Edition, into San Bernardino County regulations.

The San Bernardino County Fire Department (SBCFD) is the Certified Unified Program Agency (CUPA) in the project area, and is responsible for reviewing Hazardous Materials Business Plans and Risk Management Plans. With regard to seismic safety issues, the proposed Calico Solar Project site is located in Seismic Risk Zone 4. The construction and design of buildings and vessels storing hazardous materials would meet the seismic requirements of the Uniform Building Code (SES 2008a).

C.5.4 PROPOSED PROJECT

The proposed Calico Solar Project site is approximately 6,215 acres of Bureau of Land Management (BLM) land located in San Bernardino County, California (SES 2008f page 3-3). The site is located on Hector Road north of Interstate 40, 17 miles east of Newberry Springs and 115 miles east of Los Angeles, California in the Mojave Desert (SES 2008f page 1-1). The project consists of 29 contiguous parcels (SES 2008f Appendix T). The Burlington Northern Santa Fe (BNSF) railroad bisects the site from west to east (SES 2008f 3-22).

The proposed project would utilize SunCatchers – 40-foot tall Stirling dish technology developed by the applicant – which track the sun and focus solar energy onto Power Conversion Units (PCU) (SES 2008f 3-2) to generate electricity. Each PCU consists of a solar receiver heat exchanger and a closed-cycle, high-efficiency Solar Stirling Engine specifically designed to convert solar power to rotary power via a thermal conversion process. The engine drives an electrical generator to produce grid-quality electricity.

Phase I would be limited to 275 MW, with the remaining 575 MW as part of Phase II. There would be one laydown area located within the main services complex area occupying approximately 10 acres. In addition, the project may also have within the main services complex a 15 acre construction laydown staging area. In addition to the proposed Calico Solar Project site and construction areas, there are other features and facilities associated with the proposed project (the majority of which are located on the proposed project site or construction laydown area), including:

- Approximately 34,000 SunCatchers and associated equipment and infrastructure within a fenced boundary;
- An onsite, 52 acre main services complex located in the northern portion of the Phase I section of the project site for administration and maintenance activities. The complex would include buildings, parking and access roads (SES 2008f page 3-62 and Figure 3-4); and
- An onsite, 2.8-acre 850-MW Calico Solar Project Substation located in the southern portion of the Phase I section of the site (SES 2008f page 3-62 and Figure3-4).

C.5.4.1 SETTING

Several characteristics of an area in which a project is located affect its potential for an accidental release of a hazardous material to result in a significant public exposure. 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, ambient air temperatures, and terrain characteristics are described in the Air Quality section (C.5.2) and Appendix V of the Application for Certification (AFC) (SES 2008a).

Terrain Characteristics

The location of elevated terrain is often an important factor in assessing potential exposure. An emission plume from an accidental release may impact high elevations before it impacts lower elevations. The topography of the Calico Solar Project site (like it's immediately surrounding areas) is essentially flat.

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. There are no sensitive receptors within the project vicinity. There are a total of three residences within a 3-mile radius of the proposed site, the nearest of which is located approximately 1,300 feet south of the property boundary on the other side of I-40. (SES 2008a, Section 5.16.1).

C.5.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Method and Threshold for Determining CEQA Significance

Staff reviews and assesses 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 off-site 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 migrating off-site and impacting the public, staff analyzes several aspects of the proposed use of materials at a facility. Staff recognizes that some hazardous materials must be used at solar power plants. Therefore, staff conducts 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 it 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 reviews 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 reviews and evaluates the proposed use of hazardous materials, as described by the applicant. Staff's assessment follows the five steps listed below:

- **Step 1**: Staff reviews the chemicals and amounts proposed for on-site use, as listed in AFC Table 5.15-2 (SES 2008a) 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**: 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 are removed from further assessment.
- **Step 3**: Measures proposed by the applicant to prevent spills are 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 are 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 then analyzes 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.

Direct/Indirect Impacts and Mitigation

Small Quantity Hazardous Materials

In conducting this analysis, staff reviewed Tables 5.15-1 and -2 of the AFC (SES 2008a, section 5.15) and 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 small quantities, have low mobility, low vapor pressure, and/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 hypochlorite, diesel fuel, gasoline, ethylene glycol, and other various chemicals (see **Hazardous Materials Appendix A** for a list of all chemicals proposed to be used and stored at the Calico Solar Project site) would be used and stored on-site and represent limited off-site hazard due to their small quantities, low volatility, and/or low toxicity.

After removing from consideration those chemicals that pose no potential for risk of off-site impact in Steps 1 and 2, staff continued with Steps 3, 4, and 5 to review the remaining hazardous material, hydrogen gas.

Large Quantity Hazardous Materials

Hydrogen

Hydrogen is used as the working fluid in the Stirling cycle engines utilized by the project. The proposed project involves 34,000 individual engines and solar collectors. Originally, the applicant proposed to use hydrogen storage in k-bottles at each collector engine assembly. The proposal was later modified to utilize onsite hydrogen generation and a centralized system. The centralized hydrogen system described in the Supplement to the Application for Certification and which was evaluated in the SA/DEIS proposed to store about 7,162,148 standard cubic feet (scf) or approximately 37,243 pounds (lbs) of hydrogen on-site (SES 2009d).

Currently the applicant is evaluating <u>both</u> methods of providing hydrogen to the SunCatchers and both hydrogen systems have been refined to reflect design changes. For both systems the hydrogen would be generated by electrolysis using two generators, each producing 1,820 scf per hour. Both systems would store up to 36,400 standard cubic feet in one tank. The currently proposed centralized hydrogen system would distribute hydrogen from the central storage tank to 95 compressor groups and from there to each SunCatcher using piping. Each compressor group would include a 29,333-scf high pressure supply tank and a 9,900-scf low pressure dump tank (TS 2010am).

Modifications to the distributed system include an increase in the amount of hydrogen needed at each SunCatcher from 3.4 to 11 standard cubic feet. In this system the hydrogen would not be distributed by pipes, but rather the SunCatchers would be supplied from the central storage tank by trucks. About 610 scf of hydrogen would be present at each SunCatcher in an 82-scf high pressure supply tank, 28-scf low pressure dump tank, and 489-scf storage tank (plus 11-scf at 580 psi). Hydrogen refilling of each SunCatcher supply tank is expected to occur about three times per year (TS 2010am). It would bring the on-site hydrogen to over 20,000,000 scf.

The applicant conducted an analysis assuming a worst case release of hydrogen on site for both proposed hydrogen systems. It was assumed that a hydrogen release would form a vapor cloud and detonate causing an unconfined vapor cloud explosion. The distance to an over pressure of 1.0 psi was then determined. This is an overpressure that could cause some damage to structures and injury to exposed members of the general population. Four different scenarios were evaluated for the centralized system and three different scenarios for the distributed system. These include the release of 36,400 scf of hydrogen from the central storage tank associated with either system, the release of 29,333 scf from a high pressure tank or 9,900 scf from a low pressure tank associated with the centralized system, the release of 610 scf from a single SunCatcher in the distributed system, and the maximum amount of hydrogen on-site for each system (4,140,000 scf for the centralized and 20,800,000 scf for the distributed). All scenarios assumed that 10 percent of the vapor participated in an explosion (TS 2010am, Table 2.15-3).

The maximum distances to the 1.0 psi level of impact for the worst-case scenarios (involving all hydrogen present on-site) were estimated to be 0.32 miles for the centralized system and 0.54 miles for the distributed system (TS 2010am, Table 2.15-4). It should be noted that the hypothetical scenario involving all hydrogen on-site participating in a vapor cloud explosion is highly unlikely. The modeled endpoint distance to the more realistic worst-case scenario involving the central storage tank is 0.07 miles. The nearest residence is about 0.25 miles from the project site and there are no sensitive receptors in the project vicinity.

Staff notes that although Phase I of the project would not include sections of land nearest Interstate-40, Phase II of the project would place SunCatchers and their stored hydrogen on land only a few hundred feet from traffic in I-40 and within ¼ mile of the residence located to the south of I-40. This would result in traffic on I-40 and the residence being located within the 0.54 mile worst-case overpressure zone, thus indicating a potential for blast effects on traffic and the residence. However, it should be noted that it is nearly impossible to detonate hydrogen in an unconfined vapor cloud because it disperses very rapidly due to its low density relative to air. It should also be noted that the applicant's release scenarios are very conservative in assuming an instantaneous release of the entire volume of hydrogen instead of a more realistic release occurring over a period of time resulting in significant dispersion of the hydrogen while the cloud was forming. Actual experience with hydrogen releases have not resulted in unconfined cloud explosions. It is widely believed that unconfined hydrogen will not detonate without a high explosive initiating event (Lees 1998).

Staff therefore concurs with the analysis of both methods of hydrogen use and storage and the conclusions provided by the applicant. Staff independently concludes that the applicant's analysis is conservative and most likely overestimates both the magnitude and potential impacts of an actual explosion that could occur at the facility. It is staff's conclusion that an unconfined hydrogen vapor cloud explosion is not plausible and will not occur at the proposed facility. Thus, the use of hydrogen at the proposed facility poses a risk of an on-site explosion fire but no significant risk of an explosion impacting on surrounding populations, I-40 traffic, or the environment. Nevertheless, staff feels that even without a significant risk of explosion impacts, the risk of a fire at the Calico Solar Project impacting the area, including traffic on I-40 and the nearest residence when Phase II is completed, due to impacts from the extreme heat produced by a large hydrogen gas fire and the potential escalation of a fire beyond the site boundaries. Although an explosion shock wave has a very low probability of occurring and impacting the area off-site, the heat flux from a fire could exceed the human exposure standard of 1.5 KW/m^2 (450 $Btu/hr\text{-}ft^2$) (1.5 Kilowatts of heat energy per square meter of skin or 450 British Thermal Units per square foot of skin), a thermal radiation flux standard used by the U.S. Department of Housing and Urban Development (HUD; 49 Fed. reg. 5100 Feb. 10, 1984), the World Bank, and the recommendation of the American Petroleum

Institute. A hydrogen fire could also be hot enough to ignite a wild land fire, a structural fire, or cause a vehicular accident of unknown proportions on I-40. Furthermore, the solar fields will be bisected by the BNSF railroad tracks which pose their own risk to the solar field by a derailment while at the same time will experience a risk of closure should a hydrogen gas leak of sufficient magnitude occur and result in a fire.

Towards mitigating these on-site and off-site impacts, staff is proposing to address the risk management of hydrogen gas by requiring that the California Occupational Safety and Health Administration (Cal-OSHA) Process Safety Management standard (8 CCR 5189) be followed and that a process hazard analysis and a Process Safety Management Plan (PSM Plan, which includes a Hazard and Operability analysis) and a Risk Management Plan (RMP, which would include an Offsite Consequence Analysis that includes the consequences of a train derailment resulting in a hydrogen leak and fire) be prepared. The RMP would be required in staff's proposed condition **HAZ-2**. Staff strongly believes that it is imperative that the applicant understands that the entire Cal-OSHA Process Safety Management standard (8 CCR 5189) must be strictly followed and implemented. Towards that, staff believes that when conducting the process hazard analysis required in 8 CCR 5189 (e)(1), the project owner should perform a hazard analysis using a Hazard and Operability Study (HAZOP). Also, staff believes that an independent outside third party group of professionals should provide peer review and approval of the plan before the plan is submitted to the Energy Commission Compliance Project Manager (CPM) for approval. The most important part of the hazard review is described in 8 CCR 5189 (e)(3)(A) which requires that "*The process hazard analysis shall be performed by a team with expertise in engineering and process operations, and the team shall include at least one operating employee who has experience and knowledge specific to the process being evaluated. The team shall also include one member knowledgeable in the specific process hazard analysis methodology being used. The final report containing the results of the hazard analysis for each process shall be available in the respective work area for review by any person working in that area*". Staff proposes Condition of Certification **HAZ-8** which would require that the hazard analysis for the hydrogen system be conducted and that an independent outside third party that also has the required expertise be hired by the project owner to review, evaluate, and sign-off on the process hazard analysis and PSM plans required by Energy Commission conditions. Staff also is proposing Condition of Certification **HAZ- 7** to ensure that the hydrogen system – whichever of the two systems the applicant ultimately decides to use - is designed to applicable engineering safety codes. In particular, staff is recommending that the applicant provide a design for the hydrogen handling system that is reviewed and stamped by a professional engineer registered in the State of California. This will ensure that the hydrogen system ultimately chosen by the applicant will comply with the applicable American National Standards Institute (ANSI) and American Society of Mechanical Engineers (ASME) pressure vessel codes and applicable National Fire Protection Association (NFPA) fire protection codes. Staff is also proposing mitigation in the **Worker Safety and Fire Protection** section of this SSA to ensure adequate emergency response from the San Bernardino County Fire Department.

Mitigation

Staff believes that this project's use of hazardous materials poses no significant risk (pursuant to CEQA) 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 the Calico Solar Project, 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** which requires 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 5.15-2 of the AFC and concurred with the need and appropriateness of their use. **HAZ-1** also requires changes to the allowed list of hazardous materials and their maximum amounts 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 (see Appendix A for the list of proposed hazardous materials to be used).

A Hazardous Materials Business Plan (HMBP), a Risk Management Plan (RMP), and a Spill Prevention, Control, and Countermeasures Plan (SPCC Plan) would also be prepared by the applicant that would incorporate state requirements for the handling of hazardous materials (SES 2008a, section 5.15). Staff proposes Condition of Certification **HAZ-2** which ensures that the HMBP (which includes the Inventory and Site Map, an Emergency Response Plan, Owner/Operator Identification, and Employee Training), an RMP, and a SPCC Plan would be provided to the San Bernardino County Fire Department so that they can better prepare emergency response personnel for handling emergencies which could occur at the facility.

On-site Spill Response

In order to address spill response, the facility would prepare and implement an emergency response plan that 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. The presence of oil in a quantity greater than 1,320 gallons might invoke a requirement to prepare a Spill Prevention, Control, and Countermeasure (SPCC) Plan if other requirements are met. The quantity of oil contained in any one of the planned 230/500 kV (kilovolts = 1000 volts) transformers would be in excess of the minimum quantity that requires such a plan. However, there are no known Waters of the United States but they may be Waters of the State and thus staff's position is that no SPCC Plan is required by 40 CFR 112 but is required pursuant to California HSC Sections 25270 through 25270.13. Therefore, the Calico Solar Project will be required to prepare a SPCC because it will store 10,000 gallons or more of petroleum on-site. The above regulations would also require the immediate reporting of a spill or release of 42 gallons or more to the California Office of Emergency Services and the Certified Unified Program Agency (CUPA).

Personnel working with hazardous materials will be trained in proper handling and emergency response to chemical spills or accidental releases. Designated personnel will also be trained as a project hazardous materials response team which would be the first responder to hazardous materials incidents. In the event of a large incident involving hazardous materials, backup support would be provided by the San Bernardino County Fire Department (SBCFD) which has a hazmat response unit capable of handling any incident at the proposed Calico Solar Project. The SBCFD

Hazmat unit is located at Station #322 in Adelanto, about a one-hour drive away (SBCFD 2010).

Staff concludes that, given the remote location, the hazardous material response time is acceptable, and that the SBCFD is adequately trained and equipped to respond to a hazardous materials spill emergency at Calico Solar in a timely manner.

Transportation of Hazardous Materials

Containerized hazardous materials would be transported to the facility via truck. During construction and operation of the Calico Solar Project, staff believes that minimal amounts and types of hazardous materials (paint, cleaners, solvents, gasoline, diesel fuel, motor oil, lubricants, sodium hypochlorite, and welding gases in standard-sized cylinders) do not pose a significant risk (pursuant to CEQA) of either spills or public impacts along any transportation route. Staff therefore does not recommend a specific route.

Liquid hazardous materials can be released during a transportation accident, and the extent of their impact in the event of a release would depend on the location of the accident and the rate of vapor dispersion from the surface of the spilled pool. The likelihood of an accidental release during transport is dependent upon the truck driver, the type of vehicle used for transport; and accident rates for the type of road.

In determining that the risk of accident and release during the transportation of hazardous materials to the site, staff determined that the transport on I-40 and then for a short distance from I-40 on a dedicated road in a remote area would present a less than significant risk of accident and release. In making this determination, staff relied upon the extensive regulatory program that applies to shipment of hazardous materials on California Highways to ensure safe handling in general transportation (see the Federal Hazardous Materials Transportation Law 49 USC §5101 et seq, the U.S. Department of Transportation Regulations 49 CFR Subpart H, §172-700, and the California DMV Regulations on Hazardous Cargo). These regulations also address driver competence. See AFC section 5.11 for additional information on regulations governing the transportation of hazardous materials.

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 the release of hazardous materials. 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.

Staff has also initiated a review of the impacts of the recent earthquakes in Haiti (January 12, 2010; magnitude 7.0) and Chile (February 27, 2010; magnitude 8.8). The building standards in Haiti are extremely lax while those in Chile are as stringent and modern as California seismic building codes. Yet, the preliminary reports show a lack of impact on hazardous materials storage and pipelines infrastructure in both countries. For Haiti, this most likely reflects a lack of industrial storage tanks and gas pipelines; for Chile, this most likely reflects the use of strong safety codes.

Referring to the sections on **Geologic Resources and Hazards** and **Facility Design** in the AFC, staff notes that the proposed facility would be designed and constructed to the applicable standards of the 2007 California Building Code for Seismic Zone 4 (SES 2008a). Therefore, on the basis of what occurred in Northridge with older tanks and the lack of failures during the Nisqually earthquake (with newer tanks) and in the 2010 Chilean earthquake, staff determined that tank failures during seismic events are not probable and do not represent a significant risk (pursuant to CEQA) to the public.

Site Security

The Calico Solar Project proposes to use hazardous materials that necessitate that special site security measures should be developed and implemented to prevent unauthorized access. The North American Electric Reliability Corporation (NERC) published *Security Guidelines for the Electricity Sector* in 2002 (NERC 2002) as well as issued a Critical Infrastructure Protection standard for cyber security (NERC 2009), 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 and hydrogen is listed as a Chemical of Interest with a threshold level of 10,000 lbs. The Calico project will have a maximum of 116,000 lbs of hydrogen on-site and therefore the CFATS regulation will apply and the project owner will need to submit a “Top Screen” assessment to the DHS. However the DHS decides to regulate the site and even if it decides not to require security measures at the Calico Solar Project, 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 solar 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 the Calico Solar Project 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 include perimeter fencing and breach detectors, guards (if appropriate), 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. DOT requirements that hazardous materials vendors prepare and implement security plans per 49 CFR 172.802 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 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 NERC, after consultation with appropriate law enforcement agencies and the applicant.

C.5.4.3 CEQA LEVEL OF SIGNIFICANCE

Cumulative Impacts and Mitigation

Staff considered the potential for impacts due to a simultaneous release of any of the hazardous chemicals from the proposed Calico Solar Project with any other existing or foreseeable nearby facilities. Because of the small amounts of the hazardous chemicals to be stored at the facility, staff determined that there was 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, there is no possibility that vapor plumes would mingle (combine) to produce an airborne concentration that would present a significant risk (pursuant to CEQA). Therefore, no potential cumulative impacts are predicted for the proposed action.

Compliance With LORS

Staff concludes that construction and operation of the Calico Solar Project would be in compliance with all applicable LORS for both long-term and short-term project impacts in the area of hazardous materials management.

Noteworthy Public Benefits

Staff has not identified any noteworthy public benefits associated with the use of hazardous materials at the proposed project.

C.5.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage alternative would essentially be a 275 MW solar facility located within the central portion of the proposed 850 MW project. It was developed because it can be constructed as to minimize potential impacts to environmental resources. This alternative is illustrated in **Alternatives Figure 1**.

C.5.5.1 SETTING AND EXISTING CONDITIONS

The Reduced Acreage alternative would not significantly change the distance from hazardous materials (i.e. hydrogen storage) to the nearest residences and thus would not change the potential for impact due to proximity as compared to the proposed project. The local meteorology, terrain characteristics, and location of population centers and sensitive receptors relative to the project would remain the same. Please see the discussion of existing conditions within affected BLM lands under Section C.5.4.1

C.5.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The types of construction and operational impacts of the Reduced Acreage Alternative would be the same as those of the proposed project, as described in Section C.5.4.2. For the analysis, staff examines plausible potential loss of containment incidents (spills) for the hazardous materials to be used at the proposed facility. The proposed project analysis considers the worst case, plausible event, and the impacts are found to be less than significant (pursuant to CEQA) with the incorporation of conditions of certification. The impacts of this alternative would be even smaller due to the reduce use, handling, storage, or transport of hazardous materials and the smaller number of SunCatchers of the alternative. Construction and operation risk to workers due to the use of hydrogen will be reduced because of the reduced number of SunCatchers.

The Reduced Acreage alternative would not result in any significant change in the potential for impact associated with hazardous materials handling and storage. The proposed project would not pose a significant risk of public impact as a result of an accidental release of hazardous materials. This alternative would not significantly change the risk profile of the facility.

C.5.5.3 CEQA LEVEL OF SIGNIFICANCE

The significance criteria for the Reduced Acreage alternative are the same as the criteria for the proposed project. Like the proposed project, the construction and operation of the Reduced Acreage alternative would be in compliance with all applicable LORS for both long-term and short-term project impacts in the area of hazardous materials management with the adoption of the proposed conditions of certification. The mitigation that would be proposed for the Reduced Acreage alternative would be the same as that proposed for the proposed project (staff recommended conditions **HAZ-1** to **HAZ-6**).

C.5.6 AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

The analysis of the Donated and Acquired Lands Alternative has been moved to Section B.2 (Alternatives) of this document.

C.5.7 NO PROJECT/NO ACTION ALTERNATIVE

There are three No Project/No Action Alternatives evaluated in this section, as follows:

NO PROJECT/NO ACTION ALTERNATIVE #1

No Action on the Calico Solar Project application and on CDCA land use plan amendment

Under this alternative, the proposed the Calico Solar Project would not be approved by the Energy Commission and BLM (Bureau of Land Management), and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. As a result, no hazardous materials would be used and no impacts related to the use of hazardous material would occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project requiring a land use plan amendment. In addition, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations

NO PROJECT/NO ACTION ALTERNATIVE #2

No Action on the Calico Solar Project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed the Calico Solar Project would not be approved by the Energy Commission and BLM, and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the project site.

Because the CDCA Plan would be amended, it is possible that the site would be developed with a different solar technology. As a result, construction and operation of the solar technology would likely result in use of hazardous materials. Different solar technologies require the use of different hazardous materials; however, it is expected that all solar technologies would require the use of hazardous materials. As such, this No Project/No Action Alternative could result in impacts to hazardous material handling similar to those under the proposed project.

NO PROJECT/NO ACTION ALTERNATIVE #3

No Action on the Calico Solar Project application and amend the CDCA land use plan to make the area unavailable for future solar development

Under this alternative, the proposed the Calico Solar Project would not be approved by the Energy Commission and BLM, and the BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no use of hazardous materials. As a result, this No Project/No Action Alternative would not result in impacts from the use of hazardous materials. However, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

C.5.8 PROJECT-RELATED FUTURE ACTIONS - HAZARDOUS MATERIALS MANAGEMENT

This section examines the potential impacts of future transmission line construction, line removal, substation expansion, and other upgrades that may be required by Southern California Edison Company (SCE) as a result of the Calico Solar Project. The SCE upgrades are a reasonably foreseeable event if the Calico Solar Project is approved and constructed as proposed.

The SCE project will be fully evaluated in a future EIR/EIS prepared by the BLM and the California Public Utilities Commission. Because no application has yet been submitted and the SCE project is still in the planning stages, the level of impact analysis presented is based on available information. The purpose of this analysis is to inform the Energy Commission and BLM, interested parties, and the general public of the potential environmental and public health effects that may result from other actions related to the Calico Solar project.

The project components and construction activities associated with these future actions are described in detail in Section B.3 of this Staff Assessment/EIS. This analysis examines the construction and operational impacts of two upgrade scenarios:

- The **275 MW Early Interconnection Option** would include upgrades to the existing SCE system that would result in 275 MW of additional latent system capacity. Under the 275 MW Early Interconnection option, Pisgah Substation would be expanded adjacent to the existing substation, one to two new 220 kV structures would be constructed to support the gen-tie from the Calico Solar Project into Pisgah Substation, and new telecommunication facilities would be installed within existing SCE Right of Ways (ROWs).

- The **850 MW Full Build-Out Option** would include replacement of a 67-mile 220 kV SCE transmission line with a new 500 kV line, expansion of the Pisgah Substation at a new location and other telecommunication upgrades to allow for additional transmission system capacity to support the operation of the full Calico Solar Project.

C.5.8.1 ENVIRONMENTAL SETTING

The environmental setting described herein incorporates both the 275 MW (megawatt or 1,000,000 watts of energy) Early Interconnection and the 850 MW Full Build-Out options. The setting for the 275 MW Early Interconnection upgrades at the Pisgah Substation and along the telecomm corridors is included within the larger setting for the project area under the 850 MW Full Build-Out option, which also includes the Lugo-Pisgah transmission corridor.

A hazardous material is generally described as any substance or mixture of substances that have properties that are capable of having an adverse effect on human health and the environment. Hazardous materials handling is regulated at the federal, state, and local level. Regulations cover the transportation, labeling, handling, storage, disposal, and accidental releases of hazardous materials. Included within these regulations are reporting requirements for hazardous materials storage and usage, worker exposure protection, and reporting and spill response requirements. Hazardous material handling also covers response to incidental discovery of buried or unknown hazardous materials present in the subsurface environment.

The general population includes many sensitive subgroups that may be at a greater health 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 Lugo-Pisgah transmission line route would traverse a combination of developed urban lands on the west end, and relatively undeveloped or limited development areas of the Mojave Desert in the central and eastern sections near Pisgah Substation. The developed areas of the project area have a higher potential to pass through areas of historic or on-going soil or groundwater contamination. The desert and rural areas of the transmission line route would generally be considered lower risk for the presence of hazardous material storage areas or subsurface uncontrolled hazardous waste disposal areas, due to the lack of commercial and industrial activities.

C.5.8.2 ENVIRONMENTAL IMPACTS

Construction activities for both upgrade options would include the handling and use of hazardous materials associated with general construction activities, such as heavy equipment operations, substation expansion, transmission tower construction, and transmission line conductoring and decommissioning. Hazardous materials, such as fuels, oils, and other vehicle and equipment maintenance fluids, would be stored at the project substation sites and construction staging areas. Improperly maintained vehicles and equipment could leak fluids during construction activities and while parked. There would be a potential for incidents involving release of gasoline, diesel fuel, oil, hydraulic fluid, solvents, paint, and/or lubricants from vehicles or other equipment at the staging areas and/or the project sites. Spills and leaks of hazardous materials during construction activities could potentially result in soil or groundwater contamination. Improper handling of hazardous materials could expose project workers or the nearby public to hazards.

Transmission line and telecomm construction activities are generally mobile, moving from one site to another for construction of towers, stringing of lines, and decommissioning equipment. As a mobile construction activity, there would not typically be any centralized fueling or equipment maintenance areas constructed to support the transmission line construction operation. Therefore most of the hazardous materials would be contained within vehicles and small volume containers. Typically vehicle fueling and maintenance activities would occur at off-site facilities.

In addition, although polychlorinated biphenyls (PCB) have been banned from use with electrical distribution and substation transformers by the U.S. EPA since 1985 (U.S. EPA 2009), some older pieces of electrical equipment within SCE's system may still contain PCBs. There is a likelihood that some PCB containing equipment would need to be removed from some of the project locations during the construction of the project and removal of the existing line. Therefore, there would be a potential for a PCB release to contaminate the environment in the event of a spill while handling and transporting PCBs.

Excavation required to construct the components of the project would primarily be limited to areas at existing and proposed structure locations, at underground fiber optic trench locations, and at the expanded Pisgah Substation locations. A contamination site record search would need to be conducted to determine existing known contaminated sites in the project vicinity. Therefore, it is possible that subsurface construction activities could accidentally disturb documented contamination sites, potentially mobilizing soil and/or groundwater contamination.

Finally, previously undocumented soil and or groundwater contamination could be encountered during tower and pole installation, trenching, grading, or other excavation related activities despite the steps taken to identify and avoid contamination.

The presence of oil in a quantity greater than 1,320 gallons invokes Spill Prevention Control and Countermeasures (SPCC) regulations. The quantity of oil contained in any one of the planned 500/220 kV transformers would be in excess of the minimum quantity that requires such regulations.

C.5.8.3 MITIGATION

To identify and avoid documented contamination sites relative to the project sites, record searches specifically for the project locations would need to be conducted. Implementation of mitigation measures should require identification and avoidance of documented contamination sites, thus ensuring that the potential impacts caused by documented contaminated sites would be reduced to less than significant levels.

Soils testing should be conducted and analyzed by a professional, licensed Geotechnical Engineer or Geologist, to determine existing soil conditions. Borings in a sufficient quantity to adequately gather variations in the site soils should be conducted to remove sample cores for testing. The type of soils, soil pressure, relative compaction, resistivity, and percolation factor are among the items that should be tested for. If contaminants are encountered, special studies and remediation measures in compliance with environmental regulations should be implemented by qualified professionals.

During trenching, grading, or excavation work, mitigation measures should be developed that would require the contractor to observe the exposed soil for visual evidence of contamination. If visual contamination indicators are observed during construction, the contractor should be required to stop work until the material is properly characterized and appropriate measures are taken to protect human health and the environment. The contractor would also have to comply with the all local, State, and federal requirements for sampling and testing, and subsequent removal, transport, and disposal of hazardous materials.

All project personnel should be trained on the handling, storage, disposal, and reporting requirements for hazardous materials. All training activities should be completed in compliance with appropriate regulatory requirements. All training activities should be documented and records of training activities maintained for the project for all employees and contractors. Training activities should include appropriate spill response and containment plans.

All hazardous material storage areas and disposal areas should be constructed and operated in compliance with appropriate federal, state, and local regulations. All permits for handling of hazardous materials should be acquired prior to initiation of project activities and should be maintained at the project site. Appropriate spill response and containment plans should be maintained at the project site.

Helicopter fueling, if necessary, should occur at staging areas or at a local airport using the helicopter contractor’s fuel truck, should be supervised by the helicopter fuel service provider, and Storm Water Pollution Prevention Plan (SWPPP) measures should be followed, as applicable. The helicopter and fuel truck would likely stay overnight at a local airport or at a staging area if adequate security is in place.

Pisgah Substation Expansion (850 MW Full Build-Out). SCE would follow SPCC regulations and the control of oils spills through secondary containment would be designed by a licensed California Registered Professional Engineer. Permanent or temporary SPCC measures should be in place prior to the delivery of transformers to the site. Improvements may consist of, but not be limited to, trenches, holding areas, retention basins and curbs. An SPCC plan would be prepared and maintained on-site. Substation operating personnel should be trained in the execution of the plan.

C.5.8.4 CONCLUSION

Implementing mitigation measures similar to the Conditions of Certification that are proposed in the Staff Assessment/EIS for construction of the Calico Solar Project, and implementation of SWPPP and a SPCC plans would avoid potential significant hazard impacts from work associated with the SCE upgrade options.

C.5.9 CUMULATIVE IMPACT ANALYSIS

A project may result in significant adverse cumulative impacts (pursuant to CEQA) when its effects are “cumulatively considerable.” Cumulatively considerable means that the incremental effects of an individual project are significant (pursuant to CEQA) when viewed in connection with the effects of past projects, the effects of other current projects, or the effects of probable future projects. (Title 14, California Code of Regulations, section 15130). NEPA states that cumulative effects can result from individually minor but significant actions taking place over a period of time (40 CFR § 1508.7).

As discussed in section C.5.4.3 above, staff considered the potential for impacts due to a simultaneous release of any of the hazardous chemicals from the proposed the Calico Solar Project with any other existing or foreseeable nearby facilities. Because of the small amounts and low hazard of the hazardous chemicals to be stored at the facility, Staff determined that there was 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, there is no possibility that vapor plumes would mingle (combine) to produce an airborne concentration that would present a significant risk (pursuant to CEQA).

Section B.3, Cumulative Scenario, provides detailed information on the potential cumulative solar and other development projects in the project area. Together, these projects comprise the cumulative scenario which forms the basis of the cumulative impact analysis for the proposed project. In summary, these projects are:

- Renewable energy projects on BLM, State, and private lands, as shown on **Cumulative Figures 1 and 2** and in **Cumulative Tables 1A and 1B.** Although not all of those projects are expected to complete the environmental review processes, or be funded and constructed, the list is indicative of the large number of renewable projects currently proposed in California.

These projects are defined within a geographic area that has been identified by the CEC and BLM as covering an area large enough to provide a reasonable basis for evaluating cumulative impacts for all resource elements or environmental parameters. Most of these projects have, are, or will be required to undergo their own independent environmental review under CEQA and/or NEPA. Even if the cumulative projects described in Section B.3 have not yet completed the required environmental processes, they were considered in the cumulative impacts analyses in this SA/Draft EIS.

<u>Geographic Scope of Analysis</u>

The geographic area considered for cumulative impacts from the use of Hazardous Materials is the area within 1 mile of the project boundary. Staff concludes that there is no potential to cause impacts beyond the facility boundary.

For this analysis, no other projects are located close enough to the proposed the Calico Solar Project to cause cumulative impacts on any surrounding population.

<u>Effects of Past and Present Projects</u>

There are no past or currently operating projects in the geographic area that would affect the same area that would be affected by the proposed facility.

<u>Effects of Reasonably Foreseeable Future Projects</u>

There are no reasonably foreseeable future projects in the geographic area that would affect the same area that would be affected by accidental releases at the proposed facility.

Contribution of the Calico Solar Project to Cumulative Impacts

Construction. The Calico Solar Project would not be expected to contribute to the possible short term cumulative impacts related to Hazardous Materials because it is not in close proximity to any other facility that might impact the same surrounding population in the event of an accidental release of hazardous materials.

Operation. The Calico Solar Project would not be expected to the possible long term operational cumulative impacts related to because it is not in close proximity to any other facility that might impact the same surrounding population in the event of an accidental release of hazardous materials.

Decommissioning. The decommissioning of the Calico Solar Project would not be expected to contribute to the possible short term cumulative impacts related to Hazardous Materials, similar to during construction, because it is not in close proximity to any other facility that might impact the same surrounding population in the event of an accidental release of hazardous materials. similar to construction impacts. It is unlikely that the construction or decommissioning of any of the cumulative projects would occur concurrently with the decommissioning of this project, because the decommissioning is not expected to occur for approximately 40 years. As a result, there may not be impacts related to during decommissioning of the Calico Solar Project generated by the cumulative projects. As a result, the impacts of the decommissioning of the Calico Solar Project would not be expected to contribute to cumulative impacts related to Hazardous Materials because all hazardous materials would either continue to be managed within BLM's framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

C.5.10 COMPLIANCE WITH LORS

A discussion of the proposed project's compliance with LORS applicable to hazardous materials is provided above in subsection C.5.4.3, and **Hazardous Materials Table 1**.

C.5.11 NOTEWORTHY PUBLIC BENEFITS

The proposed project would help in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable energy and any resultant decreases in the use of riskier hazardous materials for power production at other facilities.

C.5.12 FACILITY CLOSURE

The requirements for handling 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, San Bernardino Fire Department, and the California Department of Toxic Substances Control (DTSC) as BLM would be the landowner of the abandoned facility. To ensure that any unacceptable risk to the public is eliminated, Funding for such emergency action as well as site removal, rehabilitation and revegetation activities would be available from a performance bond required of the applicant by BLM.

C.5.13 RESPONSE TO COMMENTS

Comment: Intervener Patrick C. Jackson commented that the proposed project will have an impact on the safety of the population, employees, and visitors to the privately owned lands adjacent to the project in terms of primary and emergency access. He is especially concerned with the project's hydrogen supply system which may result in serious injuries to nearby population. He is concerned that a hydrogen gas explosion could result in injuries to the population on the adjacent lands and those commuting through the project to access the privately owned lands.

Response: Staff has evaluated the off-site consequence analysis conducted by the applicant for the accidental release of hydrogen at the project site, and has determined that there is no significant risk to nearby populations from a hydrogen explosion. Staff finds that the use of hydrogen at the proposed facility poses a risk of an on-site fire and the potential for a heat flux impact on off-site areas, including a nearby residence and traffic on I-40, but found no impact on distant surrounding populations. Staff has proposed mitigation to reduce the risk of fire and off-site impacts to below the level of significance.

Comment: The applicant claims that proposed condition **HAZ-5** would require background checks to be conducted for in excess of 700 construction personnel and states that this would be onerous. The applicant proposes that background checks be limited to those workers who handle hydrogen or other hazardous materials.

Response: Proposed condition **HAZ-5** only applies to <u>operations</u> security—not <u>construction</u> security—and thus the requirement for background checks applies only to operations personnel.

Comment: BNSF Railway expressed concern that the hydrogen gas supplying the 34,000 SunCatchers through an underground piping system would be vulnerable to leaks and damage should a derailment of a train occur. BNSF also asked that the specific location of the railway signal cable be identified when placing hydrogen gas lines underground, that a risk analysis be prepared to consider the derailment scenario, that the SPCC Plan require notification to the railroad when hydrogen is released, that an auto-dialer or other direct notification system be established to immediately notify of hydrogen releases, and that BNSF be granted access to the Calico site should a train derailment or other emergency involving the railroad occur.

Response: Staff has considered the comments from BNSF very seriously. While staff does not agree with all the suggestions made by BNSF, it does believe that BNSF has several valid concerns that staff will address. Regarding the issue of including a train derailment in a risk assessment, staff is proposing to require the project owner, when preparing the Risk Management Plan, to include such a scenario in the Off-site Consequence Analysis (see **HAZ-2**) should the option of using pipes to distribute hydrogen be chosen. Staff is further proposing to require the preparation of a hazards and operability analysis and proposing that an outside third party review and sign-off on the Process Safety Management Plan and HAZOP study (see **HAZ-8**) and that the hydrogen system is reviewed, evaluated by a Mechanical Engineer registered in California to ensure that it complies with all applicable ANSI, ASME, and NFPA design codes, and is approved by this person as shown by applying a professional "stamp" to the document review page (see **HAZ-7**).

Regarding the requests that the SPCC Plan require notification to the railroad when hydrogen is released, staff feels that is not required by law and would be overly burdensome to the project owner because there will be routine inconsequential losses of hydrogen gas over time.

Regarding the requested "auto-dialer or other direct notification system" to immediately notify BNSF of hydrogen releases, staff feels that once again, this would be overly burdensome and instead recommends that the project owner and the BNSF Railway establish a voluntary notification system through the SBCFD when a significant leak of hydrogen gas occurs.

Finally, while staff agrees that BNSF be granted access to the Calico site should a train derailment or other emergency involving the railroad occur, staff once again believes that the project owner and BNSF negotiate a voluntary agreement to afford the access to BNSF which appears to be in everyone's best interest.

C.5.14 PROPOSED CONDITIONS OF CERTIFICATION

HAZ-1 The project owner shall not use any hazardous materials not listed in **Appendix A**, below, or in greater quantities than those identified by chemical name in **Appendix A,** unless approved in advance by the Compliance Project Manager (CPM).

Verification: The project owner shall provide to the CPM in the Annual Compliance Report, a list of hazardous materials contained at the facility.

HAZ-2 The project owner shall concurrently provide a Hazardous Materials Business Plan (HMBP), a Risk Management Plan (RMP) that includes the consequences of a train derailment resulting in a hydrogen pipeline leak and fire, and a Spill Prevention, Control, and Countermeasure Plan (SPCC) to the San Bernardino County Fire Department, and the CPM for review. After receiving comments from the San Bernardino County Fire Department, 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 HMBP, RMP, and SPCC Plan shall then be provided to the San Bernardino County Fire Department for their records and to the CPM for approval.

Verification: At least 60 days prior to receiving any hazardous material on the site for commissioning or operations, the project owner shall provide a copy of a final Hazardous Materials Business Plan (HMBP), a Risk Management Plan (RMP), and a Spill Prevention, Control, and Countermeasure Plan (SPCC) to the CPM for approval.

HAZ-3 The project owner shall develop and implement a Safety Management Plan for delivery of liquid and gaseous 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 or gaseous hazardous material to the facility, the project owner shall provide a Safety Management Plan as described above to the CPM for review and approval.

HAZ-4 At least thirty (30) days prior to commencing construction, a site-specific Construction Site Security Plan for the construction phase shall be prepared and made available to the CPM for review and approval. The Construction Security Plan shall include the following:

1. Perimeter security consisting of fencing enclosing the construction area;
2. Security guards;
3. Site access control consisting of a check-in procedure or tag system for construction personnel and visitors;
4. Written standard procedures for employees, contractors and vendors when encountering suspicious objects or packages on-site or off-site;
5. Protocol for contacting law enforcement and the CPM in the event of suspicious activity or emergency; and
6. Evacuation procedures.

Verification: At least thirty (30) days prior to commencing construction, the project owner shall notify the CPM that a site-specific Construction Security Plan is available for review and approval.

HAZ-5 The project owner shall prepare a site-specific 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).

The Operation Security Plan shall include the following:

1. Permanent full perimeter fence, at least 8 feet high around the Solar Field;
2. Main entrance security gate, either hand operable or motorized;
3. Evacuation procedures;
4. Protocol for contacting law enforcement and the CPM in the event of suspicious activity or emergency;
5. Written standard procedures for employees, contractors and vendors when encountering suspicious objects or packages on-site or off-site;
6. a. A statement (refer to sample, attachment “A”) signed by the project owner certifying that background investigations have been conducted on all project personnel. Background investigations shall be restricted to ascertain the accuracy of employee identity and employment history, and shall be conducted in accordance with state and federal law regarding security and privacy;

   b. A statement(s) (refer to sample, attachment “B”) signed by the contractor or authorized representative(s) for any permanent contractors or other technical contractors (as determined by the CPM after consultation with the project owner) that are present at any time on the site to repair, maintain, investigate, or conduct any other technical duties involving critical components (as determined by the CPM after consultation with the project owner) certifying that background investigations have been conducted on contractor personnel that visit the project site.
7. Site access controls for employees, contractors, vendors, and visitors;
8. Closed circuit TV (CCTV) monitoring system, recordable, and viewable in the power plant control room and security station (if separate from the control room) with cameras able to pan, tilt, and zoom, have low-light capability, and are able to view the outside entrance to the control room and the front gate; and
9. Additional measures to ensure adequate perimeter security consisting of either:

   a. Security guard present 24 hours per day, 7 days per week, **OR**

   b. Power plant personnel on-site 24 hours per day, 7 days per week **and one** of the following:

      perimeter breach detectors

      <u>or</u>

      CCTV able to view both site entrance gates and 100 per cent of the power block area perimeter.

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 plant components or cyber security 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 holder (project owner) shall comply with all applicable Federal laws and regulations existing or hereafter enacted or promulgated. In any event, the holder(s) shall comply with the Toxic Substances Control Act of 1976, as amended (15 U.S.C. 2601, et seq.) with regard to any toxic substances that are used, generated by or stored on the right-of-way or on facilities authorized under this right-of-way grant. (See 40 CFR, Part 702-799 and especially, provisions on polychlorinated biphenyls, 40 CFR 761.1-761.193.) Additionally, any release of toxic substances (leaks, spills, etc.) in excess of the reportable quantity established by 40 CFR, Part 117 shall be reported as required by the Comprehensive Environmental Response, Compensation and Liability Act of 1980, Section 102b

Verification: A copy of any report required or requested by any Federal agency or State government as a result of a reportable release or spill of any toxic substances shall be furnished to the CPM concurrent with the filing of the reports to the involved Federal agency or State government.

HAZ-7 The project owner shall ensure that whichever of the two proposed hydrogen storage and handling systems is used in the project, the system is reviewed, evaluated by a Mechanical Engineer registered in California to ensure that it complies with all applicable ANSI, ASME, and NFPA design codes, and that the system is and approved by this person as shown by applying a professional “stamp” to the document review page.

Verification: At least 60 days prior to construction, the project owner shall provide to the CPM for review and approval a copy of design drawings, documentation, and specifications of the hydrogen storage and handling system that has been reviewed, evaluated, approved, and stamped by a Mechanical Engineer registered in the state of California.

HAZ-8 The project owner shall:

a. Conduct a process hazard analysis and prepare a Process Safety Management Plan (PSM Plan) that contains a hazard analysis using a Hazard and Operability Study (HAZOP).
b. Retain an independent outside third party group of professionals to provide peer review and approval of the process hazard analysis and the PSM plan before they are submitted to the CPM. The outside third party shall have expertise in engineering and process operations, shall include at least one member who has experience and knowledge specific to the processes being evaluated, and shall also include one member knowledgeable in the specific process hazard analysis methodologies being used.

The final report containing the results of the hazard analysis, the final PSM Plan, and the review and approval of the outside third party shall be submitted to the San Bernardino County Fire Department for review and to the CPM for approval.

Verification: At least thirty (30) days prior to receiving hydrogen gas on the site, the project owner shall provide a copy of a final hazard analysis, the final PSM Plan, and the review and approval of the outside third party to the CPM for approval.

C.5.15 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 (pursuant to CEQA) impact on the public. Staff's analysis also shows that there would be no significant (pursuant to CEQA) 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 (pursuant to CEQA) 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 (pursuant to CEQA) 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 (pursuant to CEQA) 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 and Water**, and the **Waste Management** sections of this SSA.

Staff also concludes that none of the alternatives to the proposed project would materially or significantly change the impacts associated with hazardous materials handling. None of the alternatives would be preferred to the proposed project or reduce any otherwise significant (pursuant to CEQA) impacts caused by hazardous materials handling.

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 (CPM). **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 or gaseous 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, and further prevent the mixing of incompatible materials that could result in the generation of toxic vapors. Site security during both the construction and operation phases is addressed in **HAZ-4** and **HAZ-5. HAZ-6** ensures that the applicant complies with all Federal LORS regarding use, management, spills, and reporting of hazardous materials on Federal lands. Proposed conditions **HAZ-7** and **-8** will ensure that the hydrogen storage and handling systems used in the project is reviewed, evaluated, approved by a Mechanical Engineer registered in California, and has undergone a hazards and operability analysis to ensure that it complies with all applicable ANSI, ASME, and NFPA design codes.

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 U.S. Bureau of Land Management Right-of-Way and 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)

____

(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.

C.5.16 REFERENCES

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Hazardous Materials Appendix A
Hazardous Materials Proposed for Use at Calico Solar

Hazardous Materials Usage and Storage During Operations				
Chemical	**Use**	**Storage Location/Type**	**State**	**Storage Quantity**
Insulating oil	Electrical equipment	Electrical equipment (contained in transformers and electrical switches)	Liquid	60,000 gallons initial fill
Lubricating oil	Stirling Engine/dish drives PCU	Equipment 150-gallon recycle tank located in Maintenance Building	Liquid	40,000 gallons initial fill with usage of 21 gallons per month
Hydrogen	PCU working fluid	Generated on-site and stored in pressure vessel	Gas	Either 4,140,000 cubic feet or 20,800,000 cubic feet depending on hydrogen system selected
Acetylene	Welding	Cylinders stored in maintenance buildings	Gas	1,000 cubic feet
Oxygen	Welding	Cylinders stored in maintenance buildings	Gas	1,000 cubic feet
Ethylene glycol	PCU Radiator Coolant, antifreeze	PCU radiator Maintenance Buildings	Liquid	40,000 gal initial fill with usage of 21 gallons per month
Various solvents, detergents, paints, and other cleaners	Building maintenance and equipment cleaning	Three (3) 55-gallon drums and 1-gallon containers will be stored Maintenance Buildings	Liquid	Ten (10) 55-gallon drums Commercial 1-gallon containers
Gasoline	Maintenance vehicles	5,000 gallon AST at refueling station with containment	Liquid	5,000 gallons
Diesel fuel	Firewater pump Maintenance Vehicles	Firewater skid 5,000-gallon AST refueling station with containment	Liquid	100 gallons initial fill 5,000 gallons
Sodium hypochlorite 12.5% solution (bleach)	Disinfectant for potable water	Water treatment structure	Liquid	4 gallons

Notes:
AST = aboveground storage tank
PCU = power conversion unit
Source: SES 2008a, Table 5.15-2.

C.6 – PUBLIC HEALTH AND SAFETY

Testimony of Alvin J. Greenberg, Ph.D.

C.6.1 SUMMARY OF CONCLUSIONS

Energy Commission staff (hereafter referred to as staff) have analyzed potential public health and safety risks associated with construction and operation of the Calico Solar Project (formerly the Stirling Energy Systems Solar One Project or the SES 1) and does not expect any significant adverse cancer or short- or long-term noncancer health effects from project toxic emissions. Staff's analysis of potential health impacts from the proposed Calico Solar Project uses a conservative health-protective 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 Calico Solar Project, which include only one stationary source (an emergency diesel generator) and a large number of mobile sources (gasoline-fueled and diesel-fueled maintenance and delivery vehicles), would not contribute significantly to morbidity or mortality in any age or ethnic group residing in the project area. Therefore, the impacts on public health from emissions of Toxic Air Contaminants (Hazardous Air Pollutants) according to the California Environmental Quality Act (CEQA) would be less than significant.

C.6.2 INTRODUCTION

The purpose of this Supplemental Staff Assessment SSA is to determine if emissions of toxic air contaminants (TACs) from the proposed Calico Solar Project would have the potential to cause significant adverse public health and safety impacts or to violate standards for public health protection. If potentially significant health and safety impacts are identified, staff will evaluate mitigation measures to reduce such impacts to insignificant levels.

In addition to the analysis contained in this Public Health and Safety Section that focuses on potential effects to the public from emissions of toxic air contaminants, other related aspects to the assessment of potential public health and safety impacts from the Calico Solar Project are considered elsewhere in this document as listed and briefly described below:

- **Air Quality** – evaluates the expected air quality impacts from the emissions of criteria air pollutants from both the construction and operation of the Calico Solar Project; Criteria air pollutants are defined as air contaminants for which the state and/or federal governments have established an ambient air quality standard to protect public health;
- **Hazardous Materials Management** – evaluates the potential impacts on public and worker health from accidental releases of hazardous materials;
- **Socioeconomics and Environmental Justice** – evaluates project-induced changes on community services including law enforcement and hospitals;
- **Soil and Water Resources** – evaluates the potential for the Calico Solar Project to cause contamination of soil and water resources, to exacerbate flooding, and to

cause adverse effects to water supply in consideration of other existing users and projected needs;

- **Transmission Line Safety and Nuisance** – evaluates potential effects associated with proposed transmission lines accounting for both the physical presence of the lines and the physical interactions of their electric and magnetic fields; The potential effects include aviation safety, interference with radio-frequency communication, audible noise, fire hazards, hazardous shocks, nuisance shocks, and electric and magnetic field (EMF) exposure.
- **Worker Safety and Fire Protection** – assess the worker safety and fire protection measures proposed by the applicant including determining whether the project would have any adverse impacts on fire protection and emergency medical services that are also relied upon by the public;
- **Waste Management** – evaluates issues associated with wastes generated from the proposed project construction and operation including ensuring that wastes would be managed in an environmentally safe manner.

C.6.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

The Energy Commission staff's analysis of proposed project effects must comply with CEQA requirements given the power plant licensing of the California Energy Commission). CEQA requires that the significance of individual effects be determined by the Lead Agency.

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 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

Effects of the proposed project on the land use environment (and in compliance with both CEQA) have been determined using the thresholds listed below.

The **Public Health and Safety** section of this supplemental staff assessment discusses toxic emissions to which the public could be exposed during project construction and routine operation. Following the release of toxic contaminants into the air or water, 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 noncriteria pollutants. Unlike criteria pollutants such as ozone, carbon monoxide, sulfur dioxide, or nitrogen dioxide, noncriteria pollutants have no ambient (outdoor) air quality standards that specify levels considered safe for everyone.

Since noncriteria pollutants do not have such standards, a health risk assessment 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 the Calico Solar Project 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 relies upon the expertise of the California Environmental Protection Agency (Cal/EPA) Office of Environmental Health Hazard Assessment (OEHHA) to identify contaminants that are known to the state to cause cancer or other noncancer toxicological endpoints and to calculate the toxicity and cancer potency factors of these contaminants. Staff also relies upon the expertise of the California Air Resources Board and the local air districts to conduct ambient air monitoring of toxic air contaminants and the state Department of Public Health to conduct epidemiological investigations into the impacts of pollutants on communities. It is not within the purview or the expertise of the Energy Commission staff to duplicate the expertise and statutory responsibility of these agencies.

Initially, a screening level risk assessment is performed using simplified assumptions that are intentionally biased toward protection of public health. That is, an analysis is designed that overestimates public health impacts from exposure to project emissions. In reality, it is likely that the actual risks from the power plant will be much lower than the risks as estimated by the screening level assessment. The risks for screening purposes are based on examining conditions that would lead to the highest, or worst-case, risks and then using those conditions in the study. Such conditions include:

- 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 cancer-causing agents occurs 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 will, 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 includes 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: acute (short-term) health effects, chronic (long-term) noncancer effects, and cancer risk (also long-term). Acute health effects result from short-term (one-hour) exposure to relatively high concentrations of pollutants. Acute effects are temporary in nature and include symptoms such as irritation of the eyes, skin, and respiratory tract.

Chronic health effects are those that arise as a result of long-term exposure to lower concentrations of pollutants. The exposure period is considered to be approximately from 12% to 100% of a lifetime, or from 8 to 70 years (OEHHA 2003, p. 6-5). Chronic health effects include diseases such as reduced lung function and heart disease.

The analysis for noncancer health effects compares the maximum project contaminant levels to safe levels called *Reference Exposure Levels*, or RELs. These are amounts of toxic substances to which even sensitive people can be exposed and suffer no adverse health effects (OEHHA 2003, p. 6-2). These exposure levels are designed to protect the most sensitive individuals in the population, such as infants, the aged, and people suffering from illness or disease which makes them more sensitive to the effects of toxic substance exposure. The Reference Exposure Levels are based on the most sensitive adverse health effect reported in the medical and toxicological literature and include margins of safety. The margin of safety addresses uncertainties associated with inconclusive scientific and technical information available at the time of standard setting and is meant to provide a reasonable degree of protection against hazards that research has not yet identified. The margin of safety is designed to prevent pollution levels that have been demonstrated to be harmful, as well as to prevent lower pollutant levels that may pose an unacceptable risk of harm, even if the risk is not precisely identified as to nature or degree. Health protection is achieved if the estimated worst-case exposure is below the relevant reference exposure level. In such a case, an adequate margin of safety exists between the predicted exposure and the estimated threshold dose for toxicity.

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 substances, the health risk assessment could underestimate or overestimate the risks.

For carcinogenic substances, the health assessment considers the risk of developing cancer and assumes that continuous exposure to the cancer-causing substance occurs 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 number based on worst-case assumptions.

Cancer risk is expressed in chances per million and is a function of the maximum expected pollutant concentration, the probability that a particular pollutant will cause cancer (called *potency factors* and established by OEHHA), and the length of the exposure period. Cancer risks for each carcinogen are added to yield total cancer risk. The conservative nature of the screening assumptions used means that actual cancer risks due to project emissions are likely to be considerably lower than those estimated.

The screening analysis is performed to assess worst-case risks to public health associated with the proposed project. If the screening analysis predicts no significant risks, then no further analysis is required. However, if risks are above the significance level, then further analysis, using more realistic site-specific assumptions, would be performed to obtain a more accurate assessment of potential public health risks.

Significance Criteria

Energy Commission staff determines the health effects of exposure to toxic emissions based on impacts to the maximum exposed individual. This is a person hypothetically exposed to project emissions at a location where the highest ambient impacts were calculated using worst-case assumptions, as described above.

As described earlier, noncriteria pollutants are evaluated for short-term (acute) and long-term (chronic) noncancer health effects, as well as cancer (long-term) health effects. The significance of project health impacts is determined separately for each of the three categories.

Acute and Chronic Noncancer Health Effects

Staff assesses the significance of noncancer health effects by calculating a *hazard index*. A hazard index is a ratio comparing exposure from facility emissions to the reference (safe) exposure level. A ratio of less than 1.0 signifies that the worst-case exposure is below the safe level. The hazard index for every toxic substance that has the same type of health effect is added to yield a Total Hazard Index. The Total Hazard Index is calculated separately for acute and chronic effects. A Total Hazard Index of less than 1.0 indicates that cumulative worst-case exposures are less than the reference exposure levels. Under these conditions, health protection from the project is likely to be achieved, even for sensitive members of the population. In such a case, staff presumes that there would be no significant noncancer project-related public health impacts.

Cancer Risk

Staff relied 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 to determine a cancer risk significance level. 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 excess case of cancer in an exposed population of 100,000, assuming lifetime exposure.” This level of risk is equivalent to a cancer risk of 10 in 1 million, which is also written as 10×10^{-6}. An important distinction 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 cancer-causing chemicals. Thus, the manner in which the significance level is applied by staff is more conservative (health-protective) than that applied by Proposition 65. The significant risk level of 10 in 1 million is consistent with the level of significance adopted by many air districts. In general, these air districts would not approve a project with a cancer risk exceeding 10 in 1 million.

As noted earlier, 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 can be ensured. Staff's analysis also addresses 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 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 set to protect the public from the effects of airborne toxics. When a screening analysis shows cancer risks to be above the significance level, refined assumptions would likely result in a lower, more realistic risk estimate. Based on refined assumptions, if risk posed by the facility exceeds the significance level of 10 in 1 million, staff would require appropriate measures to reduce the risk to less than significant. If, after all risk reduction measures had been considered, a refined analysis identifies a cancer risk greater than 10 in 1 million, staff would deem such risk to be significant and would not recommend project approval.

Laws, Ordinances, Regulations, and Standards

Public Health and Safety Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable Law	Description
Federal	
Clean Air Act section 112 (Title 42, U.S. Code section 7412)	This act requires new sources that emit more than 10 tons per year of any specified Hazardous Air Pollutant (HAP) or more than 25 tons per year of any combination of HAPs to apply Maximum Achievable Control Technology.
State	
California Health and Safety Code section 25249.5 et seq. (Proposition 65)	These sections establish thresholds of exposure to carcinogenic substances above which Prop 65 exposure warnings are required.
California Health and Safety Code section 41700	This section states that "no 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 which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or

Applicable Law	Description
	have a natural tendency to cause injury or damage to business or property.”
California Public Resource Code section 25523(a); Title 20 California Code of 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.	These regulations require a quantitative health risk assessment for new or modified sources, including power plants that emit one or more toxic air contaminants (TACs).
Local	
Mojave Desert Air Quality Management District (MDAQMD) Rule 1302	New Source Review for Toxic Air Contaminants.

C.6.4 PROPOSED PROJECT

C.6.4.1 SETTING AND EXISTING CONDITIONS

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 causing impacts on public health. An emissions plume from a facility may affect elevated areas before lower terrain areas due to a reduced opportunity for atmospheric mixing. Consequently, areas of elevated terrain can often be subjected to increased pollutant impacts. Also, the types of land use near a site influence the surrounding population distribution and density, which, in turn, affect public exposure to project emissions. Additional factors affecting potential public health impacts include existing air quality, existing health concerns, and environmental site contamination.

Site and Vicinity Description

The project would be located in an undeveloped part of San Bernardino County adjacent to Interstate 40 and about 37 miles east of Barstow. Lands in this part of the Mojave Desert are managed predominantly by the Bureau of Land Management (BLM). Land uses in the vicinity of the proposed project include transportation use, open space, and resource conservation (SES 2008a, Section 5.9.1). There are a total of three residences within a 3-mile radius of the proposed site, the nearest of which is located approximately 1,300 feet south of the property boundary on the other side of I-40. There are no sensitive receptors in the vicinity of the project site (SES 2008a, Section 5.16.1 and Figure 5.16-1).

The site elevation slopes gently to the northeast and ranges from 1,925 to 3,050 feet above sea level (SES 2008a, Section 5.2). Topography in the vicinity of the project is varied in elevation, with regions of elevated terrain existing mostly to the north and east, where the sloping grade continues beyond the project boundary (SES 2008a, Section 5.2.1 and Figure 5.2-1).

Meteorology

Meteorological conditions, including wind speed, wind direction, and atmospheric stability, affect the extent to which pollutants are dispersed into ambient air as well as the direction of pollutant transport. This, in turn, affects the level of public exposure to emitted pollutants and associated health risks. When wind speeds are low and the atmosphere is stable, for example, dispersion is reduced, and localized exposure may be increased.

San Bernardino County is characterized by a high desert climate; summers are hot and dry, winters are moderate with low precipitation, and temperature inversions are strong. Winds generally flow from the west across the region (SES 2008a, Section 5.2.1.1 and Figure 5.2-3).

Atmospheric stability is a measure related to turbulence, or the ability of the atmosphere to disperse pollutants due to convective air movement. Mixing heights (the height above ground level through which the air is well mixed and in which pollutants can be dispersed) are lower during mornings due to temperature inversions and increase during the warmer afternoons. Staff's **Air Quality** section presents more detailed meteorological data.

Existing Air Quality

The proposed site is within the jurisdiction of the Mojave Desert Air Quality Management District (MDAQMD). By examining average toxic air contaminants' concentration levels from representative air monitoring sites with cancer risk factors specific to each contaminant, lifetime cancer risk can be calculated to provide a background risk level for inhalation of ambient air. For comparison purposes, it should be noted that the overall lifetime cancer risk for the average individual in the United States is about 1 in 3, or 333,000 in 1 million.

There are several air quality monitoring stations in San Bernardino County operated by the MDAQMD and the California Air Resources Board (ARB), the closest of which is in Barstow, about 37 miles west of the proposed site. Data from this monitoring station shows that the annual arithmetic mean for PM10 ranged approximately between 22 and 30 micrograms per cubic meter ($\mu g/m^3$) between the years 2005 and 2008. The annual arithmetic mean for PM2.5 measured at the Victorville monitoring station (about 57 miles southwest) ranged between 9.7 and 10.4 $\mu g/m^3$ between 2006 and 2007 (SES 2008a, Section 5.2.1.2 and Tessera Solar 2009q, General Comment Tables 5.2-3a and 5.2-4 Revised).

The nearest ARB air toxics monitoring station that actively reports values is located on Mission Boulevard in Riverside, approximately 80 miles southwest of the project site. Although staff does not consider this location to be representative of air quality in the area of the proposed site, it does serve to show the upper-bound levels of toxic air contaminants emitted by all stationary and mobile sources found in the region. In 2008, the background cancer risk calculated by ARB for the Riverside monitoring station was 104 in one million (ARB 2009). The pollutants 1,3-butadiene and benzene, emitted primarily from mobile sources (gasoline-fueled cars and trucks), accounted together for about half of the total risk. The risk from 1,3-butadiene was about 22 in one million at Riverside, while the risk from benzene was about 30 in one million. Formaldehyde accounts for about 20% of the 2008 average calculated cancer risk based on air toxics monitoring results, with a risk of about 21 in one million. Formaldehyde is emitted directly from vehicles and other combustion sources. The risk from hexavalent chromium was about 23 in one million, or ~22% of the total risk. Fifty-one percent of hexavalent chromium in California is emitted from stationary sources with activities such as chrome plating, welding, spray painting, and leather tanning, while mobile sources such as jet aircrafts and ships contribute about 38%.

The use of reformulated gasoline, beginning in the second quarter of 1996, as well as other toxics reduction measures, have led to a decrease of ambient levels of toxics and associated cancer risk during the past few years in all areas of the state and the nation. For example, in the San Francisco Bay Area, cancer risk was 342 in 1 million based on 1992 data, 315 in 1 million based on 1994 data, and 303 in 1 million based on 1995 data. In 2002, the most recent year for which data is available, the average inhalation cancer risk decreased to 162 in 1 million (BAAQMD 2004b, p. 12).

Existing Public Health Concerns

When evaluating a new project, staff often conducts a detailed study and analysis of existing public health issues in the project vicinity. This analysis is prepared in order to identify the current status of respiratory diseases (including asthma), cancer, and childhood mortality rates in the population located near the proposed project. Assessing existing health concerns in the project area will provide staff with a basis on which to evaluate the significance of any additional health impacts from the proposed Calico Solar Project and evaluate any proposed mitigation. Because of the very low population in the immediate vicinity of the project and because no existing health issues within a 6-mile radius of the project have been identified by the applicant (SES 2008a, Section 5.16.1), staff did not conduct an analysis of existing public health issues.

C.6.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Direct/Indirect Impacts and Mitigation

Proposed Project – Construction Impacts and Mitigation

Potential risks to public health during construction may be associated with exposure to toxic substances in contaminated soil disturbed during site preparation, as well as diesel exhaust from heavy equipment operation. Criteria pollutant impacts from the operation of heavy equipment and particulate matter from earth moving are examined in staff's **AIR QUALITY** analysis.

Site disturbances occur during facility construction from excavation, grading, and earth moving. Such activities have the potential to adversely affect public health through various mechanisms, such as the creation of airborne dust, material being carried off site through soil erosion, and uncovering buried hazardous substances. A Phase I Environmental Site Assessment conducted for this site in 2008 identified no "Recognized Environmental Conditions" per the American Society for Testing and Materials Standards (ASTM) definition. That is, there was no evidence or record of any use, spillage, or disposal of hazardous substances on the site, nor was there any other environmental concern that would require remedial action (SES 2008a, Appendix T Section 7). In the event that any unexpected contamination is encountered during construction, proposed Conditions of Certification **WASTE-1** and **WASTE-2** (which require a registered professional engineer or geologist to be available during soil excavation and grading to ensure proper handling and disposal of contaminated soil) would ensure that contaminated soil does not affect the public. See the staff assessment section on **Waste Management** for a more detailed analysis of this topic.

The operation of construction equipment will result in air emissions from diesel-fueled engines. Diesel emissions are generated from sources such as trucks, graders, cranes, welding machines, electric generators, air compressors, and water pumps. Although diesel exhaust contains criteria pollutants such as nitrogen oxides, carbon monoxide, and sulfur oxides, it also includes a complex mixture of thousands of gases and fine particles. These particles are primarily composed of aggregates of spherical carbon particles coated with organic and inorganic substances. Diesel exhaust contains over 40 substances that are listed by the U.S. Environmental Protection Agency (U.S. EPA) as hazardous air pollutants and by the ARB as toxic air contaminants.

Exposure to diesel exhaust may cause both short- and long-term adverse health effects. Short-term effects can include increased coughing, labored breathing, chest tightness, wheezing, and eye and nasal irritation. Long-term effects can include increased coughing, chronic bronchitis, reductions in lung function, and inflammation of the lung. Epidemiological studies also strongly suggest a causal relationship between occupational diesel exhaust exposure and lung cancer.

Based on a number of health effects studies, the Scientific Review Panel on Toxic Air Contaminants recommended a chronic reference exposure level (see discussion of reference exposure levels in Method of Analysis section above) for diesel exhaust particulate matter of 5 micrograms of diesel particulate matter per cubic meter of air ($\mu g/m^3$) and a cancer unit risk factor of $3x10^{-4}$ $(\mu g/m^3)^{-1}$ (SRP 1998, p. 6).[1] The Scientific Review Panel did not recommend a value for an acute Reference Exposure Level 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 effect levels.

Construction of the Calico Solar Project is anticipated to take place over a period of 48 months. Section 5.2.2.1 of the Response to Energy Commission and BLM Data

[1] The SRP, established pursuant to California Health and Safety Code section 39670, evaluates the risk assessments of substances proposed for identification as Toxic Air Contaminants by ARB and the Department of Pesticide Regulation (DPR). The SRP reviews the exposure and health assessment reports and the underlying scientific data upon which the reports are based.

Requests (Tessera Solar 2009q) presents daily and annual maximum emissions of criteria pollutants including fugitive dust and diesel exhaust emissions from construction equipment and worker vehicles. The applicant estimated worst-case emissions of 719 pounds per day of PM10 and 143 pounds per day of PM2.5 during construction, which includes onsite and offsite activities (Tessera Solar 2009q, Table 5.2-9 Revised). The applicant has not estimated the health risks resulting from construction activities due to the short duration of this phase (SES 2008a, Section 5.16.2.2). Staff also did not conduct a quantitative assessment of construction impacts on public health because of the distance to the sparsely populated area surrounding the site and because staff has found numerous times using quantitative risk assessment tools that impacts due to construction vehicle diesel emissions are invariably less than significant even to close-in receptors. Also, as noted earlier, assessment of chronic (long-term) health effects assumes continuous exposure to toxic substances over a significantly longer time period, typically from 8 to 70 years.

Additionally, mitigation measures are proposed by both the applicant and Energy Commission staff to reduce the maximum calculated PM10 and PM2.5 emissions and thus reduce the potential impacts even further. These mitigation measures can be found in the **Air Quality** section of this document and include the use of extensive fugitive dust and diesel exhaust control measures. The fugitive dust control measures are assumed to result in 90% reductions of emissions. In order to further mitigate potential impacts from particulate emissions during the operation of diesel-powered construction equipment, Energy Commission staff recommends the use of ultra-low sulfur diesel fuel and Tier 2 or Tier 1 California Emission Standards for Off-Road Compression-Ignition Engines or the installation of an oxidation catalyst and soot filters on diesel equipment. The catalyzed diesel particulate filters are passive, self-regenerating filters that reduce particulate matter, carbon monoxide, and hydrocarbon emissions through catalytic oxidation and filtration. The degree of particulate matter reduction is comparable for both mitigation measures in the range of approximately 85–92%. Such filters will reduce diesel emissions during construction and reduce any potential for significant health impacts.

Proposed Project – Operation Impacts and Mitigation

Emissions Sources

The only stationary emissions source at the proposed Calico Solar Project would be one emergency diesel generator which would be operated once a month for about 20 minutes (4 hours per year). Mobile sources of TAC emissions during operations would include gasoline-fueled and diesel-fueled maintenance and delivery vehicles as well as visitor and staff traffic (Tessera Solar 2009q, Data Responses #109 and #111).

Public Health Table 2 lists the toxic emissions potentially emitted by the Calico Solar Project and shows how each contributes to the health risk analysis. Each TAC has a toxicity value with a Reference Exposure Level established by OEHHA, which is used to calculate short-term and long-term noncancer health effects, and cancer unit risk as published in the OEHHA Guidelines (OEHHA 2003).

Public Health Table 2
Types of Health Impacts and Exposure Routes Attributed to Toxic Emissions

Substance*	Oral Cancer	Oral Noncancer	Inhalation Cancer	Noncancer (Chronic)	Noncancer (Acute)
Acetaldehyde			✔	✔	
Acrolein				✔	✔
Benzene			✔	✔	✔
1,3-butadiene			✔	✔	
DPM			✔	✔	
Formaldehyde			✔	✔	✔

Source: OEHHA 2003, Appendix L and Tessera Solar 2009q, Table DR-111a.
*All substances come from the emergency diesel generator or from on-site maintenance vehicles.

Emissions Levels

Once potential emissions are identified, the next step is to quantify them by conducting a “worst case” analysis. Maximum annual emissions are required to calculate cancer and chronic (long-term) noncancer health effects.

Table DR-111a of the Response to Energy Commission and BLM Data Requests (Tessera Solar 2009q) provides the maximum hourly and annual emission rates for TACs from all sources during operations. Diesel particulate matter (DPM) emissions for the diesel emergency engine were calculated based on emission factors obtained from the vendor. DPM emissions from diesel-fueled delivery trucks were estimated using ARB’s EMFAC2007 model. TACs from gasoline-fueled maintenance, staff, and visitor vehicles were estimated using EPA’s MOBILE6.2 software.

The next step in the health risk assessment process is to estimate the ambient concentrations of toxic substances. This is accomplished by using a screening air dispersion model and assuming conditions that result in maximum impacts. The applicant’s screening analysis was performed using the AERMOD model. Ambient concentrations were used in conjunction with Reference Exposure Levels and cancer unit risk factors to estimate health effects that might occur from exposure to facility emissions. Exposure pathways, or ways in which people might come into contact with toxic substances, include inhalation, dermal (through the skin) absorption, soil ingestion, consumption of locally grown plant foods, and mother’s milk.

The above method of assessing health effects is consistent with OEHHA’s Air Toxics Hot Spots Program Risk Assessment Guidelines (OEHHA 2003) referred to earlier and results in the following health risk estimates.

Impacts

The applicant’s screening health risk assessment for the project resulted in an acute Hazard Index (HI) of 0.062 and a chronic HI of 0.00000042 at the point of maximum impact (PMI). The worst-case individual cancer risk was calculated to be 0.000667 in 1 million at the PMI. All three PMIs were located on the boundaries of the project site or NAP areas (Tessera Solar 2009q, Table DR-111b). As **Public Health Table 3** shows, both the acute and chronic hazard indices and the maximum cancer risk are below the level of significance, indicating that no long-term or short-term cancer or non-cancer health effects are expected.

Public Health Table 3
Operation Hazard/Risk at Point of Maximum Impact: Applicant Assessment

Type of Hazard/Risk	Hazard Index/Risk	Significance Level	Significant?
Acute Noncancer	0.062	1.0	No
Chronic Noncancer	0.00000042	1.0	No
Individual Cancer	0.000667 in 1 million	10.0 in 1 million	No

Source: Tessera Solar 2009q, Table DR-111b

Staff conducted a quantitative evaluation of the risk assessment results presented in the Calico Solar Project Application for Certification (AFC 08-AFC-13) and the document "In Response to Energy Commission and BLM Data Requests, Set 1, Parts 1 and 2, Data Requests 1-48, 81, and 109-112," dated August 2009. Modeling files provided by the applicant were also reviewed. Staff concludes that, while standard procedures were followed in the applicant's analysis, two sources of uncertainty exist for which further clarification is necessary:

1. The difference in the number of vehicles to be used at the facility versus the number of vehicles modeled.
2. The use of average annual emission rates in the HARP modeling that are lower than the peak hourly rates.

In order to reduce public health impacts, several administrative changes were made to the original AFC. Of note is the proposal that, during construction, unpaved roads will be sealed, vehicle trip lengths will be reduced and the option of using alternatively fueled vehicles will be investigated. In order to reduce public health impacts during the operational phase of the project, the changes made include changing the diesel fire water pump to an electric unit, switching from diesel to gasoline vehicles for mirror wash and other maintenance vehicles, and switching to gasoline, electric and/or hybrid, vehicles for other vehicles used on-site. The remaining stationary emitting unit is the diesel-fueled emergency generator, for which the applicant is continuing to investigate the possibility of using gasoline or other alternative fuels. The emergency generator will be used 4 hours/year for testing purposes.

For the operations phase, atmospheric dispersion modeling of facility emissions was conducted by the applicant using AERMOD and the risk assessment was conducted using the CARB/OEHHA Hotspots Analysis and Reporting Program (HARP), Version 1.4a. The HARP On-Ramp program was used to load the AERMOD results into HARP. Local meteorological data were used and building downwash effects were included for 5 buildings. Potential risks to 5,211 grid receptors and 3 sensitive receptors were modeled. Exposure pathways assessed include inhalation, ingestion of home-grown produce, dermal absorption, soil ingestion and mother's milk. In staff's analysis of the HARP modeling files, the transaction file (.tra file) and the source receptor file (.src file) provided by the applicant were used.

Vehicle requirements for operations and maintenance are listed on page 144 of the August 2009 responses to data requests and include the following:

- 50 gasoline wash vehicles for cleaning solar reflector mirrors
- 28 gasoline LRU (line replacement unit) maintenance trucks
- 7 gasoline/hybrid staff and security trucks
- 120 staff cars, 5 vanpool vehicles, 10 visitor cars (all gasoline)
- 7 diesel delivery trucks
- 16 propane forklifts

The total vehicle emissions were divided by the number of sources in the model, not the number of vehicles associated with the project. The number of sources in the model was selected to ensure that project related emissions were appropriately distributed across the site. It was determined that more than doubling the mobile sources in the model would not add accuracy to the HRA, it would only add to the model computational time. Therefore, only a total of 97 emitting units were modeled by the applicant for facility operations, including:

- 1 diesel emergency generator
- 96 mobile sources involved in routine operations:
    - 39 wash and LRU vehicles
    - 7 security vehicles
    - 8 forklifts (fueled by propane)
    - 10 visitor vehicles
    - 25 staff vehicles
    - 7 diesel delivery trucks

Emission factors obtained from the August 2009 responses to data requests (Table DR-111a) are listed in **Public Health Table 4**. In staff's examination of the HARP modeling files provided by the applicant, it was noted that annual emissions values used are much lower than maximum 1-hour emissions values, as seen in **Public Health Table 5**. The applicant has clarified that annual emissions presented in Table DR111a were correct, but unfortunately these emission factors did not get transferred correctly to the HARP model. Energy Commission Staff re-ran the HARP model with estimated annual emissions for the mobile sources. For risk calculations using the HARP model, the "Derived (Adjusted) Method" was used for cancer risk and the "Derived (OEHHA) Method" was used for chronic noncancer hazard.

Staff conducted additional HARP modeling in which the 1-hour emissions reported in the HARP files for each mobile source were multiplied by a factor of 2,880 hours/year, which assumes operation of vehicles for 8 hours/day, 30 days/month for 12 months/year which is the rate at which the washing and LRU vehicles are expected to operate (source: page 144 of the August 2009 responses to data requests). For some vehicles this may be an underestimation (security vehicles are expected to run 24 hrs/day) or an overestimation (staff and vanpool vehicles are expected to run 2 hrs/day). The emission factors used in staff's HARP analysis are listed in **Public Health Table 6**. Cancer risk and chronic hazard index modeled by staff in this analysis are greater than those reported in the August 2009 responses to data requests, but still less than the significance levels of 10 in 1 million for cancer risk and 1.0 for hazard index. Staff believes the differences are due to the applicant not transferring the emission factors correctly into the HARP model. The results of staff's operations phase risk assessment are compared to the results reported by the applicant in **Public Health Table 7**.

Staff's results for acute hazard index are lower than the results reported by the applicant due to a change in the acute REL for acrolein from the value used in the applicant's August 2009 report (0.19 ug/m^3) to the value published by OEHHA in their December 2008 guidance, 2.5 ug/m^3 (OEHHA 2008).

The point of maximum impact, PMI, was determined under the 70 year residential scenario. Three nearby residences, the only residential receptors located near the facility, were also modeled. Cumulative impacts were not evaluated as there are no existing or proposed projects within 6 miles of the facility.

Public Health Table 4
Operation Phase Emission Rates Listed in Response to Data Requests

Substance	Diesel Generator	Washing Vehicle (running & idling)	LRU Maintenance Truck (running & Idling)	Staff & visitor cars, van pool, security truck	Diesel Delivery Trucks	Total Emissions
Peak Hourly Emissions from all vehicles of each type (lb/hr)						
DPM	0.015				0.027	0.042
Benzene		0.024	0.014	0.036		0.074
1,3-Butadiene		0.002	0.001	0.002		0.005
Formaldehyde		0.010	0.006	0.005		0.022
Acetaldehyde		0.005	0.003	0.004		0.012
Acrolein		0.001	0.000	0.000		0.002
Annual Emissions from all vehicles of each type (lb/yr)						
DPM	0.18				13.40	13.58
Benzene		69.78	39.08	36.28		145.14
1,3-Butadiene		5.17	2.90	2.51		10.58
Formaldehyde		29.80	16.69	5.43		51.92
Acetaldehyde		13.45	7.53	4.27		25.25
Acrolein		2.29	1.28	0.30		3.87

Source: Response to Data Requests, August 2009, Table DR-111a
Note: Values listed are for emissions from all vehicles of each type
DPM = diesel particulate matter

Public Health Table 5
Operation Phase Emission Rates Used in Applicant's HARP Modeling

Substance	Diesel Generator	Washing Vehicle & LRU Maintenance Truck	Security	Visitor	Staff	Delivery Trucks
Peak Hourly Emissions per vehicle (lb/hr)						
DPM	0.015					3.91E-03
Benzene		9.69E-04	1.70E-04	6.52E-05	1.37E-03	
1,3-Butadiene		7.19E-05	1.21E-05	4.42E-06	9.38E-05	
Formaldehyde		4.14E-04	2.52E-05	9.80E-06	2.06E-04	
Acetaldehyde		1.87E-04	2.00E-05	7.67E-06	1.61E-04	
Acrolein		3.18E-05	1.37E-06	5.48E-07	1.15E-05	
Annual Emissions per vehicle (lb/yr)						
DPM	0.18					1.09E-07
Benzene		1.59E-07	8.37E-08	7.87E-09	7.87E-09	
1,3-Butadiene		1.18E-08	5.95E-09	5.33E-10	5.33E-10	
Formaldehyde		6.80E-08	1.24E-08	1.18E-09	1.18E-09	
Acetaldehyde		3.07E-08	9.84E-09	9.24E-10	9.24E-10	
Acrolein		5.23E-09	6.73E-10	6.60E-11	6.60E-11	

Source: Applicant's HARP modeling files
Note: Values listed are for emissions from ONE vehicle of each type
DPM = diesel particulate matter

Public Health Table 6
Operation Phase Emission Rates Used in Staff's HARP Modeling

Substance	Diesel Generator	Washing Vehicle & LRU Maintenance Truck	Security	Visitor	Staff	Delivery Trucks
Peak Hourly Emissions per vehicle (lb/hr)						
DPM	1.50E-02					3.91E-03
Benzene		9.69E-04	1.70E-04	6.52E-05	1.37E-03	
1,3-Butadiene		7.19E-05	1.21E-05	4.42E-06	9.38E-05	
Formaldehyde		4.14E-04	2.52E-05	9.80E-06	2.06E-04	
Acetaldehyde		1.87E-04	2.00E-05	7.67E-06	1.61E-04	
Acrolein		3.18E-05	1.37E-06	5.48E-07	1.15E-05	
Annual Emissions per vehicle (lb/yr)						
DPM	1.80E-01					1.13E+01
Benzene		2.79E+00	4.90E-01	1.88E-01	3.95E+00	
1,3-Butadiene		2.07E-01	3.48E-02	1.27E-02	2.70E-01	
Formaldehyde		1.19E+00	7.26E-02	2.82E-02	5.93E-01	
Acetaldehyde		5.39E-01	5.76E-02	2.21E-02	4.64E-01	
Acrolein		9.16E-02	3.95E-03	1.58E-03	3.31E-02	

Source: Peak hourly emissions from applicant's HARP modeling files; annual emissions are hourly emissions times 2,880 hrs/yr
Note: Values listed are for emissions from ONE vehicle of each type
DPM = diesel particulate matter

Public Health Table 7
Results of Staff's Analysis and the Applicant's Analysis for Cancer Risk and Chronic and Acute Hazard

	Staff's Analysis			Applicant's Analysis *(Source: Table DR-111b)*		
	Cancer Risk (per million)	Chronic HI	Acute HI	Cancer Risk (per million)	Chronic HI	Acute HI
PMI	2.7	0.0019	0.0083	0.000667	0.00000042	0.0616
MEIR (nearest resident receptor)	0.13	0.00011	0.0044	0.000014	0.000000009	0.0344

Notes:
PMI = point of maximum impact determined in staff's analysis; the PMI is located on the facility fenceline
MEIR = maximally exposed individual, residential is located at a residence approximately 0.3 miles south of the western area of the facility

Public Health Table 8
Results of Staff's Analysis: Contribution to Total Cancer Risk by Individual Substances from All Sources at the Point of Maximum Impact (PMI)

Substance	Diesel Emergency Generator	Mirror Wash and LRU Vehicles	Security Vehicles	Visitor Vehicles	Staff Vehicles	Diesel Delivery Vehicles	Total Risk
DPM	5.26E-11					2.17E-06	2.17E-06
Benzene		3.05E-09	4.47E-11	9.36E-11	3.66E-07		3.70E-07
1,3-Butadiene		1.36E-09	1.91E-11	3.79E-11	1.50E-07		1.52E-07
Formaldehyde		2.73E-10	1.39E-12	2.95E-12	1.15E-08		1.18E-08
Acetaldehyde		5.89E-11	5.26E-13	1.10E-12	4.30E-09		4.36E-09
Acrolein							
SUM	5.26E-11	4.74E-09	6.57E-11	1.36E-10	5.32E-07	2.17E-06	2.71E-06

Public Health Table 9
Results of Staff's Analysis: Contribution to Total Cancer Risk by Individual Substances from All Sources at the MEI-Resident

Substance	Diesel Emergency Generator	Mirror Wash and LRU vehicles	Security Vehicles	Visitor Vehicles	Staff Vehicles	Diesel Delivery Vehicles	Total Risk
DPM	5.08E-12					8.66E-08	8.66E-08
Benzene		1.31E-09	2.82E-11	1.04E-09	2.98E-08		3.21E-08
1,3-Butadiene		5.82E-10	1.20E-11	4.21E-10	1.22E-08		1.32E-08
Formaldehyde		1.17E-10	8.77E-13	3.28E-11	9.39E-10		1.09E-09
Acetaldehyde		2.53E-11	3.31E-13	1.22E-11	3.50E-10		3.87E-10
Acrolein							
SUM	5.08E-12	2.03E-09	4.14E-11	1.51E-09	4.33E-08	8.66E-08	1.33E-07

C.6.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage alternative would essentially be a 275 megawatt (MW) solar facility located within the central portion of the proposed 850 MW project. It was developed because it could be constructed without the necessity of a new 500 kilovolt (kV) transmission line, and would avoid several other environmental impacts. This alternative's boundaries and the revised locations of the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 1**.

C.6.5.1 SETTING AND EXISTING CONDITIONS

The general setting and existing conditions would remain as described in C.15.4.1 although the land requirements would be proportionately reduced to reflect the smaller project size. Locations of laydown areas may also vary.

C.6.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The Reduced Acreage Alternative is likely to result in reduced emissions which would decrease the cancer risk and chronic and acute hazard indices predicted for the 850 MW project as proposed. However, the public health analysis has determined that the cancer risk and chronic and acute hazard indices are far below the level of significance at the point of maximum impact for the project as proposed. Therefore staff concludes that with respect to public health impacts, the Reduced Acreage Alternative is not preferable over the project as proposed.

C.6.5.3 CEQA LEVEL OF SIGNIFICANCE

Similar to the proposed project, staff considers project compliance with LORS to be sufficient to ensure that no significant impacts to public health would occur as a result of emissions of TACs (HAPS) associated with the Reduced Acreage Alternative.

C.6.6 AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

The analysis of the Donated and Acquired Lands Alternative has been moved to Section B.2 (Alternatives) of this document.

C.6.7 NO PROJECT/NO ACTION ALTERNATIVE

There are three No Project / No Action Alternatives evaluated as follows:

No Project / No Action Alternative #1: No Action on the Calico Solar Project application and on California Desert Conservation Area (CDCA) land use plan amendment

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

The results of the No Project / No Action Alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another renewable energy project.
- Both State and Federal law support the increased use of renewable power generation.

If the proposed project is not approved, renewable projects would likely be developed on other sites in San Bernardino County, the Mojave Desert, or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are dozens of other wind and solar projects that have applications pending with BLM in the California Desert District. Under the No Project/No Action alternative public health impacts to the proposed project site and area would be similar as those currently occurring under the existing conditions in the area. Given that there would be no significant change over the existing conditions, the public health impacts of the No Project/No Action alternative would be less-than-significant.

No Project / No Action Alternative #2: No Action on the Calico Solar Project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the project site.

Because the CDCA Plan would be amended, it is possible that the site would be developed with the same or a different solar technology. As such, this No Project/No Action Alternative could result in benefits similar to those of the proposed project.

No Project / No Action Alternative #3: No Action on the Calico Solar Project application and amend the CDCA land use plan to make the area unavailable for future solar development

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and the BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site. However, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

C.6.8 PROJECT-RELATED FUTURE ACTIONS – PUBLIC HEALTH AND SAFETY

This section examines the potential impacts of future transmission line construction, line removal, substation expansion, and other upgrades that may be required by Southern California Edison Company (SCE) as a result of the Calico Solar Project. The SCE upgrades are a reasonably foreseeable event if the Calico Solar Project is approved and constructed as proposed.

The SCE project will be fully evaluated in a future Environmental Impact Report/ Environmental Impact Statement (EIR/EIS) prepared by the BLM and the California Public Utilities Commission. Because no application has yet been submitted and the SCE project is still in the planning stages, the level of impact analysis presented is based on available information. The purpose of this analysis is to inform the Energy Commission and BLM, interested parties, and the general public of the potential environmental and public health effects that may result from other actions related to the Calico Solar Project.

The project components and construction activities associated with these future actions are described in detail in Section B.3 of this Staff Assessment/EIS. This analysis examines the construction and operational impacts of two upgrade scenarios

- The **275 MW Early Interconnection Option** would include upgrades to the existing SCE system that would result in 275 MW of additional latent system capacity. Under the 275 MW Early Interconnection option, Pisgah Substation would be expanded adjacent to the existing substation, one to two new 220 kV structures would be constructed to support the gen-tie from the Calico Solar Project into Pisgah Substation, and new telecommunication facilities would be installed within existing SCE ROWs.
- The **850 MW Full Build-Out Option** would include replacement of a 67-mile 220 kV SCE transmission line with a new 500 kV line, expansion of the Pisgah Substation at a new location and other telecommunication upgrades to allow for additional transmission system capacity to support the operation of the full Calico Solar Project.

C.6.8.1 ENVIRONMENTAL SETTING

The environmental setting described herein incorporates both the 275 MW Early Interconnection and the 850 MW Full Build-Out options. The setting for the 275 MW Early Interconnection upgrades at the Pisgah Substation and along the telecomm corridors is included within the larger setting for the project area under the 850 MW Full Build-Out option.

There are many potential public health concerns that could be associated with construction and operation of the SCE upgrades. These include health impacts due to the emissions of air pollutants; health risks from the emissions of air contaminants and airborne pathogens; exposure to hazards from the handling of wastes, chemicals and other materials; exposure to electromagnetic fields (EMF) from power transmission; and safety concerns for workers. EMF is discussed in the **Transmission Line Safety and**

Nuisance section of this Staff Assessment/EIS. Small quantities of hazardous or solid waste may be generated during the construction phase of the proposed upgrades, which is discussed under **Hazardous Materials Management** and **Waste Management**. Worker safety is discussed in the **Worker Safety and Fire Protection** section of this Staff Assessment/EIS.

C.6.8.2 ENVIRONMENTAL IMPACTS

The potential for public exposure to hazardous materials is considered minimal because waste management plans would be implemented (see SA/EIS sections on **Hazardous Materials Management** and **Waste Management**). Releases from the project in wastewater streams to the public sewer system are discussed in the section addressing **Soil and Water Resources**. Programs to create a safe workplace for project employees are described in **Worker Safety**.

A public health issue that is not addressed elsewhere in this Staff Assessment/EIS would be health risks from the emissions of air contaminants during construction. The construction activities caused by the SCE upgrades would generate emissions at the locations of the work along the transmission line and telecommunication ROWs and at the Pisgah Substation site, as are discussed in the **Air Quality** section of this Staff Assessment/EIS. The project would comply with federal, state, and local air quality rules and regulations. A State Implementation Plan was prepared for the Mohave Desert Planning Area, which identifies sources of PM10 emissions and identifies control measures to reduce these emissions. Mitigation measures would be implemented to reduce the emissions generated during project construction and operation. Following implementation of mitigation discussed below, the construction of the SCE upgrades would not likely have a significant adverse impact on air quality in the area. Therefore, public exposure to air contaminants would not generate a significant public health risk.

C.6.8.3 MITIGATION

The Mojave Desert Air Quality Management District (MDAQMD) is responsible for the project area and developed the MDAQMD Ozone State Implementation Plan (SIP) (2004) for inclusion in the 2004 Southeast Desert Modified Ozone State Implementation Plan (2004 SED SIP). This plan identifies sources of PM10 emissions and mitigation measures to reduce these emissions. The upgrade projects would be required to comply with MDAQMD rules and portable equipment rules, which would dictate how the equipment could be operated. Mitigation measures would be implemented following the MDAQMD Ozone SIP to reduce the emissions generated during project construction and operation.

In addition, with effective and comprehensive control measures such as those listed in the **Air Quality** section of this Staff Assessment/EIS, as well as those recommended for the proposed Calico Solar Project, dust and equipment exhaust impacts could likely be reduced to a less than significant level and public exposure to air contaminants would not create a significant public health and safety risk.

C.6.8.4 CONCLUSION

The construction and structure removal activities associated with all of SCE's upgrades would cause emissions due to heavy-duty diesel and gasoline-powered construction equipment and fugitive particulate matter (dust) emissions from activity on unpaved surfaces. With effective and comprehensive control measures such as those recommended in the **Air Quality** section of this SSA for the proposed Calico Solar Project and included in Appendix EE of the AFC, dust and equipment exhaust impacts could likely be reduced to a less than significant level. As a result, public exposure to air contaminants would not be expected to generate a significant public health and safety risk.

C.6.9 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 probable future projects (California Code Regulation, Title 14, section 15130). NEPA states that cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR §1508.7).

C.6.9.1 GEOGRAPHIC EXTENT

Cumulative impacts can occur if implementation of the Calico Solar Project could combine with those of other local or regional projects. Cumulative impacts would occur locally if Calico Solar Project impacts combined with impacts of projects located within the same air basin. Cumulative impacts could also occur as a result of development of some of the many proposed solar and wind development projects that have been or are expected to be under consideration by the BLM and the Energy Commission in the near future. Many of these projects are located within the California Desert Conservation Area, as well as on BLM land in Nevada and Arizona.

For purposes of the cumulative analysis, the emissions from construction or operation of the Calico Solar Project could potentially combine with emissions from past, present and reasonably foreseeable projects to result in adverse health effects to the public. Cumulative impacts to public health could occur as a result of implementation of the Calico Solar Project on both a local and regional level. The geographic extent for the analysis of local cumulative impacts associated with the Calico Solar Project includes the Mojave Desert Air Basin (MDAB), which contains most of San Bernardino County and parts of Riverside County and Kern County.

C.6.9.2 CUMULATIVE IMPACT ANALYSIS

Cumulative impacts of the proposed project and other projects within a 6-mile radius were not evaluated by the applicant. The applicant has stated that there are no current or future projects within a 6-mile radius that could contribute to a public health cumulative impact, and therefore no further analysis was conducted (SES 2008a, Section 5.16.3). Nevertheless, there is a potential for substantial future development in the project area and throughout the southern California desert region, as indicated by the list of planed projects within a 10-mile radius (provided by the applicant), which includes several energy generating projects employing solar or wind technologies (SES 2008a, Table 5.18-3). Staff has analyzed the public health and safety effects of existing and foreseeable projects listed in the Cumulative Impacts section of the AFC (SES 2008a, Section 5.18) as follows.

C.6.9.3 LOCAL PROJECTS

The maximum cancer risk for emissions from the Calico Solar Project (calculated by staff) is 2.7 in one million at the point of maximum impact located at the project fenceline. The maximum impact location occurs where pollutant concentrations from the Calico Solar Project would theoretically be the highest. Even at this location, staff does not expect any significant change in lifetime risk to any person, and the increase does not represent any real contribution to the average lifetime cancer incidence rate due to all causes (environmental as well as life-style and genetic). Modeled facility-related residential risks are lower at more distant locations, and actual risks are expected to be much lower since worst-case estimates are based on conservative assumptions and thus overstate the true magnitude of the risk expected. Therefore, staff does not consider the incremental impact of the additional risk posed by the Calico Solar Project to be either individually or cumulatively significant.

C.6.9.4 REGIONAL PROJECTS

The nature of public health impacts from exposure to materials that could result in negative health effects combined with the vast area over which the future solar and wind development projects would be built in southeastern California, southern Nevada, and western Arizona, as well as the relative isolation of these projects from sensitive receptors, precludes the potential for impacts of these projects to combine with each other to result in significant impacts. Any emission from construction of these projects would be dispersed over these areas and would not be expected to result in chronic health problems to sensitive receptors. Operation of the future solar and wind energy projects would result in negligible emissions, mostly related to worker vehicles and maintenance trucks, therefore, operation of these future projects would not result in negative regional health effects.

C.6.9.5 CUMULATIVE IMPACT CONCLUSION

Public health impacts of the Calico Solar Project would not combine with impacts of any past, present, or reasonably foreseeable projects to result in cumulatively considerable local or regional impacts. Therefore, no mitigation is recommended to address potential cumulative project impacts.

C.6.10 COMPLIANCE WITH LORS

Staff has considered the minority population as identified in **Socioeconomics Figure 1** in its impact analysis and has found no potential significant adverse impacts for any receptors, including environmental justice populations. 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 toward the 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 significant chronic or cancer health 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 to any population in the area. Therefore, given the absence of any significant health impacts, there are no disparate health impacts and there are no environmental justice issues associated with **Public Health and Safety**.

Staff concludes that construction and operation of the Calico Solar Project will be in compliance with all applicable LORS regarding long-term and short-term project impacts in the area of **Public Health and Safety**.

C.6.11 NOTEWORTHY PUBLIC BENEFITS

It is noteworthy that a solar electric generating facility such as the proposed Calico Solar Project would emit significantly less TACs to the environment than other energy sources available in California such as natural gas or biomass, thereby reducing the health risks that would otherwise occur with these non-renewable energy sources. At the same time, the proposed Calico Solar Project 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.

C.6.12 FACILITY CLOSURE

Closure of the proposed Calico Solar Project (temporary or permanent) would follow a closure plan prepared by the applicant and designed to minimize public health and environmental impacts. Permanent closure would presumably occur 40 years after the start of operation unless the project remains economically viable. Decommissioning procedures would be consistent with all applicable LORS and would be submitted to the Energy Commission for approval before implementation (SES 2008a, Section 3.12.3). Staff expects that impacts to public health from the closure and decommissioning process would represent a fraction of the impacts associated with the construction or operation of the proposed Calico Solar Project.

Therefore based on staff’s analysis for the construction and operation phases of this project, staff concludes that public health-related impacts from closure and decommissioning of the Calico Solar Project would be insignificant.

C.6.13 RESPONSE TO PUBLIC AND AGENCY COMMENTS

Staff received comments from the applicant on the **Public Health and Safety** section of the SA/DEIS. Staff’s responses to the applicant’s April 14, 2010 comments are outlined below and have been incorporated in the appropriate areas of this section. Specific Final Environmental Impact Statement (FIES)-related comments will be responded to by the BLM in the FEIS for this project.

General Applicant Comment:

The discussion and conclusions seem appropriate for the Calico Solar Project, with one exception described below. Energy Commission Staff review of the applicant's Health Risk Assessment (HRA) modeling files seemed to leave them with some confusion about the analysis. Hopefully the following will clarify any uncertainty regarding the HRA conducted to analyze the operational Emissions. All Project-related operational diesel particulate matter emissions and TAC emissions from gasoline vehicles were included in the HRA. The diesel particulate matter emission sources included the stationary emergency generator and the diesel delivery trucks. The gasoline vehicles included the wash and LRU vehicles, security, staff and visitor vehicles. In the Responses to the Data Requests submitted in August 2009, Table DR 111a outlined the hourly and annual emissions that were included in the HRA. In the HRA modeling, the total vehicle related project emissions were spread across a number of point sources representing each type of vehicle. The number of sources in the model did not necessarily match the number of each vehicle type. It was determined that sufficient accuracy in the HRA was obtained with fewer sources, thus speeding the computational time. Although the number of vehicle type sources in the model did not match the anticipated number of vehicles for the project, all vehicle-related emissions were evenly distributed among the model sources. The annual emission rates for the mobile sources entered into the HARP model in pounds per year were entered incorrectly. The annual emissions presented in Table DR111a were correct, but unfortunately these did not get transferred correctly to the HARP model. Energy Commission Staff re-ran the HARP model with estimated annual emissions for the mobile sources. They noted that for some sources these annual emissions might be overestimated, and this is the case for the diesel delivery trucks. Using the Energy Commission technique for estimating the annual emissions for the HARP model, the diesel delivery trucks annual emissions are overestimated by a factor of 5.8. This overestimation in diesel delivery trucks annual emissions causes the cancer risk and the chronic noncancer health index to be overestimated, since Tables 8 and 9 show that the diesel delivery trucks contribute the most to these health risks. Although these risks may be overestimated, they are below the significance levels, thus the project will not cause a significant impact to human health.

Response: As reflected in the applicant's comments, the diesel-related were conservatively calculated to avoid underestimation of the real risk. Since the resulting estimate is still below the significance levels, staff is more confident that the real diesel-related risk would be below staff's significance level.

Comment: On page C.6-12 of the SA/DEIS, staff states, "Construction of the Calico Solar Project is anticipated to take place over a period of 48 months." Please note that construction impacts analyzed in the Responses to Data Requests submitted in August 2009 were based on a 41 month duration.

Response: Staff notes the differences in the two noted exposure periods. Given the types of long-term effects of concern, the differences in the cited exposure durations would not significantly influence staff's conclusions regarding the significance of the health risks of concern. Staff left the 48 months in their analysis to be conservative and to cover any slip in construction duration.

Comment: On page C.6-13 of the SA/DEIS, “Staff concludes that, while standard procedures were followed in the applicant’s analysis, two sources of uncertainty exist for which further clarification is necessary: The difference in the number of vehicles to be used at the facility versus the number of vehicles modeled. The use of average annual emission rates in the HARP modeling that are lower than the peak hourly rates.”

Please see the discussion in the general comments section above that addresses Staff’s concerns.

Response: Given the applicant’s clarification regarding the total sources of the vehicular emissions of potential concern, staff is in agreement with the applicant about the appropriateness of their accounting for the vehicle-related impacts**.**.

Comment: On page C.6-14 of the SA/DEIS, Vehicle requirements for operations and maintenance are listed on page 144 of the August 2009 responses to data requests and include the following:

- 50 gasoline wash vehicles for cleaning solar reflector mirrors
- 28 gasoline LRU (line replacement unit) maintenance trucks
- 7 gasoline/hybrid staff and security trucks
- 120 staff cars, 5 vanpool vehicles, 10 visitor cars (all gasoline)
- 7 diesel delivery trucks

The summary from the Responses to Data Requests, August 2009 also included 16 propane forklifts.

Response: The propane forklifts have been added to the list.

Comment: On page C.6-15 of the SA/DEIS, staff states, “It is not clear in the report why the number of vehicles modeled differs from the number of vehicles listed for the facility, leading to uncertainty as to whether all mobile sources were included in the modeling of emissions from facility operations.”

No mobile source emissions were omitted from the HRA modeling. The total vehicle emissions were divided by the number of sources in the model, not the number of vehicles associated with the project. The number of sources in the model was selected to ensure that project related emissions were appropriately distributed across the site. It was determined that more than doubling the mobile sources in the model would not add accuracy to the HRA, it would only add to the model computational time.

Response: Given the applicant’s clarification regarding the total sources of the vehicular emissions of potential concern, staff is in agreement with the applicant about the appropriateness of their accounting for the vehicle-related impacts**.**

Comment: On page C.6-15 of the SA/DEIS, staff states, “Emission factors obtained from the August 2009 responses to data requests (Table DR-111a) are listed in **Public Health Table 4**. In staff’s examination of the HARP modeling files provided by the applicant, it was noted that annual emissions values used are much lower than maximum 1-hour emissions values, as seen in **Public Health Table 5**. It is not possible, of course, for annual emissions to be lower than 1- hour emissions and this is contrary to the values reported in Table DR-111a, in which the annual emissions are much higher than the 1-hour emissions, as expected. This leads to the supposition that the average annual emission values used in the applicant's HARP modeling are mistaken."

The annual emissions presented in Table 5, which were from the HARP modeling, were incorrectly transposed from Table DR111a into the model, see general comment discussion.

Response: Staff notes the inaccurate use of emissions data from the noted Data Response**.**

Comment: On page C.6-15 of the SA/DEIS, staff states, "Staff conducted additional HARP modeling in which the 1-hour emissions reported in the HARP files for each mobile source were multiplied by a factor of 2,880 hours/year, which assumes operation of vehicles for 8 hours/day, 30 days/month for 12 months/year which is the rate at which the washing and LRU vehicles are expected to operate (source: page 144 of the August 2009 responses to data requests)."

Staff acknowledges that this technique for estimating the annual emissions may overestimate some sources; however, the overestimation of the emissions from the diesel delivery trucks is a factor of 5.8. This has a significant effect on the results of the HRA. Tables 8 and 9 show the contributions to cancer risk by individual substances from each source, in these tables the main contributor to the cancer risk are the diesel delivery trucks. Therefore the cancer risk predicted by staff appears to be too high, solely from the overestimation of emissions.

Response: As previously noted, the potential risk from project operations is conservatively calculated to avoid underestimation of the real risk. Since staff's calculated risk is still below staff's significance level, staff is more confident in its conclusion regarding the potential risks in question**.**

C.6.14 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

No conditions of certification or mitigation measures are proposed.

C.6.15 CONCLUSIONS

Staff has analyzed potential public health risks associated with construction and operation of the Calico Solar Project and does not expect any significant adverse cancer 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 Calico Solar Project uses a conservative health-protective 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 Calico Solar Project would not contribute significantly or cumulatively to morbidity or mortality in any age or ethnic group residing in the project area.

C.6.16 REFERENCES

BAAQMD (Bay Area Air Quality Management District) 2004b – Toxic Air Contaminant Control Program Annual Report 2002. Volume I. June.

California Air Resources Board (ARB) 2002 – California Air Quality Data, http://www.arb.ca.gov/aqd/aqd.htm.

California Air Resources Board (ARB) 2009 – Annual Toxics Summaries. http://www.arb.ca.gov/adam/toxics/toxics.html.

CAPCOA (California Air Pollution Control Officers Association)1993 – CAPCOA Air Toxics "Hot Spots" Program Revised 1992 Risk Assessment Guidelines. Prepared by the Toxics Committee. October.

OEHHA (Office of Environmental Health Hazard Assessment) 2003 – *Air Toxics Hot Spots Program Risk Assessment Guidelines*. The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments. August.

Office of Environmental Health Hazard Assessment (OEHHA) 2008 – "All OEHHA Acute, 8-hour and chronic Reference Exposure Levels (chRELS) as of December 18, 2008." http://www.oehha.ca.gov/air/allrels.html

SES (Stirling Energy Systems Solar Three and Solar Six, LLC) 2008a (tn: 49181) – Application for Certification for the Stirling Energy Systems (SES) Solar One Project, Volumes 1 and 2. Submitted to the California Energy Commission, December 1, 2008.

SRP (Scientific Review Panel on Toxic Air Contaminants) 1998 – Findings of the Scientific Review Panel on The Report on Diesel Exhaust as adopted at the Panel's April 22, 1998, meeting.

Tessera Solar 2009q – Applicant's Responses to Energy Commission and BLM Data Requests 1-48, 81, and 109-112 Set 1 Parts 1 and 2, August 31, 2009.

C.7 – HYDROLOGY, WATER USE AND WATER QUALITY (SOIL AND WATER RESOURCES)

Testimony of Casey Weaver, Gus Yates, John Fio and Steve Allen

C.7.1 SUMMARY OF CONCLUSIONS

Based on the information provided to date, staff has determined that construction, operation, and decommissioning of the proposed Calico Solar (formerly known as the Stirling Energy Systems Solar One) Project could potentially impact soil and water resources. Where potential impacts have been identified, staff has proposed mitigation measures to reduce identified impacts to levels that are less than significant. The mitigation measures, as well as measures needed to ensure conformity with applicable laws, ordinances, regulations and standards, are included as conditions of certification. Staff's conclusions, based on analysis of the information submitted to date, are as follows:

1. The proposed project would be located in the Mojave Desert of San Bernardino County in an area characterized by braided stream channels, flash flooding, alluvial fan conditions, low rainfall, sparse vegetation, and the potential for wind erosion/ deposition.
2. The project proposes to place 34,000 solar dishes, known as SunCatchers, on individual pole foundations within areas known to be subject to flash flooding and erosion. Project-related changes to the braided and alluvial fan stream hydraulic conditions could result in on-site erosion, stream bed degradation or aggradation, and erosion and sediment deposition impacts to adjacent land. SunCatchers within the stream courses could be subject to destabilization by stream scour. Impacts to soils related to wind erosion and runoff-borne erosion are potentially significant, as are impacts to surface water quality from sedimentation and the introduction of foreign materials, including potential contaminants, to the project area. Compliance with laws, ordinances, regulations and standards and Conditions of Certification **SOIL&WATER-1**, **SOIL&WATER-2**, **SOIL&WATER-3** and **SOIL&WATER-5** will mitigate these potential impacts to a level less than significant.
3. The applicant completed a hydrologic study and hydraulic modeling of the major stream channels on the project site. The applicant has proposed the construction of large debris basins in channels upstream of the proposed solar array. The most recently-submitted design indicates that dams will be constructed to temporarily retain flows in the basins. The applicant has not submitted the comprehensive detail that staff needs to analyze the ability of the basins to retain maximum flows and protect the project from flooding. As a result, staff has recommended adoption of Conditions of Certification **GEO-2** and **-3**, which contain performance standards that ensure that the design of the debris basin dams will comply with current engineering practices and existing regulations, and prevent significant impacts. However, any proposed design must comply with requirements set forth in Conditions of Certification **SOIL&WATER-1**, **-2**, **-3** and **-8**, which will ensure that no adverse impacts due to flooding will occur.
4. Basins or other forms of flood protection have not been addressed for the three drainages that traverse private property near the center of the project and enter the

proposed solar array. Impacts due to flooding in these areas are potentially significant without adequate mitigation. This leaves portions of the project subject to significant adverse impact due to flooding. Any proposed designs to mitigate these potential flood-related impacts must comply with requirements set forth in Conditions of Certification **SOIL&WATER-1**, **-2**, **-3** and **-8**, which will ensure that no adverse impacts due to flooding will occur.

5. The applicant's Draft Drainage, Erosion, and Sedimentation Control Plan may mitigate the potential on site project-related storm water and sediment impacts. However, the calculations and assumptions used to evaluate potential storm water and sedimentation impacts in the Draft Plan are imprecise and have limitations and uncertainties associated with them such that the magnitude of potential impacts that could occur cannot be determined precisely. As a result, staff drafted Conditions of Certification **SOIL&WATER-1**, **-2**, and **-3** to define specific methods of design analysis, development of best management practices, and monitoring and reporting procedures to mitigate impacts related to flooding, erosion, sedimentation, and stream morphological changes.

6. The applicant has not provided information necessary to complete development of requirements for dredge and fill in waters of the State. Compliance with LORS, particularly the Clean Water Act requirements, will insure no adverse impacts to waters of the State. In addition, staff drafted Conditions of Certification **SOIL&WATER-1**, **-2**, and **-3** to define specific methods of design analysis, development of best management practices, and monitoring and reporting procedures to mitigate impacts related to flooding, erosion, sedimentation, and stream morphological changes.

7. Surface water and groundwater quality could be affected by construction activities and ongoing operational activities on the project site including mirror washing, vehicle use and fueling, storage of oils and chemicals, the proposed septic and leach field system for sanitary wastes, and wastes generated from the water treatment system. These impacts are potentially significant. Conditions of Certification **SOIL&WATER-1**, **-2**, **-3 and -5** will mitigate these potential impacts to a level less than significant. The applicant has not provided information necessary to complete development of requirements for discharges of brine waters to evaporation ponds or sanitary sept**ic systems.** H**owe**v**er, staff h**as identified performance standards that will ensure no significant adv**e**rse impacts will occur, and included these performance standards in Conditions of Certification **SOIL&WATER-2** and **-3** and **Soil and Water Appendix B.**

8. There is uncertainty in the long-term reliability of the proposed water supply. Condition of Certification **SOIL&WATER-9** is proposed to provide water conservation and plans for an alternative supply, if necessar**y, to ensure** pow**er p**lan**t and potable water demands** are met for the project.

9. Dust control (during both construction and operation) and mirror washing (during operation) will comprise the primary water uses for the project. Daily maximum water use is estimated to be 43.7gallons per minute (gpm) during construction and 69.8 gpm during operation (maximum annual construction and operational water use is 142.4 acre feet per year (AFY) and 20.4 AFY, respectively). Condition of Certification **SOIL&WATER-4** ensures groundwater storage depletion and water

level declines due to project groundwater use are less than significant by limiting annual construction water use to 145 AF and annual operational water use to 21 AF.

10. Water budget estimates and simulated drawdown due to proposed project pumping indicate groundwater storage depletion and water level declines will be less than significant. Condition of Certification **SOIL&WATER-4** limits annual groundwater use during construction and project operations. Condition of Certification **SOIL&WATER-7** shall confirm these findings by requiring groundwater level monitoring and reporting to document pre-project groundwater conditions and measure changes that occur as a result of groundwater use for project construction and operations.
11. Waste water will be generated as a byproduct of water treatment processes, equipment maintenance and from sanitary practices. Conditions of Certification **SOIL&WATER-2** and **-5** are proposed by staff to ensure impacts caused by generation and disposal of wastewater would be less than significant.
12. The proposed project would use air-cooled radiators fitted on each individual engine for heat rejection. Use of this technology would substantially reduce potential water use and is consistent with Energy Commission water policy.

C.7.2 INTRODUCTION

This section analyzes potential impacts to soil and water resources from the construction and operation of the proposed Calico Solar Project. The analysis specifically focuses on the potential for the Calico Solar Project to:

- cause accelerated wind or water erosion or sedimentation;
- exacerbate flood conditions in the vicinity of the project;
- adversely affect surface or groundwater supplies;
- degrade surface or groundwater quality; and,
- comply with all applicable laws, ordinances, regulations, and standards (LORS) and state policies.

Where the potential for significant adverse impacts is identified, staff has proposed mitigation measures to reduce the significance of the impacts, if possible, and has recommended conditions of certification.

C.7.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

The most significant potential impacts due to project development are typically those leading to soil erosion, flooding, or depletion or degradation of water resources. Thresholds for determining significance in this document are based on Appendix G of the California Environmental Quality Act (CEQA) Guidelines (CCR 2006).

Soils, hydrology and water resources impacts would be considered significant if the proposed project results in the effects listed below:

- violates any water quality standards or waste discharge requirements.
- substantially depletes groundwater supplies or interferes substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted).
- substantially alters 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 onsite/offsite.
- substantially alters 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 onsite/offsite.
- creates or contributes runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.
- otherwise substantially degrades surface water or groundwater quality.
- places structures 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.
- exposes 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.

Staff believes that soil erosion and flooding impacts, which are described below, are the most potentially significant impacts associated with the proposed project.

- The project will cause erosion of the project site and deposition of sediment into waters of the State. Portions of the site will largely be barren soil when constructed. Barren soil is subject to erosion by wind and water. Application of soil stabilizers and adherence to best management practices (BMPs) would reduce surface soil erosion and sedimentation impacts to less than significant levels.
- There could be flooding of the project site, as designed and constructed, and redirection of flood flows. Foundation elements (driven hollow poles) designed to support the SunCatchers are proposed to be installed within existing drainage channels. The volume of the foundation elements will decrease the capacity of the existing channel to contain flood flows. Adherence to the Conditions of Certification regarding the construction and maintenance of the foundation elements within the active channels will reduce the potential impacts to less than significant levels.
- Dams will be constructed across drainages to create flood control basins designed to prevent flooding of the project site while allowing low flow discharges to pass sediment and water across the project. Adherence to the Conditions of Certification regarding the construction and maintenance of the flood control basins will reduce the potential impacts to less than significant levels.
- Basins or other form of flood protection have not been addressed for the three drainages that traverse private property near the center of the project and enter the

proposed solar array. Impacts due to flooding in these areas are potentially significant without adequate mitigation.

C.7.3.1 LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The following federal, state, and local environmental LORS are applicable to the Calico Solar Project. Because these LORS address management of soil and water resources in a manner that protects human health and the environment, the project's compliance with these LORS is a major component of staff's determination regarding the significance and acceptability of the Calico Solar Project.

Soil & Water Table 1
Laws, Ordinances, Regulations, and Standards

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 of 1967. The CWA also establishes protection of navigable waters through Section 401 and 404. Section 404 permitting and. Section 401 certification through the Army Corps of Engineers and Regional Water Quality Control Board (RWQCB) is required if there are potential impacts to surface waters of the State and/or Waters of the United States, such as perennial and ephemeral drainages, streams, washes, ponds, pools, and wetlands. The Army Corps and RWQCB can require impacts to these waters to be quantified and mitigated.
Resource Conservation and Recovery Act, 40 CFR Part 260 et seq.	The Resource Conservation Recovery Act (RCRA) is a comprehensive body of regulations that give U.S. EPA the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also sets forth a framework for the management of non-hazardous solid wastes.
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.
The Porter-Cologne Water Quality Control Act of 1967, Water Code Sec 13000 et seq.	Requires the State Water Resources Control Board (SWRCB) and the nine RWQCBs to adopt water quality criteria to protect state waters. Those regulations require that the RWQCBs issue Waste Discharge Requirements 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.
California Water Code Section 13050	Defines "waters of the State."

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 Water Code Section 13260	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 23, Division 3, Chapter 30	This chapter requires the submission of analytical test results and other monitoring information electronically over the internet to the SWRCB’s Geotracker database.
State Water Resources Control Board General Permit CAS000002.	The SWRCB regulates storm water discharges associated with construction projects affecting areas greater than or equal to 1 acre to protect state waters. Under General Permit CAS000002, 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.
State Water Resources Control Board 2003-003-DWQ	This general permit applies to the discharge of water to land that has a low threat to water quality. Categories of low threat discharges include piping hydrostatic test water.
California Code of Regulations, Title 22	Title 22, Division 4, Chapter 15 specifies Primary and Secondary Drinking Water Standards in terms of Maximum Contaminant Levels (MCLs). These MCLs include total dissolved solids (TDS) ranging from a recommended level of 500 milligrams per liter (mg/l), an upper level of 1,000 mg/l and a short term level of 1,500 mg/l. Other water quality MCLs are also specified, in addition to MCLS specified for heavy metals and chemical compounds.
California Code of Regulations, Title 23	Title 23, Division 3, Chapter 15 applies to waste discharges to land and requires the Regional Board issue Waste Discharge Requirements specifying conditions for protection of water quality as applicable.
California Water Code Section 6000 to 6004.5 and 6025.5, Division of Safety of Dams	Dams and reservoirs are defined in the California Water Code Sections 6002, 6003, and 6004. Certain exemptions are included in Sections 6004 and 6025. All dams under these definitions are subject to State supervision unless they are owned and operated by the United States and assures that the ponds have been constructed and operated to standards adequate to protect life and property, and provides that the city, county, district, or other agency shall supervise and regulate the design, construction, operation, enlargement, replacement, and removal of the ponds after the effective date of the resolution.
California Code of Regulations, Title 23, Division 2, Chapter 1, Article 303, Water Rights	This Article requires evidence that the developer has appropriate Water Rights before a construction or enlargement application can be approved.

California Water Code Section 10910	SB 610 and SB 221 are companion measures which require specific large development projects provide city and county decision-makers detailed water availability information prior to their consideration for approval. The statute also requires that this information be included in the administrative record that serves as the evidentiary basis for the city's or county's approval action on such projects. Under SB 610 water assessments must be furnished to local governments for inclusion in any environmental documentation for certain projects (as defined in Water Code 10912 [a]) subject to the California Environmental Quality Act. The assessment is required to include an identification of existing water supply entitlements, water rights, or water service contracts relevant to the identified water supply for the proposed project and water received in prior years pursuant to those entitlements, rights, and contracts. The assessment includes discussion of the total projected water supplies available during normal, single dry, and multiple dry water years during a 20-year projection, and whether these supplies meet the projected water demand associated with the proposed project in addition to existing and planned future uses, including residential and non-residential water uses.
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.
Local LORS	
County of San Bernardino General Plan and Development Code	Grading in San Bernardino County is subject to terms and conditions of San Bernardino County's General Plan, Development Code and California Building Code, based upon the 2006 International Building Code. Although the proposed site is located on federal land, county regulations for public health and safety are considered to be applicable to the project. If a county grading permit is required, the grading plan would need to be completed in compliance with San Bernardino County's General Plan and Development Code.
California Safe Drinking Water Act and San Bernardino County Code Title 3, Division 3, Chapter 6, Public Water Supply Systems	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 San Bernardino County to the County. Under the San Bernardino 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.

San Bernardino County Title 3, Division 3, Chapter 6,Article 5, Desert Groundwater Management	To help protect water resources in unregulated portions of the desert while not precluding its use, the County adopted this article. This article requires a permit to locate, construct, operate, or maintain a new groundwater well within the unincorporated, unadjudicated desert region of San Bernardino County. California Environmental Quality Act (CEQA) compliance must be completed prior to issuance of a permit, and groundwater management, mitigation, and monitoring may be required as a condition of the permit. The ordinance states that it does not apply to “groundwater wells located on Federal lands unless otherwise specified by inter-agency agreement.” The BLM and County entered into a Memorandum of understanding (MOU) that provides that the BLM will require conformance with this code for all projects proposing to use groundwater from beneath public lands.
San Bernardino County Development Code Section 82.13.080, Soil Erosion and Sediment Control Plans/Permits	Section 82.13.080 establishes regulations and procedures to control human existing and potential induced accelerated erosion. Elements of this ordinance include project planning, preparation of Soil Erosion and Sediment Control Plans, runoff control, land clearing, and winter operations.
San Bernardino County Municipal Stormwater Permit	The current Permit, Order No. R8-2010-0036 adopted January 29, 2010,, outlines a schedule of monitoring requirements, best management practices, and conditions designed to promote the reduction of pollutants in stormwater discharges.
San Bernardino County Ordinance Code, Title 3, Division 3, Chapter 8, Waste Management, Article 5, Liquid Waste Disposal	This ordinance requires the following compliance for all liquid waste disposal systems: (1) compliance with applicable portions of the Uniform Plumbing Code and the San Bernardino County Department of Environmental Health (DEHS) standards; (2) approval by the DEHS and building authority with jurisdiction over the system; or (3) for alternative systems, approval by the DEHS, the appropriate building official of this jurisdiction, and the appropriate California RWQCB.
San Bernardino County Ordinance Code, Title 6, Division 3, Chapter 3, Uniform Plumbing Code	This ordinance describes the installation and inspection requirements for locating disposal/leach fields and seepage pits.
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 waste discharge requirements 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.
State Water Resources Control Board Res. 2008-0030	Requires sustainable water resources management such as low impact development (LID) and climate change considerations, in all future policies, guidelines, and regulatory actions. 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.”

C.7.4 PROPOSED PROJECT

C.7.4.1 SETTING AND EXISTING CONDITIONS

Proposed Project

The proposed Calico Solar Project site is approximately 6,215 acres of undeveloped land located within the Mojave Desert in the central portion of San Bernardino County. The site is located approximately 37 miles east of Barstow, California with its southern boundary adjacent to Interstate 40 (I-40) (**Soil and Water Figure 1**). Main access to the project is via north-bound Hector Road, which exits I-40, enters the southern project boundary near the center line of the project and travels north for approximately 1 mile, where it crosses the Burlington North Santa Fe (BNSF) railroad. Secondary access to the project is attained adjacent to the Pisgah substation. Access to the Pisgah substation begins on I-40 at the southbound Hector Road off ramp. Southbound Hector Road ends abruptly at the intersection with old Route 66. Taking east-bound Rte 66 approximately 4 3/4 miles, the road turns north, passes beneath I-40 and turns west for approximately 1 mile ending at a northeast heading dirt road that leads to the Pisgah substation, approximately ¼ mile northeast of that intersection.

The proposed project would utilize SunCatchers — 40-foot tall Stirling dish technology developed by the applicant — which track the sun and focus solar energy onto Power Conversion Units (PCU) (SES 2008f 3-2) to generate electricity. Each PCU consists of a solar receiver heat exchanger and a closed-cycle, high-efficiency Solar Stirling Engine specifically designed to convert solar power to rotary power via a thermal conversion process. The engine drives an electrical generator to produce grid-quality electricity.

Phase I would be limited to 275 MW, with the remaining 575 MW as part of Phase II. There would be one laydown area located within the main services complex area occupying approximately 10 acres. In addition, the project may also have within the main services complex a 15 acre construction laydown staging area. In addition to the proposed Calico Solar Project site and construction areas, there are other features and facilities associated with the proposed project (the majority of which are located on the proposed project site or construction laydown area), including:

- Approximately 34,000 SunCatchers and associated equipment and infrastructure within a fenced boundary;
- An onsite, 52 acre main services complex located in the northern portion of the Phase I section of the project site for administration and maintenance activities. The complex would include buildings, parking and access roads (SES 2008f page 3-62 and Figure 3-4). The complex would include three SunCatcher assembly buildings, administrative offices, operations control room, maintenance facilities, parking and access roads and a water treatment complex that would include a water treatment structure, raw water storage tank, demineralized water storage tank, basins and a potable water tank;
- An onsite hydrogen generation system;
- An onsite, 2.8-acre, 850-MW Substation that would deliver the generated electrical power to the existing Pisgah Substation, located generally in the south east corner of the site;
- Twelve to fifteen electrical transmission towers approximately 100 feet high that would be constructed to convey the electricity from the onsite substation to the Pisgah substation;
- Approximately 50 miles of underground 34.5 kV cable;
- Approximately 650 miles of 600V cable;
- Approximately 500 miles of paved and unpaved roads;
- Underground water pipeline;
- Underground hydrogen supply pipelines; and,
- A groundwater well with underground water conveyance piping from the well to the Main Services Complex.

Project, Site, and Vicinity Setting

The proposed project site is located in the central portion of San Bernardino County. The surrounding area consists of undeveloped desert land with small rural communities in the vicinity. The City of Barstow is located approximately 37 miles northwest of the project, the ghost town of Calico is located approximately 25 miles northwest of the project, the town of Bagdad is located approximately 36 miles southeast of the project and the town of Amboy is located approximately 42 miles southeast of the project.

Climate

The Calico Solar Project site is located in the Mojave Desert in southeastern California. The area is classified as a high desert climate characterized by low precipitation, hot summers, mild to cold winters, low humidity and strong temperature inversions. It is separated from the coastal regions by the San Gabriel and San Bernardino mountain ranges to the south and the Tehachapi Mountains to the west. The area’s climatic conditions are strongly influenced by the large scale sinking and warming of air in the semi-permanent subtropical high pressure center over the eastern Pacific Ocean. This sinking air coupled with the site's distance from the ocean and its location in the rain shadow of surrounding mountains severely limits precipitation in the site vicinity.

Temperature and precipitation have been measured at Barstow Daggett Airport since 1948. These data indicate that the hottest month is July with the highest mean annual temperature of 104.2 degrees Fahrenheit (ºF) and lowest mean annual temperature of 73.2 ºF. The coldest month is January with the highest mean annual temperature of 60.6 ºF and lowest mean annual temperature of 35.9 ºF.

Most of the area's precipitation occurs during the winter season, which is largely responsible for the average precipitation of approximately 4 inches. During summer months, rain is scarce, and relative humidity is very low.

The area is often windy, typical of a desert environment. The prevailing wind is from the west or west-southwest, and is generally stronger during summer than winter.

Groundwater

Lavic Valley

The project site lies within the Lavic Valley Groundwater Basin. The basin is approximately 159 square miles in area and is bounded by nonwater-bearing rocks of the Cady Mountains on the north and east, of the Bullion Mountains on the south and east, of the Lava Bed Mountains on the southwest, and by the Pisgah fault on the west. Parts of the eastern and northern boundaries are drainage divides. The southern part of this basin lies within the Twentynine Palms Marine Corps Base.

In the northern part of the basin—including the project site—surface drainage is westward toward the Mojave River. In the southern part of the basin, surface drainage is toward Lavic (dry) Lake (DWR 2004; Rogers 1967).

Groundwater flow at the project site is thought to be to the southeast, but not toward Lavic (dry) Lake which is a surface water playa above the regional water table. Rather, groundwater probably flows eastward into the Broadwell Valley Basin near the (ghost) town of Ludlow (Moyle 1967). This interpretation is consistent with recharge modeling that indicates the largest source of recharge to the Lavic Valley Basin is rainfall infiltration in the Bullion Mountains that border the southern end of the basin (Alan Flint, U.S. Geological Survey, personal communication, 6-10-10). A variety of methods have been used to estimate groundwater recharge to the Lavic Valley. These methods range from simple estimates involving recharge as a percentage of average annual precipitation, to complex relationships between daily precipitation, evapotranspiration, soil moisture, and surface water runoff. A summary of groundwater recharge estimates is provided in **Soil & Water Table 2** below.

Soil & Water Table 2
Summary of Groundwater Recharge Estimates*

Methodology	Author	Recharge Estimate (acre-feet per year)
Unknown	DWR (1975)	300
GIS Recharge Model	USGS (2010)	200–400
Maxey-Eakin	Energy Commission Staff	0

Water from a well in the southern part of the basin near Lavic Lake sampled in 1917 was sodium sulfate in character with total dissolved solids (TDS) content of 1,680 milligrams per liter (mg/L) (DWR 1967; DWR 1954). Water from a well in the northeastern part of the basin sampled in the 1950s was sodium sulfate in character with a TDS content of 1,721mg/L. Water from a well in the northwestern part of the basin near Hector Siding sampled in the 1950s was calcium-sodium bicarbonate in character with a TDS content of 278 mg/L.

The applicant proposes to use groundwater for project construction and operation obtained from Well #3 located on private property adjacent to the project site. Well #3 was drilled in March 2010 and is screened from 552-802 feet and 1,042-1,142 feet below ground surface. The initial depth to water in the completed well was 344 feet. Analytical test results conducted on water samples collected from the well indicate groundwater contains 1,340 mg/L total dissolved solids (TDS).

Hydrology

The project site is in the southwest portion of the Mojave Desert, which is characterized by broad alluvial fans and fluvial terraces, playas, and scattered mountains. There are no perennial streams within the project site or in the area. The site drains towards Troy (dry) Lake in the Mojave Valley, 5 miles west of the site. The nearest major waterway is the Mojave River, an ephemeral stream 15 miles northwest of the site. The project site is situated within the Troy Valley hydrologic subarea, as defined by the Lahontan Region basin plan (California RWQCB 2005). The watershed divide separating the Troy Lake and Lavic Lake drainage areas is near Pisgah, about 2 miles southeast of the project site.

The proposed site occupies a broad alluvial fan/plain with relatively little topographic variation (see **Soil and Water Figure 1**, Site Topography). An alluvial fan is a sedimentary deposit located at a topographic break, such as the base of a mountain front, escarpment, or valley side, that is composed of stream flow and/or debris flow sediments and has the shape of a fan, either fully or partially. The National Flood Insurance Program defines alluvial fan flooding as “flooding occurring on the surface of an alluvial fan or similar landform which originates at the apex and is characterized by high velocity flows; active processes of erosion, sediment transport, and deposition; and, unpredictable flowpaths.” It is the unpredictability of flowpath that is key in the development of a risk assessment for a project located on an alluvial fan.

The overall landform is relatively flat with shallow slopes trending from the north to south and in some areas to the southwest. The ground generally slopes in a northeast-to-southwest direction, ranging from 2 percent to 5 percent across the site, except for the western portion where the slope reduces to 1 percent. There are occasional small hills (buttes) and sand dune areas on the project site. Several drainage patterns occur on the site. These drainage patterns follow the gradient of higher elevations in the mountains north and east of the site towards lower elevations southerly and westerly across the site. The land between I-40 and the BNSF railroad slope to the west, ultimately towards Troy Dry Lake, a playa that is located west of the site. There are no well-defined channels on-site, although some discontinuous flood terraces occur in a few areas on-site. The drainage features on-site are not well-defined channels resulting from active flow but consist of discontinuous floodplains with areas that exhibit a mixed pattern of sheet flow or shallow concentrated flow across isolated, wide areas of land. Relatively undefined drainage features traverse most of the site with evenly distributed desert scrub vegetation throughout.

Surface water flow does not occur on-site in most years. According to the NOAA Atlas 14 internet-based Precipitation Frequency Data Server, the 100-year 24-hour storm event will generate approximately 3.5 inches of rain. When water does flow on-site, it is usually the result of precipitation occurring during 5- to 10-year storm events. These flows are ephemeral and occur only during periods of brief intense rainfall.

In general, drainage in Phase 1 of the project area flows southwest from the Cady Mountains, however, along the south boundary of Phase 1 some flows are diverted by the railroad and flow straight west (see **Soil and Water Figure 2**, Regional Watersheds and **Soil and Water Figure 3**, CDFG Flow Paths). As shown, there is an offsite watershed area of nearly 20 square miles which drains either directly to the Phase 1 project site or drains to the railroad tracks and is partially diverted into the Phase 1 site. The Phase 1 site is nearly 10 square miles, so the total watershed area for Phase 1 is approximately 30 square miles. Several blue line streams pass through the Phase 1 project area. Many of these coalesce into larger washes and all drain to the railroad at the southern boundary of the Phase 1 site. The runoff from the Phase 1 site flows through the existing trestles at the railroad. Some of the trestles may have insufficient capacity to pass 100-year flows and some flow is diverted west along the railroad on the southern boundary of the project site and eventually flows through trestles along the southern boundary of the Phase 1 site. It is assumed that the 100-year flood will generally be conveyed along the railroad and through the trestles along the railroad right of way. This right of way is excavated and maintained by the BNSF Railroad Company to allow the water to pond and flow at low velocities. The right of way is delineated along the north line with a barbed wire fence.

The offsite watershed impacting the Phase 1 site emanates from the Cady Mountains which flank the northeast side of the project area. Field investigation and review of topographic maps suggest that the watershed consists of a series of alluvial fans which coalesce to form a bajada. A bajada is a broad slope of debris, spread along the lower slopes of mountains by descending streams; a bajada is often formed by the coalescing of several alluvial fans. From review of the topographic mapping in the field, it appears that the areas with the highest current risk of active flooding are generally shown on the USGS 7.5 -minute quadrangles. These areas are indicated as blue lines and as shaded wash areas. While these areas are easily identifiable on the mapping, they may be occasionally difficult to identify in the field. Washes are often well incised near the base of the mountains. However, these same washes transition into sheet flow and shallow concentrated flow areas which do not have a well incised channel or a series of small channels which are braided, each of which may carry a fraction of the total flow. Sheet flow is defined as flow of water as broad sheets that are unconfined by channel boundaries. Sheet flow areas appear to be more prevalent at distal locations from the apex of the fan. These locations are primarily within the proposed site development area. Because the sheet flow and braided wash flow may carry a sediment load and follow unpredictable flow paths, development within these areas could be impacted by the storm water.

The watershed affecting the Phase 1 area is located in the Cady Mountains to the north of the project site. Flows that traverse the site emanate from the Cady Mountains watershed, drain through the trestles on the railroad and then continue west through the Phase 2 site. Upstream of the railroad trestles, the railroad embankment has diverted and channelized much of the flow creating numerous ponding areas. The trestles and ponding areas attenuate the peak flow and allow most of the sediment to drop out on the upstream (north or east) side of the railroad embankment. Additional drainage flows south from the Cady Mountains, west of the Phase 1 property limits, is diverted at the railroad tracks and then flows south in the Phase 2 area. In addition to the Cady Mountain watershed, a second watershed is located south of the freeway and includes the Pisgah Crater and lava flow area. Runoff from this watershed generally flows either north or west. It reaches I-40 and then continues north through numerous culverts and bridges into the Phase 2 project area. After flowing through the culverts at the highway, the runoff commingles with the flow from the Cady Mountains and then flows west to the outfall. As with the Cady Mountain watershed, the Pisgah watershed runoff is diverted by the I-40 road embankment and associated dikes and berms and is routed through culverts. Ponding occurs at these culvert locations and this reduces the peak flow and sediment loads which pass through the culverts.

The channels on the project site are regulated by the California Department of Fish and Game under the Section 1600 Lake and Streambed Alteration Agreement program. This program applies to any work undertaken in or near a stream that flows at least intermittently through a bed or channel, including ephemeral streams and desert washes. Storm water flow on the project site are considered “waters of the State” by the Lahontan Regional Water Quality Control Board and are subject to regulation under the Porter-Cologne Water Quality Control Act. As such, manipulation of the “waters” (i.e., area of flow) on the site and installation of project facilities within those areas would constitute “discharge of waste” subject to Waste Discharge Requirements (**Soil and Water Appendices B**, **C** and **D**). It should be noted that concentrated flood flows through the culverts under the railroad and highway may also be potentially regulated under these programs.

A Section 401 Water Quality Certification does not apply, as the U.S. Army Corps of Engineers has determined that no “waters of the U.S.” exist on the project and no federal wetland permitting is required – thereby eliminating the need for certification.

Soil Erosion Potential

Current soil survey data is limited in much of the Mojave Desert due to the lower potential for agricultural use. Detailed soil mapping has not been performed by NRCS for the site. However, soil mapping in the general area is being conducted by NRCS. The results of that mapping effort will not likely be available for a few years.

Available soil data for the project area are derived from the STATSGO soil database (STATSGO 2001) which presents mapping at the association level. The mapped soil associations database contains several soil series within each map unit. Primarily two soil associations would be affected by project construction; the Carrizo-Rositas-Gunsight and the Nickel-Arizo-Bitter associations. The Carrizo-Rositas-Gunsight soil association occupies the majority of the site, while the Nickel-Arizo-Bitter association is present over much of the southern portion of the site, south of the BNSF rail lines. The Rock Outcrop-Lithic Torriorthents-Calvista association is present in the mountains along the northern site perimeter and the Rock Outcrop-Upspring-Sparkhule association is present on the southwest corner of the Project Site, as well as north and northwest of the site.

Soil & Water Table 3
Summary of Soil Characteristics

Soil	Texture	Depth of Surface Layer (Inches)	Land Capability Class[1]	Wind Erodibility Group[2]	Erosion (K) Factor[3]	Natural Drainage Class[4]	Permeability in inches per hour[5]
Carrizo-Rositas-Gunsight	Loamy Fine Sand	9	7S	2	0.15	Somewhat Excessively Drained	6–20
Nickel-Arizo-Bitter	Gravelly Sandy Loam	7	7S	5	0.10	Well Drained	2–6
Rock Outcrop-Lithic Torriorthents-Calvista	Gravelly Loam	8	7E	8	0.20	Excessively Drained	2–6

Notes:
1 - Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat. Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.
2 - Wind erodibility groups range from 1 to 8, with 1 being highly erodible and 8 having low erodibility.
3 - This is an index of erodibility for standard condition and includes susceptibility of soil to erosion and rate of runoff. Low K values (below 0.15) indicate low erosion potential. High K values (above 0.4) are highly erodible. See report text for additional information.
4 - Table presents nonirrigated land capability classification. Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Capability classes range from 1 to 8, with higher numbers indicating progressively greater limitations and narrower choices for use: Class 1 - slight limitations that restrict use; Class 2 - moderate limitations restricting choice of plants, or requiring moderate conservation practices; Class 3 - severe limitations restricting plant choice or requiring conservation; Class 4 - severe limitations, requiring very careful management; Class 5 - subject to little or no erosion, but mainly restricted use to pasture, rangeland, forestland, wildlife habitat; Class 6 - severe limitations, generally unsuitable for cultivation, restrictions per Class 5; Class 7 - severe limitations, unsuitable for cultivation, restrictions per Class 5. Capability subclasses: e - erosion is main hazard unless close-growing plant cover maintained; s - soil limited because shallow, droughty or stony; c - chief limitation is very cold or dry climate. Capability units (after '-') are soil groups within a subclass with similar suitability for crops and pasture plants with similar management requirements and productivity.
5 - Permeability refers to saturated hydraulic conductivity for the surface layer. Permeability rates listed are minimum and maximum expressed in inches/hr.
Source: Except as otherwise indicated, table source is SES 2008a Section 5.4.

Carrizo soils are formed in alluvium present primarily on flood plains, alluvial fans, fan piedmonts, and bolson floors, with slopes up to 15 percent. These soils are typically very deep gravelly sand. The upper 2 inches is extremely gravelly sand with about 65 percent gravel. Below the upper 2 inches, the material contains coarse sand and averages 70 percent gravel and coarser materials, with a clay content less than 8 percent. The soils are excessively drained with negligible or very low runoff and rapid or very rapid permeability.

Rositas soils are formed in sandy aeolian material on dunes and sand sheets, with slopes up to 30 percent. These soils are typically fine sand with up to 5 percent gravel and up to 10 percent clay. Rositas soils are very deep and somewhat excessively drained, with negligible or low runoff and rapid permeability.

The Gunsight series is comprised of very deep calcareous alluvial soils on fan or stream terraces with slopes up to 60 percent. The soils are very gravelly loam, with gravel content ranging from 40 percent to 75 percent gravel and an average of less than 18 percent clay. The soils are somewhat excessively drained with very low to high runoff and moderate or moderately rapid permeability.

Nickel soils are derived in alluvium from mixed rock sources and are present on fan remnants with slopes up to 35 percent. The soils are very gravelly loam, with gravel content ranging from 25 percent to 75 percent, generally increasing with depth and typically less than 15 percent clay. The A horizon contains approximately 20 percent gravel and cobbles and is classified as gravelly very fine sandy loam. The soils are very deep, well drained with very low to medium runoff and moderate permeability. Nickel soils are commonly associated with Arizo and Bitter soils.

Arizo soils are also formed in mixed alluvium and are present on recent alluvial fans, inset fans, fan apron, fan skirts, stream terraces, and in intermittent stream and channel floodplains. The material is typically very gravelly fine sand with 35 percent to 80 percent gravel and cobbles, increasing with depth. The A horizon is very gravelly fine sand with 35 percent pebbles. The soils are very deep, excessively drained, with negligible to medium runoff and rapid to very rapid permeability.

Similar to Arizo and Nickel soils, Bitter soils are formed in mixed alluvium. They are present on dissected old fans between lower recent fans and the toes of steep slopes generally ranging from 2 percent to 15 percent. The material is extremely gravelly sandy loam with 45 percent to 75 percent pebbles and cobbles. The upper horizons are composed of extremely to very gravelly sandy loam with 50 percent pebbles and cobbles. Bitter soils are well drained with medium runoff and moderately slow permeability.

The rock outcrop classification is typically observed on mountainsides, ridges, and rugged hills. It can be composed of many rock types, typically granite, quartz monzonite, basalt, dacite, limestone, quartz, mica, schist, and fanglomerate.

Lithic torriorthents (shallow rocky soils) are present between rock outcrop areas, in small depressions and on relatively stable hillsides. Slopes typically range from 15 percent to 50 percent. The soil varies from sandy loam to very gravelly sand. They form in material weathered from granitic rock, with hard, fractured rock present at a depth of 1 to 18 inches. These soils are very shallow and shallow, well drained, with medium to rapid runoff and a high water erosion hazard.

The Calvista series consists of sandy loam formed from granitic rock with seams of calcite. It is typically present on slopes of 2 percent to 30 percent and mountain ridges, buttes and domes in Southern California deserts. Hard rock is generally present at a depth of 14 to 20 inches, although rock outcrops may be present. The gravel content is typically less than 35 percent. Calvista soils are shallow and well drained soils, with medium to rapid runoff and moderately rapid permeability.

Project Water Supply

Groundwater is the primary water source available in the site vicinity. Groundwater occurrence and quality varies significantly within the Mojave Desert. To evaluate project area groundwater resource characteristics, the applicant conducted field explorations on private land adjacent to the project site. The applicant initially found that drilling was difficult, groundwater was not abundant and what groundwater that was encountered was of relatively poor quality (high TDS). The applicant continued with the exploration on the private property and discovered a water bearing zone beneath the site that produced a volume and rate that is sufficient to supply both construction and operation water. The well boring was drilled in March 2010 to a depth of 1,147 feet below ground surface. Aquifer testing indicated the well is capable of producing at least 100 gpm over a 24-hour period without incurring excessive drawdown.

Analytical test results conducted on water samples collected from the well indicate groundwater contains a TDS concentration of 1,340 mg/L which exceeds secondary drinking water standards (1,000 mg/L TDS). In May 2010, the applicant determined that the newly constructed well will provide all water needs for the project.

Potable Water

The applicant proposes to use treated groundwater for potable needs. The groundwater will first be demineralized, then stored in a designated storage facility equipped with chemical dosage for disinfection. This treated potable water will be available at the Main Services Complex.

Construction Water

Water demands during construction of the project will be relatively light for an effort as large as that proposed. Vertical foundation elements (hollow metal pipes) for the SunCatchers will be inserted into the subsurface using track driven vibratory equipment. The vibratory insertion method eliminates conventional drilling techniques that would generate cuttings that typically require dust suppression for stockpiling, transferring, trucking and disposal of the cuttings. The track mounted equipment will also reduce ground disturbance (rutting) by spreading the load over a larger surface area.

Site construction will be accomplished in two phases, Phase 1 and Phase 2. Phase 1 construction will take place during the first 26-month period, consisting of construction of the primary access routes, the construction laydown areas, the rough grading for the Main Services Complex and the substation sites, as well as the clearing areas disturbed by the construction of each solar group. The total water use for the first 26 months of construction is estimated to be 92,107,331 gallons or approximately 282.67 AF.

Phase 2 will take place during construction months 32 through 60. Phase 2 will mostly involve construction of additional access roads and continued solar field development. The total water use during Phase 2 construction (months 32 through 60) is estimated to be 103,421,405 gallons or approximately 317.39 AF.

The applicant estimates that during the 60 months of project construction, the water demand for combined construction and dust suppression would be approximately 600 AF (**Soil & Water Table 4**). During this 60-month construction period, water use is expected to vary from approximately 3.108 million gallons (9.54 AF) per month (month 18), to 4.046 million gallons (12.42 AF) per month (after the 34th month).

Soil & Water Table 4
Construction Water Use

Month of Construction	Estimated Volume of Water Required: Millions of Gallons	Estimated Volume of Water Required: Acre Feet
1	3,278,200	10.06
2	3,278,200	10.06
3	3,369,775	10.34
4	3,811,595	11.70
5	3,915,144	12.02
6	3,915,144	12.02
7	3,823,569	11.73
8	3,823,569	11.73
9	3,823,569	11.73
10	3,823,569	11.73
11	3,823,569	11.73
12	3,823,569	11.73
1st year total	44,509,472	136.59
13	3,823,569	11.73
14	3,549,820	10.89
15	3,549,820	10.89
16	3,549,820	10.89
17	3,549,820	10.89
18	3,108,000	9.54
19	3,108,000	9.54
20	3,108,000	9.54
21	3,108,000	9.54
22	3,108,000	9.54
23	3,359,073	10.31
24	3,359,075	10.31
2nd year total	40,280,997	123.62
25	3,400,702	10.44
26	3,916,160	12.02
27	0	0.00
28	0	0.00
29	0	0.00
30	0	0.00
31	0	0.00
32	0	0.00
33	4,045,919	12.42
34	4,045,921	12.42
35	4,004,928	12.29
36	4,004,300	12.29
3rd year total	23,417,930	71.87

37	4,004,302	12.29
38	4,004,304	12.29
39	4,004,306	12.29
40	4,004,307	12.29
41	4,004,309	12.29
42	4,004,311	12.29
43	3,753,242	11.52
44	3,753,243	11.52
45	3,75,3245	11.52
46	3,753,247	11.52
47	3,753,249	11.52
48	3,623,493	11.12
4th year total	46,415,558	142.44
49	3,623,495	11.12
50	3,623,497	11.12
51	3,623,499	11.12
52	3,623,501	11.12
53	3,623,503	11.12
54	3,623,504	11.12
55	3,623,506	11.12
56	3,108,052	9.54
57	3,108,054	9.54
58	3,108,056	9.54
59	3,108,056	9.54
60	3,108,056	9.54
5th year total	40,904,779	125.53
Construction Total	195,528,736	600.06

Source: SES 2010

Water trucks will be used throughout the duration of the construction phase for the project. Truck filling stations will be located at the Main Services Complex and at various temporary truck filling stations throughout the project site.

Operations Water

Due to the technology proposed for this project (Stirling engines), water use during electric generation will be minimal. The applicant considers site groundwater as “raw” water that will require treatment to remove dissolved solids for SunCatcher mirror wash water applications and additional treatment to meet drinking water quality standards. Water treatment processes identified by the applicant for demineralization are Reverse Osmosis (RO) and ion exchange. Potable water consumption, groundwater treatment, and SunCatcher mirror washing under regular monthly maintenance routines (average) will require approximately 15.6 gpm of water per day. A maximum requirement of approximately 41 gpm of water per day will be needed during the months when each SunCatcher receives a scrub wash.

Water consumption during operation will be limited to mirror washing (10.3 AFY), water treatment (5.2 AFY), potable use (2.2 AFY), and dust control (2.5 AFY). Additionally, water will be used to generate hydrogen used in the SunCatcher engines. The applicant estimates that 205 gallons per day (0.23 AFY) of water will be required to produce a sufficient volume of hydrogen for power plant use. The applicant estimates that the total maximum consumptive use of groundwater for operation of the power plant will be approximately 20.4 AFY (see **Soil & Water Table 5**, below).

Soil & Water Table 5
Operations Water Usage Rates

Water Use	Daily Average (gallons per minute)	Daily Maximum (gallons per minute)	Annual Usage (acre-feet)
Equipment Water Requirements			
SunCatcher Mirror Washing	9.3	25.0	10.3
Water Treatment System Discharge			
Brine to Evaporation Ponds	4.7	14.1	5.2
Potable Water Use			
For drinking and sanitary water requirements	1.6	1.9	2.2
Soil Stabilizer			
Groundwater mixed with SoilTac for dust control	1.5	28.6	2.5
Hydrogen Generation			
Electrolysis water requirements	0.1	0.2	0.2
Totals	**17.3**	**69.8**	**20.4**

Notes:
1 - Based on washing 80 percent of the SunCatcher dishes (27,177 dishes) each month with an average of 10.3 gallons of demineralized water per wash and 21 work days per month.
2 - Assumes one 500 gallon water tanker is filled in 20 minutes.
3 - Based on all 34,000 SunCatchers experiencing 9.6 washes per year.
4 - Based on the maximum amount of demineralized water required for mirror washing and assumes a decrease in raw water quality requiring an additional 20 percent of system discharge.
5 - Assumes 17 gallons per person per day for 136 people.
6 - Maximum amount assumes a 20 percent contingency over the Daily Average.
7 - Assumes a six-day work week and average daily usage.
8 - Based on filling a 2,000 gallon tanker truck 6/7 full of water over 1 hour.
9 - Assumes 6:1 mix of water to SoilTac applied to 1,245 acres of road every two years.
10 - Assumes 195 standard cubic feet (scf) of hydrogen generated per year per dish.

Source: SES 2010

Wastewater

Sanitary

Initially, control of sanitary waste will be accomplished using portable chemical toilets. No public or private entities manage sanitary wastewater in the vicinity of the project site. Therefore, construction of a permanent onsite wastewater disposal system consisting of a septic tank and leach field will be completed to handle sanitary wastewater. According to the applicant, a facility of this type will be designed to meet the requirements of the Lahontan RWQCB and the San Bernardino County Public Health Department, and will meet operation and maintenance guidelines required by the California Department of Public Health.

Construction Wastewater

Improper handling or containment of construction wastewater could cause a broad dispersion of contaminants to soil or groundwater. Discharge of any non-hazardous construction-generated wastewater would require compliance with discharge regulations. Sources of wastewater would include equipment wash water and piping and vessel hydrostatic test water. Equipment wash water would be transported to an appropriate treatment facility. Hydrostatic test water would be reused to the extent possible and, pending analytical results of the water, would be discharged to land or trucked offsite to an appropriate treatment and disposal facility.

Process Wastewater

Extracted groundwater will require treatment to remove dissolved solids for SunCatcher mirror wash water applications and additional treatment will be required to meet current drinking water quality standards. The water will be demineralized to prevent mineral deposits forming on the SunCatcher mirrors. Treatment processes proposed to remove TDS include reverse osmosis (RO) and ion exchange. The wastewater generated by the RO unit will contain relatively high concentrations of TDS. The applicant proposes to discharge the high TDS wastewater into two double-lined evaporation ponds. Each pond will be designed to contain 1-year of discharge flow, estimated to total 3 million gallons. Discharge to the ponds will alternate on an annual basis, allowing one pond to undergo evaporation while the other receives the effluent. Treating the groundwater using demineralization equipment to attain a concentration suitable for mirror washing will create a waste water stream that will contain four to five times as much TDS as the source water, or approximately 5,500-7,000 mg/L. (Draft Report of Waste Discharge 6-25-2010)

C.7.4.2 ASSESSMENT OF DIRECT AND INDIRECT IMPACTS AND DISCUSSION OF MITIGATION

The direct and indirect impact and mitigation discussion presented below is divided into a discussion of impacts related to construction and a discussion of impacts related to operation. For each potential impact evaluation, staff describes the potential effect and applies 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. In the absence of an applicant-proposed mitigation or if mitigation proposed by the applicant is inadequate, staff recommends its own mitigation measures. Staff also recommends specific conditions of certification to assure that the mitigation measures are implemented.

Construction Impacts and Mitigation

The project will be developed in two phases. Construction of Phase 1 is expected to take 26 months to complete and Phase 2 is expected to take 28 months. Construction will, therefore, occur over three or four winter seasons. Construction of the proposed project would include soil excavation, grading, installation of utility connections, installation of finned pole SunCatcher foundations, road building, paving, erection of structures and the use of groundwater. The amount of temporary construction and permanent disturbance generated by these activities is shown in **Soil & Water Table 6**. Groundwater use would primarily be for dust suppression, hydrostatic testing of the project's pressure vessels, moisture conditioning compacted soil and mixing concrete. Potential impacts to soils related to increased erosion or release of hazardous materials are possible during construction. Potential storm water impacts could result in an increase in flooding and sedimentation downstream if there is an increase in runoff flow rates and volume discharges from the site. Water quality could be impacted by discharge of hazardous materials released during construction. Project water demand could decrease the quantity of groundwater available. Potential construction-related impacts to soil, storm water, and water quality or quantity, including the applicant's proposed mitigation measures and staff's proposed mitigation measures, are discussed below.

Soil & Water Table 6
Estimated Disturbed Area Summary

Project Component Item	Area		Proposed Length	Comments
	Construction Disturbance	Operations Permanent Disturbance		
Off-Site Development				
Off-site access road	4.5 acres	3.6 acres	3 miles	30-foot width for roadway and drainage from I-40
Off-site transmission line	3 acres	Included below	0.25 miles	50 feet each side of center
Tower structures	Included above	1 acre		35 to 45 towers x 1,024 SF per tower
Waterline and pumping station	2.0 acres	1 acre	3,500 feet	9.5 feet each side of center
Off-site electrical and communication overhead service	0.3 acres	Included below	539 feet	12 feet each side of center
Poles	Included above	26 square feet		2 poles x 13 square feet per pole
Subtotal	**9.8 acres**	**6.6 acres**		
On-Site Balance-of-Plant Development				
Construction staging and construction administration area	15 acres	N/A		
Site boundary fence line	36 acres	21.5 acres	38 miles	10-foot width construction access; 3 feet each side of the fence
Site Unpaved access roadways	36.4 acres	36.4 acres	10 miles	30-foot width for roadway and drainage
Unpaved perimeter roadways	78.7 acres	78.7 acres	29.5 miles	22 feet wide
Main Services Complex, Parking and Services	17 acres	17 acres		

Project Component Item	Area		Proposed Length	Comments
	Construction Disturbance	Operations Permanent Disturbance		
Subtotal	**183.1 acres**	**153.6 acres**		
On-Site Wet and Dry Utilities Access				
Water pipeline	7.3 acres	N/A	3 miles	
On-site electrical and communications overhead service	7.3 acres	N/A	3 miles	10 feet each side of center
Calico Solar Substation	5.2 acres	N/A		650 feet by 350 feet
On-site transmission line	45 acres	N/A	3.8 miles	50 feet each side of center
Transmission access road	Included above	0.9 to 1.4 acres		50 feet each side of center
Transmission tower structures	Included above	0.9 to 1.4 acres		40 to 60 towers at 1,024 SF per tower
34.5 kV overhead runs to Calico Solar Substation	4.0 acres	N/A		10.95 miles by 12 feet wide with a significant portion overlapping other construction disturbed areas (75 percent)
Poles	Included above	26 square feet		
34.5 kV runs to overhead lines	5.3 acres	N/A		
Subtotal	**74.1 acres**	**.25 acres**		
Solar Field Development = 567 by 1.5MW Solar Groups				
SunCatcher drainage swale	584 acres	584 acres		40 feet wide by 56 feet long per 2 SunCatchers
SunCatcher foundation	2.5 acres	2.5 acres	12 to15 ft	2-ft diameter post
SunCatcher pad clearing	110 acres	110 acres		12 feet wide by 12 feet long cleared pad area for each SunCatcher, excluding foundation area
North-south access routes	419 acres	319 acres	182 miles	
East-west access routes	230 acres	230 acres	111 miles	
North-south SunCatcher access routes	400 acres	400 acres		
East-west SunCatcher access routes	1,698.5 acres	1,698.5 acres		
Debris basins for on-site flows	504 acres	505 acres		Located throughout the site

Project Component Item	Area		Proposed Length	Comments
	Construction Disturbance	**Operations Permanent Disturbance**		
Subtotal	**3,949 acres**	**3,949 acres**		
Electrical Collection System				
600 V underground	50 acres	N/A		Cable disturbance based on north-south cables outside of roadways cable trench based on 2foot each side of center of cable, excluding previously accounted disturbance
1750 kVA transformers, junction boxes, and underground hydrogen lines (if centralized system is used)	50 acres	50 acres		
34.5 kV underground	35 acres	N/A		
Subtotal	**135 acres**	**50 acres**		
Total Area	**4,351 acres**	**4,159.45 acres**		Includes 10% contingency

Source: SES 2010

Soil Erosion Potential by Water and Wind

Construction activities can lead to adverse impacts to soil resources including increased soil erosion, soil compaction, loss of soil productivity, and disturbance of soils crucial for supporting vegetation and ephemeral water dependant habitats. Activities that expose and disturb the soil leave soil particles vulnerable to detachment by wind and water. Soil erosion results in the loss of topsoil and increased sediment deposition downstream.

The magnitude, extent, and duration of those impacts depends on several factors, including the exposure of the soils to water and wind, the soil types 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 can result in accelerated onsite erosion. In addition, high winds during grading and excavation activities can result in 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, protect downstream properties and resources, and protect air quality.

Staff evaluated the potential impacts to soil resources, including the effects of construction activities that could result in erosion and downstream transportation of soils and the potential contamination of soils and groundwater. 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 program-approved Best Management Practices (BMPs) to prevent erosion or contamination is sufficient to ensure that these impacts would be less than significant. In addition, soils would be protected by the development and implementation of grading plans and a Drainage, Erosion and Sedimentation Control

Plan (DESCP). The DESCP provides the plan for the use of BMPs to mitigate erosion and sedimentation impacts caused by site grading.

Although the measures discussed above are generally effective on most projects, staff believes that the circumstances of the proposed project are unusual and require additional mitigation. Specifically, this is a very large project that will be constructed on active alluvial fans, which dramatically increases the potential for soil erosion.

The project site will be developed utilizing the existing land features without undergoing major grading operations. Off-site flow will be intercepted prior to entering the project site using large flood control basins located at the toe of most mountainous drainages near the northern project boundary (**Soil and Water Figure 4**). These flood control basins are intended to retain storm water discharge and associated debris resulting from a 100-year storm. In addition to intercepting debris from the mountains, the proposed flood control basins are also intended to provide for peak runoff attenuation of the surface flows. The design attempts to protect the project site from flooding, sediment deposition, and scour.

The SunCatchers will be constructed in parallel rows, with access roads built on alternating rows. To minimize erosion and enhance storm water infiltration, rows where roads are not constructed will retain native vegetation. To minimize shading on SunCatchers and prevent potential brush fire hazards, the vegetation will be trimmed. Brush trimming will consist of cutting the top of the existing brush while leaving the existing native plant root system in place, thereby minimizing soil erosion. After brush has been trimmed, blading for roadways and foundations will be conducted between alternating rows to provide access to individual SunCatchers. Blading will consist of limited removal of terrain undulations to maintain a 10 percent maximum slope grade.

Localized rises or depressions within the individual 1.5 MW solar groups will be removed to provide for proper alignment and operation of the individual SunCatchers. Ground disturbance will be minimized wherever possible. The blading operations will generally keep native soils within 100 feet of the pre-development location, with no hauling of soils across the site. To minimize site disturbance, the construction for unpaved north-south access routes will be located along the center of a 144-foot area along every other north-south column of SunCatchers. To protect the bladed areas from surface erosion, drainage swales will be constructed to intercept and convey the surface low-flows from undisturbed natural areas to on-site debris basins. Paved roadways will be constructed as close to the existing topography as possible, with limited cut-and-fill operations to maintain roadway design grade of less than 10 percent.

Grading operations will also be required for laydown areas, building foundations and pads and parking areas in the Main Services Complex, Satellite Services Complex, and substation areas. The clearing, blading, and grading operations will be undertaken using standard contractor heavy equipment. The equipment will consist of motor graders, bulldozers, elevating scrapers, hydraulic excavators, rubber tire loaders, compacting rollers, and dump trucks.

The project site layout will maintain the local pre-development drainage patterns where feasible, and water discharge from the project site will remain at the western boundary.

The paved roadways will have Arizona Crossings (roadway dips) or low-flow culverts consisting of a small-diameter storm drain with a perforated stem pipe, as needed to cross the minor or major channels/swales. It is expected that storm water runoff will flow over the crown of the paved roadways, which are typically less than 6 inches from swale flow line to crown at centerline of roadway, thus maintaining existing local drainage patterns during storms. No crown is anticipated if polymeric stabilizers are used, further reducing drainage conveyance impacts. Where needed, unpaved roads will utilize low-flow culverts under solar field access routes. On-site debris basins will be added throughout the project site for low-flow surface runoff detention in lieu of culverts. The design of the drainage facilities will be based on BMPs to minimize soil erosion and sediment deposition.

Localized channel grading is proposed to take place on a limited basis to improve channel hydraulics in the vicinity of BNSF railway right-of-way to control the surface runoff. In addition, the Main Services Complex will be protected from a 100-year flood by berms and/or channels that will direct the flow around the perimeter of the building site.

The proposed arterial roadway section between the Main Services Complex and I-40 will be a designated evacuation route. As such, the driving surface will be constructed at an elevation above the projected profile of a 25-year storm event. In addition, project design will ensure that overflow resulting from storm events will be limited to a depth not to exceed 7 inches.

Staff anticipates that roadway maintenance will be required after rainfall events. For minor storm events, staff expects that the unpaved roadway sections may need to be bladed to remove soil deposition, along with sediment removal from on-site debris basins and stem pipe risers at the culvert locations. For major storm events, in addition to the aforementioned maintenance, roadway repairs may be required due to possible damage to pavement where the roadways cross the channels and where the flows exceed the culvert capacity. Soft bottom storm water detention basins will be constructed to mitigate the increase in runoff from the proposed building sites. Rainfall from paved areas and building roofs will be collected and directed to the storm water detention basins. The storm water detention basins will be sized to hold the entire volume from the proposed building sites resulting from a 24-hour, 100-year storm. The detention basins will be designed so that the retained flows will empty within 72 hours after the storm to provide mosquito abatement. This design can be accomplished by draining, evaporation, infiltration, or a combination thereof. Staff believes that the post-development flow rates released from the project site will be less than the pre-development flow rates. Except for the building sites, the majority of the project site will remain pervious, as only a negligible portion of the site will be affected by pavement and SunCatchers foundations.

Site drainage during construction will follow predevelopment flow patterns, with ultimate discharge to the BNSF ROW and ultimately at the westernmost property boundary. On-site debris basins and/or low-flow culverts consisting of a small-diameter storm drain will be installed for sediment control and to provide for storm peak attenuation. BMPs for erosion and sediment control will be used in combination with on-site debris basins for roadway crossing of major washes. In the Main Services Complex, the storm water will be directed to a detention basin, where the site runoff will infiltrate and/or evaporate. The detention basin will be sized to meet the San Bernardino County construction regulations.

The temporary erosion and sedimentation control measures to be used during construction will be designed to prevent sediment from being displaced and carried off-site by storm water runoff. Before beginning excavation activities, on-site debris basins, silt fence, straw bales, or other BMPs will be constructed/installed along the perimeter of the Project, where minor runoff to off-site areas could occur. On-site debris basins will be constructed for the major site runoff discharge and will also provide for low flow detention. The silt fences will filter sediments from construction runoff. Berms with culverts will be used at road crossings and other locations as needed to pass flows. During construction, the extent of earth disturbances will be minimized as much as is practical. A sediment trap will be constructed for the major site runoff discharge. The sediment trap will be located immediately upstream of the downstream property boundary.

Diversion swales with berms will be constructed to divert runoff from off-site areas and on-site undisturbed areas around the construction site. Temporary BMP control measures will be maintained during the rainy season throughout the construction period.

Proposed erosion and sedimentation control measures include, but are not limited to: scheduling installation of BMPs to precede or coincide with construction activities; on-site debris and detention basins; preserving the existing vegetation to the extent possible; wetting or using soil binders or weighting agents in active construction and laydown areas; controlling speed on unpaved surfaces; placing gravel in entrance ways; and placement of straw bales, silt fences, and earthen berms. Staff recommends the development and implementation of a DESCP in accordance with Condition of Certification **SOIL&WATER-1** to ensure potential erosion and loss of soil is mitigated. In addition, Condition of Certification **SOIL&WATER-2** would require the project owner to develop and implement a construction Storm Water Pollution Prevention Plan (SWPPP) and comply with the dredge and fill requirements developed by the Lahontan RWQCB. The vast majority of the Project grading and excavation will occur on the Project site. Known onsite soil types that will be affected by Project grading and excavations are listed in Section C.7.4.6. The wind erosion hazard is low to high. During construction, the area within the plant site fence line (6,215 acres) will be disturbed.

During construction, the surface of the disturbed areas will be devoid of vegetation and there will be the highest potential for erosion, as well as associated effects including soil loss and increased sediment yields downstream from disturbed areas. With the implementation of BMPs contained in the SWPPP and DESCP, such as straw bales, silt fences, and limiting exposed areas, the impacts of soil erosion during construction should be less than significant. Site grading will be balanced on site; there will be no import or export of fill material. The Project is not located on farmland or in areas where agricultural protection legislation is applicable; therefore, there will be no impacts to agricultural soils at the Project site.

Due to the project's large scale, numerous physical variables exist that could affect the soil resources within the site boundaries. These variables are associated with various site conditions (erodibility) and potential environmental considerations (precipitation). In order to address possible outcomes given the various site conditions and possible environmental factors, the applicant has carried out mathematical calculations and probabilistic modeling to estimate anticipated potential impacts. While modeling and calculations can be used in an attempt to estimate future effects from a variety of environmental considerations, and they 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 has proposed conditions of certification **SOIL& WATER-1**, **-2**, and **-3** that would mitigate these potential impacts.

Water Supply and Use

Staff evaluated the potential of the water use and wastewater disposal at the project site to cause a substantial depletion or degradation of groundwater resources. Staff considered compliance with the LORS and policies presented in **Soil & Water Table 1** and whether there would be a significant California Environmental Quality Act (CEQA) impact.

The water required for construction will be obtained from a well located on private property adjacent to the project site (**Soil and Water Figure 5**). The groundwater pumped from the well will be conveyed through an underground pipe to a groundwater storage tank located at the Water Treatment Facility within the Main Services Complex.

Construction water use, summarized in **Soil & Water Table 4**, will have an annual average of approximately 155,000 gallons per day, or approximately 120 AFY. The total water use for complete project construction is estimated to be approximately 600 AF.

Two types of waste water would be produced at the site. Sanitary waste water from domestic use would be disposed of by a septic system and leach field. During project operation, reject brine from a reverse osmosis demineralization facility would be discharged to on-site evaporation ponds.

Potential impacts of these facilities on groundwater were grouped into impacts on groundwater quantity and quality as shown below and discussed in the subsequent sections:

- Impacts on groundwater quantity
    - Potential long-term depletion of groundwater in the Lavic Valley Basin and possibly adjoining basins
    - Potential decrease in yield in nearby wells due to water level drawdown (well interference) near the project supply well
    - Potential impacts to protected species or habitats due to water level drawdown caused by the project supply well
- Impacts on groundwater quality
    - Contamination from materials and activities at the project site
    - Changes in the movement of saline groundwater caused by project pumping

<u>Potential Project Impacts to Groundwater Quantity</u>

Staff considered the potential impacts of the project's proposed groundwater use on the basin water budget and groundwater levels. Staff estimated the volumetric water budget ("Basin Balance") using information from the literature and provided by the project applicant. Staff employed standard well hydraulic equations to estimate project pumping effects on groundwater levels (i.e., drawdown and well interference due to pumping).

Basin Balance

Appendix G of the CEQA *Guidelines* (CCR 2006) considers the impact of a project to be significant if it would "substantially deplete groundwater supplies or interfere substantially with groundwater recharge" such that it causes overdraft or impairs the ability of other basin users to support their existing activities. In this discussion, other basin users include well operators and habitat areas that are dependent on shallow or discharging groundwater. Because of the arid climate, the sustainable yield of desert basins is often quite small, even in large basins. The project site is located at the northwest end of the Lavic Valley Basin, as defined in California Department of Water Resources' Bulletin 118 (DWR 2003). The western end of the project site is less than 0.5 mile from the boundary of the Lower Mojave Basin. Potential impacts of the project on the water balance in both basins are discussed below.

Lavic Valley Basin

The 149-square-mile Lavic Valley Basin is bounded on the north by the Cady Mountains, on the south and southeast by the Bullion Mountains and on the southwest by the Lava Bed Mountains. The Pisgah Fault has historically been assumed to bound the northwest end of the basin, separating it from the Lower Mojave Basin. Alluvial basin deposits connect the Lavic Valley basin with the Broadwell basin to the east, near Ludlow. The Broadwell Basin is similarly connected to the Soda Lake Basin to the north and the Bristol Lake Basin to the south. These basins are shown in **Soil and Water Figure 6**.

The Lavic Valley Basin is entirely undeveloped, except for U.S. Route 40 and the Burlington Northern Santa Fe railroad tracks that cut across it. There are no active wells known to be operating in the basin, and no springs are shown on maps. Although the Lavic Valley Basin contains a playa (Lavic [dry] Lake), it is not a discharge playa, which means it is formed by ponding of surface water runoff only and is not a location where groundwater discharges by evaporation (Moyle 1967). Water levels in several wells near the lake bed prior to 1970 were approximately 50 feet below the lake bed elevation. This is too deep to support phreatophytic vegetation.

The water balance of the Lavic Valley Basin can be estimated by tabulating all of the sources of recharge (inflow) and discharge (outflow). Recharge to the groundwater basin derives almost entirely from rain falling on the surrounding mountains that enters the basin as "mountain front recharge." Mountain front recharge includes percolation from ephemeral streams that infrequently flow across the basin floor as well as subsurface flow from fractured bedrock in the mountains into the alluvial basin deposits.

A widely-used method for estimating sustainable groundwater yield in the Basin and Range Province — especially Nevada — is the Maxey-Eakin method. This empirical method relates recharge (as a percentage of rainfall) to average annual rainfall, which varies primarily with elevation (Maxey and Eakin 1947). However, the method is poorly suited for conditions in the Lavic Valley Basin and adjacent mountains, which are much drier than the region used to develop the Maxey-Eakin method. In fact, the Maxey-Eakin method would predict zero recharge in the Lavic Valley basin because even at the mountain summits precipitation is less than the minimum threshold of 8 inches per year assumed to be required to initiate recharge.

DWR (1975) estimated 300 AFY of recharge in the basin (see **Soil & Water Table 2**) but they did not report the methodology they employed to derive this value. Substantial progress has been made in the past 35 years to improve scientific understanding of physical recharge processes in arid environments and to develop modeling tools to extrapolate those physical relationships over large areas (Hogan and others 2004). USGS researchers have developed methods utilizing a finely-discretized GIS recharge model of the southwest desert region (Flint and others 2004). Based on this methodology, Flint estimated average annual recharge in the Lavic Valley Basin probably ranges from 200-400 AFY, depending on the degree of bedrock fracturing in the mountain blocks (Alan Flint, U.S. Geological Survey, personal communication 6-9-10). The upper end of the recharge range is considered more likely. The model estimated that no recharge occurred on the basin floor (outside of ephemeral stream channels), and that the Bullion Mountains at the southern end of the basin generated considerably more recharge than the Cady or Lava Bed Mountains.

The project would not interfere with the quantity of groundwater recharge because percolation on the valley floor is essentially zero in desert basins (Hogan and others 2004). Ephemeral runoff from the Cady Mountains would be redirected upon reaching the site, and under large runoff events temporarily ponded upslope of the site, but runoff is not eliminated and runoff from the site ponds downslope under current conditions. Therefore, the opportunity for percolation of runoff would remain essentially unchanged.

The only outflow from the Lavic Valley Basin is subsurface outflow to adjacent basins. There are no reported active wells, springs, phreatophytic vegetation or discharging playas to consume groundwater within the basin. Previous investigators surmised that groundwater outflow was to the east into the Broadwell Valley Basin (near Ludlow) and from there southeast to the Bristol Lake Basin (Moyle 1967). Bristol Lake is the nearest downgradient discharging playa, where groundwater intersects the ground surface and is lost to evaporation. Wells in the Broadwell and Bristol Valley Basins are nearly as scarce as in the Lavic Basin. There is no irrigation in the 144-square-mile Broadwell Valley Basin, and Ludlow is now a ghost town. At 778 square miles, the Bristol Lake Basin is more than twice as large as the Lavic Valley and Broadwell Valley Basins combined. Current groundwater use within the Bristol Lake Basin consists of domestic use at a few residences near the salt mining works at Bristol Lake and irrigation of approximately 915 acres of orchard near Fenner Gap east of Bristol Lake. Thus, the final destination of groundwater recharge at the project site appears to be Bristol Lake, which is 50 miles away to the southeast. Groundwater pumping in the Bristol Lake Basin has been estimated to equal 5,020 AFY (MWD 1999). This estimate may not include accelerated evaporation of saline groundwater in trenches at the lakebed for salt harvesting, which is probably the largest consumptive use of groundwater. Although the estimate of groundwater pumping exceeds a separate estimate of basin yield (2,100

AFY; DWR 2003), water levels in that basin were reportedly stable during 1983-1998 (MWD 1999). Stable water levels indicate pumping is approximately equal to recharge, which suggests that recharge in the Bristol Lake Basin may be closer to 5,000 AFY than 2,100 AFY.

The groundwater system that would be primarily impacted by groundwater use at the project site is the combined Lavic-Broadwell-Bristol Lake groundwater region, which occupies 1,081 square miles. The amount of groundwater withdrawn during five years of project construction (total volume 600 AF, or about 120 AFY) and 40 years of project operation (total volume of 816 AF, or 20.4 AFY), averaging about 31 AFY over the 45-year life of the project, would likely be imperceptible by the time it reached the nearest user or discharge boundary in the vicinity of Bristol Lake.

In summary, water use for construction of the Calico Solar Project would have a less than significant impact on the groundwater balance and the availability of groundwater to other basin users. The average annual water use during construction (150 AFY) is 38-75 percent of the estimated recharge to the Lavic Valley Basin (200 to 400 AFY), and average water use over the life of the project (31 AFY) is only 6-13 percent of the estimated recharge. No other local users are known to rely on that recharge. The water use is less than 1 percent of the yield of the Lavic-Broadwell-Bristol Lake groundwater system, given the range of estimates of yield for the Bristol Lake Basin (5,000 AFY).

Staff believes the applicant should be required to comply with Condition of Certification **SOIL&WATER-4** which would ensure that project groundwater use would be limited to the maximum needed for project construction and is consistent with the amount analyzed.

Lower Mojave Basin

In contrast to the limited historical use of groundwater in the Lavic Valley Basin, the Lower Mojave Basin has experienced large, steady water level declines over the past 60 years. The cumulative storage decline during 1950-2000 was 1,100,000 AF (Stamos and others 2001a). Gross annual extractions in the Baja area (which generally corresponds with the Lower Mojave Basin) were 31,000-39,000 AFY during 2005-2009 (Mojave Water Agency 2010), which is nearly an order of magnitude greater than annual extractions from the desert basins to the east. Because of this contrast and the proximity of the project site to the Lower Mojave Basin, the permeability of the Pisgah Fault is a significant issue. Previous investigators have asserted that the Pisgah Fault separates the Lavic Valley Basin from the Lower Mojave Basin because groundwater levels reportedly drop from west to east across the Pisgah Fault and therefore is believed to be a partial barrier to groundwater flow (Moyle 1967; Stamos and Predmore 1995; Lines 1996; Stamos and others 2001b). However, there is no record of the historical well locations or water level data from which this conclusion was made, and given the lack of known wells and historical data near the fault—particularly on the east side—the basis for the conclusion is unknown and may be speculative.

Soil and Water Figure 5 shows known well locations, construction details, and available water level data for wells located in the Lavic Valley and adjacent Lower Mojave and Broadwell Valley basins. Staff is not aware of any significant present-day groundwater use in the Lavic Valley. DWR well reports and accessible data bases (USGS and DWR) indicate a number of wells were constructed in the area. Most of the wells are located south of the proposed project site and west of the site in the Lower Mojave Basin (**Soil and Water Figure 5a**). In the Lavic Valley, most of the wells were reportedly for stock watering and industrial uses. Groundwater elevations in Well #3 (the proposed project water supply well), an existing well located west of the site, and wells located in the Lower Mojave Basin for which water level data are available are plotted on **Soil and Water Figure 5b**. Water levels on the west side of the Pisgah Fault in the Lower Mojave Basin have been declining at a rate of 0.3-1.0 foot per year over the past 10-20 years, which is the period of record for those wells. Farther west, in the central part of the Lower Mojave Basin, declines have averaged 1.3-1.6 ft/yr for more than 50 years (Stamos and others 2001b). In spite of these declines, the groundwater elevation in 2010 at the Lavic Valley well located closest to the Pisgah Fault (1,757 feet above sea level) was greater than the water level in both wells located further east of the fault (1,733 and 1,744 feet). This is consistent with the conclusion of previous investigators that water levels are lower on the east side of the fault, but it does not rule out the possibility that pumping in the Lower Mojave Basin has impacted water levels in the Lavic Valley Basin. Well #3 is drilled more than 1,000 feet below land surface; well depths are unknown for most of the wells located west of the Pisgah Fault. If the fault does transmit some drawdown, then the concern is not only that 31 AFY (average annual withdrawal for all groundwater uses over life of project) of pumping by the Calico Solar Project would impact groundwater availability in the Lavic Valley Basin but in the Lower Mojave Basin as well. Additionally, there is the question of what impact the 31,000-39,000 AFY of pumping in the Lower Mojave River Basin may have on groundwater levels beneath the proposed project site.

Observed water levels indicate an eastward decline in water levels across the Pisgah Fault, suggesting the fault is at least a partial barrier to groundwater movement. Previous investigators and regulatory agencies have also concluded that the Pisgah Fault is a partial barrier to groundwater flow and that the Lower Mojave Basin and Lavic Basin are separate groundwater systems. Groundwater extraction for the Calico Solar Project therefore would likely have a less than significant impact on groundwater availability in the Lower Mojave Basin.

Potential Project Impacts to Groundwater Levels

The nearest known active wells to the project are located within the Lavic-Broadwell-Bristol Lake groundwater system 30-50 miles southeast of the Calico Solar Project site. Active wells are also located only 10 miles away in the Lower Mojave Basin, but the Pisgah Fault is thought to limit pumping impacts from spreading between the basins (see "Basin Balance" discussion, above). Although there are no known existing active wells near the site, concerns have been raised that drawdown caused by pumping the project supply well could adversely impact the ability of adjacent private landowners to construct wells and obtain water in the future. The significance criterion for impacts on groundwater levels and groundwater availability articulated in Appendix G of the *CEQA Guidelines* limits the consideration of impacts to "pre-existing nearby wells" and "existing land uses or planned uses for which permits have been granted." Although impacts on speculative future wells and land uses are thus beyond the required scope of this analysis, the magnitude and extent of drawdown associated with project pumping was nevertheless estimated.

The project applicant reported that less than one-half dozen wells exist in the Lavic Valley and that most, if not all, are likely inactive. Very little information is therefore available on the aquifer from which the proposed supply well will extract water. The applicant drilled three exploratory boreholes; one reportedly failed to intercept sufficient coarse-grained sediment to justify installing a well (802 feet below ground surface), and the second well (840 feet below ground surface) failed to provide sufficient yield. The third borehole was drilled to a depth of 1,147 feet below ground surface (bgs) and intercepted a significant water bearing zone at a depth interval between approximately 500 to 700 feet bgs and numerous smaller water bearing units beneath this zone to the bottom of the boring. While the depths and thicknesses of the water bearing units were measured, the boundaries and areal extent of the water bearing units are unknown.

Because aquifer data is limited, staff conducted multiple simulations to incorporate a variety of feasible hydrogeologic conditions and groundwater level impacts in the Lavic Valley. Staff utilized WinFlow v.3.11 to solve the Theis equation and simulate groundwater level changes at several reported well locations under the following conditions.

- Annual time steps using average constant extraction rates as summarized below.

Year	Pumping Rate (AF yr^{-1})
1	136.59
2	123.62
3	71.87
4	142.44
5	125.53
6-45	20.4
Total	**1,416.05**

- The Theis equation assumes the pumped well penetrates the entire aquifer, and staff's simulated impact represents an average water level change within the water-bearing zones intercepted by the well screen.
- Staff's modeling calculated drawdown relative to the existing piezometric surface, and the simulated water level decline represent the impact due solely to project pumping. The impact does not represent the absolute water level change, which is the net result of all future inflows and outflows to the basin in addition to the proposed project pumping.
- The Cady Mountains and Pisgah Fault likely form partial or complete barriers to groundwater flow. Staff employed the principle of superposition and imaginary wells to transform the infinite aquifer represented by the Theis equation into an aquifer of finite extent. Staff's simulations represent two conceivable extreme end members of possible hydrogeologic conditions: (1) water level changes in an aquifer without boundaries; and (2) water level changes in an aquifer bounded by impermeable boundaries corresponding to the Cady Mountains and Pisgah Fault. This approach ensures that staff's impact analysis is conservative, and maximizes the potential water level decline in the Lower Mojave Basin (Pisgah Fault represented as a

permeable boundary) and Lavic Lake Basin (Pisgah Fault represented as an impermeable boundary), respectively.

- Natural heterogeneity exists in all hydrogeologic systems, and the aquifer is not homogeneous, isotropic, or of uniform thickness. Aquifer transmissivity and storage properties are therefore spatially variable. Staff employed multiple simulations using a range in transmissivity and storage coefficients to represent the uncertainty in aquifer properties and the sensitivity of simulated impacts due to project groundwater use. Staff's preliminary sensitivity testing indicated model results are relatively more sensitive to the storage coefficient than transmissivity, and therefore report results using storage coefficients that range from unconfined aquifer conditions (storage coefficient of 0.10) to moderately confined conditions (storage coefficient of 0.001). This approach ensured that staff's impact analysis incorporated hydrogeologic uncertainty and considered a range in plausible aquifer conditions.
- The aquifer test conducted by the applicant provided limited information from which to estimate transmissivity and storage coefficient. The pumping rate (100 gpm) was too low to induce sufficient drawdown and recovery for analysis, and the test length (24 hours) was too short to influence water levels in nearby wells or reveal potential boundary effects. Furthermore, no pre-test data was collected to assess the influence of background trends, barometric effects, or other potential interferences on the test data. As a result, the applicant was limited to estimating transmissivity from the calculated specific capacity (estimated transmissivity of 3,500 ft^2/d) and no estimate could be made of the storage coefficient.

Soil and Water Figure 7 shows the simulated extent of impacts to groundwater levels (simulated drawdown) at the end of the project construction period where the Pisgah Fault is represented as permeable (**Soil and Water Figure 7a**) and impermeable boundaries (**Soil and Water Figure 7b**). The simulated drawdown within the contours is greater than or equal to 1-foot, and drawdown outside the contours is less than 1-foot. The simulated impacts are greater in a confined aquifer (storage coefficient of 0.001) than unconfined aquifer (storage coefficient of 0.01). If the aquifer is confined and groundwater is assumed hydraulically connected across the Pisgah Fault, project groundwater use impacts water levels in wells located in the adjacent Lower Mojave River Basin. In contrast, if the fault is an impermeable barrier to groundwater flow there is no impact in Lower Mojave River Basin wells, but the impacted area increases within the Lavic Lake Valley; no active wells are known to exist in the Lavic Lake Valley. **Soil & Water Table 7a** indicates for unconfined aquifer conditions the impacts are substantially less than 1-foot at select well locations, regardless of whether the fault is permeable or impermeable. For confined conditions (**Soil & Water Table 7b**), the impacts are 3.9 feet or less. In other words, the drawdown (water level decline) due to project groundwater use for construction at the nearest well location is 3.9 feet, and at most other well locations much less than 3.9 feet.

Soil & Water Table 7a
Simulated Drawdown (Impact) in Unconfined Aquifer
(reported in feet)

Well	Permeable Fault		Impermeable Fault	
	Construction	Operation	Construction	Operation
Site Well #3	7.3	1.4	7.3	1.4

1	0.0	0.0	0.3	0.3
2	0.0	0.1	0.0	0.2
3	0.0	0.1	0.0	0.2
4	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0

Soil & Water Table 7b
Simulated Drawdown (Impact) in Confined Aquifer
(reported in feet)

Well	Permeable Fault		Impermeable Fault	
	Construction	Operation	Construction	Operation
Site Well #3	9.8	1.9	10.9	2.4
1	1.2	0.5	3.9	1.2
2	1.5	0.5	3.4	1.2
3	1.9	0.6	3.7	1.2
4	0.8	0.4	1.1	0.7
5	0.6	0.4	0.8	0.7
6	1.0	0.5	1.5	0.8
7	0.9	0.4	1.3	0.8
8	0.9	0.4	1.5	0.8

The maximum simulated drawdown is almost 4 feet in an aquifer with no known users. Historical well construction data reported in **Soil and Water Figure 5a** indicate on average wells were about 975 feet deep and had perforated intervals of almost 300 feet. This suggests a significant column of water existed in the wells typical for the area. For example, the proposed water supply well is over 1,000 feet deep, has a total perforation length of 350 feet, and a standing water column in the well of about 800 feet. Staff concluded that an impact of less than 4 feet is likely insignificant (1.3-percent of the average screen length).

Impacts on Groundwater Quality

Contamination from Materials or Activities at the Project Site

Improper handling or containment of construction waste water could cause a broad dispersion of contaminants to soil or groundwater. If a chronic leak or large spill of a liquid hazardous material occurred at the project site, there would be a potential risk that the material would percolate down to the water table and contaminate groundwater. Staff's evaluation of impacts associated with hazardous materials (Section C.5.4.2) indicated that liquid hazardous wastes present at the site would consist of fuels, solvents, cleaners, motor oil, lubricants and paints. Staff concluded that because of their small quantities and low mobility and/or toxicity, there is limited potential for off-site impacts. Staff finds that potential on-site impacts are less than significant due to physical and administrative controls over the storage and use of these materials imposed by measures **HAZ-1** through **HAZ-5** that provide for worker training, spill response, safety plans, site control and other measures that minimize the risk of a leak or spill capable of contaminating groundwater.

Discharge of any non-hazardous construction-generated wastewater would require compliance with discharge regulations. Sources of waste water would include equipment wash water and piping and vessel hydrostatic test water. Equipment wash water would be transported to an appropriate treatment facility. Hydrostatic test water would be reused to the extent possible and, pending analytical results of the water, would be discharged to land or trucked offsite to an appropriate treatment and disposal facility in accordance with the SWRCB Water Quality Order No. 2003-003-DWQ as a discharge to land with a low threat to groundwater and the requirements identified in **Soil and Water Appendices B**, **C**, **D** and **E** that are referenced in Condition of Certification **SOIL&WATER-2**. Compliance with the requirements would reduce the potential impacts from release of waste water to less than significant levels.

Changes in the Movement of Saline Groundwater

A large pumping stress in a desert basin can potentially cause saline groundwater to flow away from the playa discharge zone and contaminate relatively fresh groundwater in surrounding areas. However, Lavic (dry) Lake is not a discharging playa and one well-water sample collected near the lake in 1917 did not suggest evaporative concentration; the total dissolved solids concentration was 1,680 mg/L (Moyle 1967). The nearest downgradient discharging playa is Bristol Lake, 50 miles away. As discussed earlier, project pumping likely will not affect groundwater levels and flow at that location and the impact, if any, is therefore less than significant.

Operation Impacts and Mitigation

Operation of the proposed project could lead to accelerated soil erosion and increased storm water runoff. The project's operation could also lead to potential water quality and water supply impacts. Soils may be potentially impacted through erosion or the release of hazardous materials used in the operation of the proposed project. Storm water runoff from the project could result in potential impacts if increased runoff flow rates and volumes discharged from the project increase erosion of the soil and increase down stream flooding. Water quality could be impacted by discharge of eroded sediments from the project or discharge of hazardous materials released during operation. Water supply used for dust suppression, SunCatcher mirror washing, and fire protection could lead to potential quantity or quality impacts to groundwater resources. Potential impacts to water quality and water supply and the potential acceleration of soil erosion and increased storm water runoff related to the operation of the project, including the applicant's proposed mitigation measures and staff's proposed mitigation measures, are discussed below.

Soil Erosion and Storm Water Control

Staff evaluated the potential impacts to soil resources caused by operation of the facility that could result in erosion and downstream transportation of soils and the potential contamination of soils and groundwater. There are extensive regulatory programs in effect (NPDES, SWPPP, NRCS) 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 program-approved BMPs to prevent erosion or contamination is sufficient to ensure that these impacts would be less than significant. In addition, soils would be protected by the development and implementation of the Drainage, Erosion and Sedimentation Control Plan (DESCP) required in **SOIL&WATER-2**.

Although these programs and established BMPs are generally effective on most projects, staff believes that the circumstances of the proposed project are unusual any require additional mitigation. Specifically, this is a very large project that will be constructed on active alluvial fans, which dramatically increases the potential for soil erosion. The proposed project would be located on a series of undeveloped alluvial fans. Currently, the storm water runoff either percolates into the soil or is conveyed as sheet flow across the fans or through the alluvial fan wash channels. Several project features would contribute to the potential for increased water erosion, including earth displacement, construction of access roads and project infrastructure, the long duration for construction, and changes to the properties of the soil. Construction of the proposed project would change natural drainages, remove natural vegetation and soil structure, and add impervious areas to the site, all of which could cause an increase in storm water runoff.

To support the final design parameters, the applicant analyzed the hydrology of the project area and calculated anticipated storm flows. The study area's watershed is approximately 80 square miles. **Soil & Water Table 8** provides a summary of anticipated precipitation and storm flow (i.e., runoff) rates.

Soil & Water Table 8
Calico Solar Hydrology Summary

Storm Frequency	6-hour Storm Rainfall (inches)	24-hour Storm Rainfall (inches)	6-hour Storm Runoff (cubic feet per second)	24-hour Storm Runoff (cubic feet per second)
2-year	0.70	0.94	0	0
5-year	1.06	1.41	0	0
10-year	1.33	1.73	1,458	4,145
25-year	1.70	2.15	3,904	7,939
50-year	1.99	2.47	6,435	11,150
100-year	2.31	2.80	22,049	28,772

Source: SES 2009i, Applicants Responses to Energy Commission & BLM Data Requests (Surface Water), pg. A-1.

Runoff from these sub-watersheds was modeled by the applicant using the Army Corps of Engineers (USACOE2009) HEC-1 computer hydrology model.

Storm water flow volume and velocity is affected by several parameters, such as surface infiltration rates and the roughness of the flow surface. Construction, operation, and decommissioning of the proposed project may modify the infiltration rate through several processes, including earthmoving, compaction, and use of dust suppressants.

Water quality could also be impacted if the storm water drainage pattern concentrates runoff in areas that are not properly designed or protected with BMPs or causes increased erosion and sediment discharge offsite. Project components that could alter or concentrate existing drainage patterns could include the installation of linear fences, access roads, buildings, SunCatchers, and associated infrastructure.

With concentrated flows, scour may transport sediment long distances. Scour may occur under sheet flow conditions due to water depths, velocities, and soil parameters. Scour of existing or future channelized flow paths can meander and move during large flow events, which is common on alluvial fans. The proposed project includes a total of 34,000 SunCatchers supported by a single metal fin-pipe foundation hydraulically driven into the ground. Migration of channels and local scour caused by storm water flows could remove sediment supporting individual poles and cause them to fall to the ground. Once on the ground during a storm event, the broken glass associated with the mirrors could further break and be transported downstream. Also, the SunCatchers structure itself and the associated wiring and piping, could be transported downstream. Although the security fence located on the downstream side of the proposed project area could stop larger pieces from leaving the property, it would not stop small glass fragments. Also, the fence itself could be threatened by storm water flows and could not guarantee the onsite capture of all damaged materials.

Condition of Certification **SOIL&WATER-3** contains requirements that will ensure that the SunCatchers withstand this potential scour. In addition, this condition requires the applicant to develop a Storm Water Damage Monitoring and Response Plan, which would include a plan to cleanup and mitigate damaged SunCatchers, should SunCatchers collapse. Several design and implementation strategies are described in **SOIL&WATER-3** to accomplish these purposes including:

1. Preparing a Pole Foundation Stability Report to determine the Minimum Depth Stability Threshold,
2. Installing SunCatcher pole foundations to meet long-term stability for applicable wind, water and debris loading effects by designing the foundations to meet Minimum Depth Stability Thresholds,
3. Controlling Storm water runoff,
4. Employing BMPs to cut off flow as it progresses down slope, incorporating cross channels or other devices, incorporating mid slope basins, incorporating level spreaders and similar approaches to reduce the ability of surface water to scour, and
5. Establishing methods and response times for broken mirror cleanup.

Staff believes the effects of erosion and storm water flow onto and off the proposed project can be mitigated through implementation of Conditions of Certification **SOIL&WATER-1**, **-2**, and **-3**. **SOIL&WATER-1** would require the project applicant to develop a DESCP to ensure protection of water quality and soil resources. **SOIL&WATER-2** would require the applicant to develop an Industrial SWPPP that meets the requirements for discharges of storm water. Condition of Certification **SOIL&WATER-3** would require the applicant to develop a Storm Water Damage Monitoring and Response Plan to monitor the SunCatchers and mitigate potential impacts from SunCatchers damaged during storm events.

In order to address possible outcomes given the various site conditions and possible environmental factors, the applicant has carried out mathematical calculations and probabilistic modeling to estimate anticipated potential impacts. While modeling and calculations can be used in an attempt to estimate future effects from a variety of environmental considerations, and they 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. The Project is not located on farmland or in areas where agricultural protection legislation is applicable; therefore, there will be no impacts to agricultural soils at the Project site. Staff has proposed conditions of certification **SOIL&WATER-1, -2**, and **-3** that would mitigate these potential impacts.

Project Water Supply and Wastewater Disposal

The project's operational water demand is estimated to be approximately 20.4 AFY. The applicant has proposed to pump groundwater from a well located on private land adjacent to the project site. The water will be pumped from the well, conveyed in an underground pipe to a water storage tank, treated and dispersed for onsite use.

Sanitary wastewater from buildings on the site will be disposed of by means of an on-site septic system and leach field. Reject brine from the demineralization facility will be discharged to two on-site ponds for evaporation.

Basin Balance

Groundwater pumping during project operation would be at a lower rate than during project construction: an average of approximately 20.4 AFY versus 120 AFY. The total volume of groundwater extracted during the life of the project would be 1,416 AF (600 AF over 5 years of construction and 816 AF over 40 years of operation), for an average annual withdrawal rate of 31.5 AFY. As described above under "Construction Impacts and Mitigation," the groundwater system that would be affected by the pumping includes the Lavic Valley, Broadwell Valley and Bristol Lake Basins, combined. The nearest active groundwater use and point of natural groundwater discharge are near Bristol Lake, 50 miles southeast of the project site. The discussion of construction impacts demonstrated that the impact of the project on groundwater levels near Bristol Lake would be negligible and the impact less than significant from project construction as well as operation.

Staff believes the applicant should be required to comply with Condition of Certification **SOIL&WATER-4** which would ensure the project supply would be limited to the maximum needed for project construction and operation.

To ensure the well can provide an adequate water supply, staff recommends the applicant be required to comply with Condition of Certification **SOIL&WATER-9** that requires a Water Conservation and Alternative Water Supply Plan should groundwater monitoring indicate long-term downward trends in water levels and storage**.**

Groundwater Levels

Soil and Water Figure 8 shows the simulated extent of impacts to groundwater levels (simulated drawdown) at the end of the 45-year project construction and operation period where the Pisgah Fault is represented as permeable (**Soil and Water Figure 8a**) and impermeable boundaries (**Soil and Water Figure 8b**). The drawdown within the contours is greater than or equal to 1-foot, and drawdown outside the contours is less than 1-foot. The simulated impacts are greater in a confined aquifer (storage coefficient of 0.001) than unconfined aquifer (storage coefficient of 0.01). If the aquifer is confined and groundwater is assumed hydraulically connected across the Pisgah Fault, project groundwater use impacts water levels in wells located in the adjacent Lower Mojave River Basin. In contrast, if the fault is an impermeable barrier to groundwater flow there is no impact in Loser Mojave River Basin wells, but the impacted area increases within the Lavic Lake Valley; no active wells are known to exist in the Lavic Lake Valley. **Soil & Water Table 7a** indicates for unconfined aquifer conditions the impacts are substantially less than 1-foot at all reported locations regardless of whether the fault is represented as a permeable or impermeable. For confined conditions (**Soil & Water Table 7b**), the impacts at the same locations are 1.2 feet or less. This drawdown is small relative to typical well conditions in the area, and staff concluded this impact is insignificant given that no active groundwater users are known to exist in the vicinity of the site.

Although there are no known existing groundwater users near enough to the project site to be substantially affected by project pumping, hydrogeologic conditions are uncertain. Staff modeling showed that the Pisgah Fault likely prevents drawdown from extending into the Lower Mojave River Basin and any overdraft effects in the Lower Mojave River Basin from extending into the Lavic Lake Basin, To confirm these findings, staff proposes Condition of Certification **SOIL&WATER-7** which requires the applicant to comply with the County of San Bernardino's Desert Groundwater Management Ordinance and implement a monitoring plan that would characterize baseline water levels in the project vicinity, characterize aquifer materials, integrate water level measurement with any existing monitoring network, and provide for analysis of the project effects on water levels in the area. The applicant shall monitor static water levels quarterly in the project water supply well and select/dedicated wells located on either side of the Pisgah Fault, and the data made available to San Bernardino County and agencies responsible for regional water level monitoring (i.e., DWR and USGS). If monitoring data indicate downward trends in water levels and groundwater water storage, Condition of Certification **SOIL&WATER-9** requires the project owner develop and implement a Water Conservation and Alternative Water Supply Plan to mitigate impacts.

Groundwater Quality

Contamination from Materials and Activities at the Project Site

The risk of groundwater contamination from the storage and use of hazardous materials at the site is considered less than significant because of their small quantities, low mobility and/or toxicity and because of physical and administrative controls included in the project description and implemented via measures **HAZ-1** through **HAZ-5.** These risks and measures were discussed in greater detail in the section on "Construction Impacts and Mitigation."

Project operation will produce three wastewater streams that are potential sources of groundwater contamination: reject brine from the RO/demineralization facility, utility water used for equipment washing and maintenance, and septic system leachate from domestic water use.

During project operation, septic system percolation will amount to approximately 2.2 AFY, which is the amount of water used for domestic purposes (**Soil & Water Table 5**). The unsaturated zone above the water table is 344 feet thick at the project site (the depth to water in Well #3). Percolation through the unsaturated zone will certainly remove any pathogens in the waste water and will likely allow substantial denitrification (Schroeder and others 1996). Domestic water use normally contributes approximately 200 mg/L of total dissolved solids to waste water. The TDS concentration of domestic water will be at least partially demineralized to meet the secondary drinking water standard of 1,000 mg/L. The TDS concentration of sanitary waste water would therefore be around 1,200 mg/L, or comparable to the local TDS concentration in the aquifer (1,340 mg/L at Well #3). Therefore, the septic leachate would not increase groundwater salinity. In any event, the septic system will meet the permitting requirements of the San Bernardino County Department of Public Health as required in **SOIL&WATER-5**. All of these factors support a conclusion that the impact of the septic system on groundwater quality is less than significant.

Analytical test results indicate groundwater produced by Well #3 has a total dissolved solids (TDS) concentration of 1,340 mg/L. The groundwater will be demineralized to produce a potable supply that meets secondary drinking water standards (TDS less than 1,000 mg/L) and to obtain a very low TDS supply for mirror washing (20 mg/L). Treating the groundwater using demineralization equipment to attain a concentration suitable for mirror washing will create a waste water stream that will contain four to five times as much TDS as the source water, or approximately 5,500-7,000 mg/L. (Draft Report of Waste Discharge 6-25-2010)

The applicant proposes to discharge the waste water to one of two concrete-lined evaporation ponds. Each pond will be sized to contain 1 year of discharge flow or approximately 3 million gallons. A minimum of 1 year is expected to be required for the waste water to undergo the evaporation process. After the first year, the second pond will receive all treatment waste water while the first pond is undergoing evaporation. The two ponds will alternate their functions on an annual basis. After the brine has gone through the evaporation process, the solids that settle at the bottom of the evaporation pond will be tested by the applicant and disposed of in an appropriate non-hazardous waste disposal facility. The solids will be scheduled for removal during the dry summer months. As indicated by the Lahontan Regional Water Quality Control Board (see **Soil and Water Appendices B**, **C**, **D** and **E**), the applicant has not provided information necessary to complete development of requirements for discharges of brine waters to evaporation ponds or sanitary septic systems. This information is needed to ensure that the ponds will be designed and operated to prevent concentrated brine leaking and reaching the water table. If the information is provided and demonstrates compliance, then this possible impact would be less than significant.

Maintenance of the Power Conversion Units (PCU) and other mechanical devices (e.g., drive repair) will be performed in onsite service stations. These service stations consist of modular, containerized work stations to perform equipment prewash and inspection, disassembly/reassembly, parts storage, end of service inspection, etc. The prewash and inspection station will include heated, pressurized water spray to clean engine components before maintenance performance. Expected waste water production is 15 gallons per wash (3 gpm sprayer for 5 minutes). The waste water generated will be captured in the service station and diverted to containers (e.g., drums) for offsite recycling by third party provider(s). Prior to disassembly of engines, the fluids will be drained and captured for recycling. This includes 10.1 gallons of coolant (Thermocool HS Coolant – ethylene glycol and deionized water) and 1 gallon of engine oil (Mobil 1 Synthetic 10W-30). These engine fluids will be captured, aggregated in containers (e.g., drums) and recycled by third party provider(s). Staff recommends that the collection and recycling of this waste water be managed in accordance with Conditions of Certification**WASTE-7** and **-8**.

A separate wastewater system would collect and treat all sanitary wastewater from sinks, toilets, and other sanitary facilities. Because there is no municipal sewer service in the area, the sanitary wastewater would be processed through a septic system and discharged to an on-site leach field. Solids would be periodically removed from the septic tank by a professional service. During project operation, septic percolation will amount to approximately 2.2 AFY, which is the amount of water used for domestic purposes (**Soil & Water Table 5**). The unsaturated zone above the water table is 344 feet thick at the project site (the depth to water in Well #3). Percolation through the unsaturated zone likely removes pathogens in the wastewater and allows denitrification (Schroeder and others 1996). Domestic water use normally contributes approximately 200 mg/L of total dissolved solids to wastewater. The percolated septic leachate would therefore contribute approximately 1,200 pounds of salt per year to the groundwater basin upon reaching the water table. This load is small for a 159-square-mile basin in a desert environment where saline water and soils are common. The septic system will meet the permitting requirements of the San Bernardino County Department of Environmental Health as required in **SOIL&WATER-5**.

No significant water or soil related impacts are expected to occur due to wastewater if the project owner complies with proposed Conditions of Certification **SOIL&WATER-2** and **-5**. **SOIL&WATER-2** would provide requirements for discharge of wastewater and **SOIL&WATER-5** provides the requirements for the installation of the proposed septic tank and leach field.

Changes in the Movement of Saline Groundwater

A large pumping stress in a desert basin can potentially cause saline groundwater to flow away from the playa discharge zone and contaminate relatively fresh groundwater in surrounding areas. In this case, Lavic (dry) Lake is not a discharging playa, and one sample of groundwater near the lake in 1917 showed no evidence of evaporative concentration. The total dissolved solids concentration was 1,680 mg/L (Moyle 1967). The nearest downgradient discharging playa is Bristol Lake, 50 miles away. As discussed earlier, the effect of project pumping on groundwater levels and flow at that location would be negligible. This potential impact is therefore considered less than significant.

Water Supply Assessment

A Water Supply Assessment is furnished to local governments for inclusion in environmental documentation for certain projects (as defined in Water Code 10912 [a]) subject to the California Environmental Quality Act. These assessments identify existing water supply entitlements, water rights, or water service contracts relevant to the projects' identified water supply. The purpose of the Water Supply Assessment is to determine if sufficient water is available to serve the project given existing and future demands. These assessments are completed by either the Lead Agency or a Public Water Supplier.

The proposed water supply for this project is a newly constructed well located on private property adjacent to the site. Staff prepared this assessment to answer the central question of a Water Supply Assessment:

> *"Does the projected supply for the next 20-years – based on normal, single dry, and multiple dry years – meet the demand projected for the project and existing and planned future uses" (DWR2003).*

The proposed water supply well was constructed in March 2010. Except for a 24-hour pumping test conducted on the well in April 2010, there is no production record for this well. The project owner will rely on this well to provide on average 120 acre-feet per year of water during project construction, and almost 21 acre-feet per year during project operations; operational water use includes 2.2 acre-feet per year for drinking and sanitary water requirements.

Water Supply Assessments typically are based on a 20-year analysis of the supply available to meet the project's water demand during normal, single dry, and multiple dry water years. However, because the water supply is groundwater it is likely insensitive to annual variability in groundwater recharge. In desert basin, wells constructed in unused aquifers typically show little to no fluctuation even though rainfall is highly variable between seasons and years. The lack of temporal variability is due to typically long distances between recharge areas and well locations, and the significant thickness of the unsaturated zone that percolating recharge must travel before reaching the water table. For these reasons, a multi-year analysis based on projected average, annual hydrologic conditions is sufficient for assessing future water supply conditions.

Staff concluded the project water supply is uncertain for the following reasons.

1. The 24-hour aquifer test conducted by the applicant provided limited information for long-term supply reliability. The pumping rate (100 gpm) was too low to induce sufficient drawdown and recovery, and the test time (24 hours) was too short to influence water levels in nearby wells or reveal potential boundary effects.
2. There appears to be significant spatial variability in well yield and water storage properties. The project applicant drilled three boreholes in the same general vicinity adjacent to the site. One boring was abandoned because the geophysical log indicated a low probability of significant permeable zones. A well was constructed in another boring at a slightly different location, but it is low-yielding (the yield is probably less than 10 gpm). The yield and efficiency of this well may have been substantially compromised by a delay in well development, and it may be of limited

value as a water supply. The third well, the proposed water supply well, produced 100 gpm for a 24-hour period without causing substantial drawdown. Because no active wells reportedly exist in the area, the long-term yield of this well is uncertain.

3. The project relies on well water for its potable supply and no firm, existing back-up or supplemental supply is identified. The project as planned is infeasible should the proposed water supply well fail to meet the water requirements of the project.

A loss of water, especially the supply for potable and sanitary demands, is a significant negative impact.

Decommissioning

The removal of the Project from service, or decommissioning, may range from "mothballing" to the removal of equipment and appurtenant facilities, depending on conditions at the time. The applicant proposes to prepare a decommissioning plan which will be submitted to the Energy Commission for approval before decommissioning. In general, the decommissioning plan will attempt to maximize the recycling of project components including selling unused chemicals back to the suppliers or other purchasers or users, draining and shutting down of equipment containing chemicals, and collection and proper disposal of hazardous and nonhazardous wastes.

Decommissioning activities will produce impacts similar to the construction impacts described above, but likely to a lesser extent. Long-term impacts after decommissioning could be substantial, particularly those related to erosion by water and wind, unless the site is restored to a condition similar to the existing condition, or a post-decommissioning maintenance plan is provided to prevent these impacts. Condition of Certification **SOIL&WATER-6** would ensure that decommissioning impacts would be minimized to a level not significant.

C.7.4.3 CEQA LEVEL OF SIGNIFICANCE

Staff's analysis addressed the following:

- **Whether the project would violate water quality standards or waste discharge requirements:** Conditions of Certification **SOIL&WATER-1** (DESCP); **SOIL&WATER-2** (Waste Discharge Requirements); **SOIL&WATER-3** (Storm Water Damage Monitoring and Response Plan) and **SOIL&WATER-5** (Septic System and Leach Field Requirements) will ensure no violation of water quality standards or waste discharge requirements.
- **Whether the project substantially depletes groundwater supplies or interferes substantially with groundwater recharge such that there is a net deficit in aquifer volume:** The project will not significantly alter groundwater recharge, and the proposed groundwater use would be less than basin recharge in the Lavic Valley Basin where no groundwater users are known to exist. The simulated impact on water levels at the nearest downgradient wells and discharging playa are small. Therefore, impacts on groundwater supplies and levels are less than significant.
- **Whether the project substantially alters existing site or area drainage patterns, including the alteration of stream or river courses, or substantially increases the rate or amount of surface runoff in a manner that results in on- or off-site**

flooding or substantial erosion or siltation: Compliance with Conditions of Certification **SOIL&WATER-1** (DESCP); **SOIL&WATER-2** (Waste Discharge Requirements); **SOIL&WATER-3** (Stormwater Damage Monitoring and Response Plan); **SOIL&WATER-8** (Stormwater Control/Flood Protection Design Plans) will ensure no adverse alteration of drainage patterns.

- **Whether the project would create or contribute runoff water that exceeds existing or planned storm water-drainage system capacity or provides substantial additional sources of polluted runoff:** Compliance with LORS, will ensure no adverse impacts to waters of the U.S. Compliance with Conditions of Certification **SOIL&WATER-1** (DESCP); **SOIL&WATER-2** (Waste Discharge Requirements); **SOIL&WATER-3** (Stormwater Damage Monitoring and Response Plan) require compliance with LORS and will ensure that the project not create or contribute runoff water that exceeds existing or planned storm water-drainage system capacity or provides substantial additional sources of polluted runoff.
- **Whether the project would lower groundwater levels such that protected species or habitats are affected:** The project will use minor volumes of groundwater. Depth to groundwater in the vicinity of the proposed water supply well is beyond the reach of phreatophitic vegetation and no other species or habitats utilize the resource. No adverse groundwater quantity impacts are expected.
- **Whether the project would substantially degrade surface water or groundwater quality: Compliance with** Conditions of Certification **SOIL&WATER-1** (DESCP); **SOIL&WATER-2** (Waste Discharge Requirements); **SOIL&WATER-3** (Storm Water Damage Monitoring and Response Plan) and **SOIL&WATER-5** (Septic System and Leach Field Requirements) will ensure no degradation of surface water or groundwater quality. Demineralization of the domestic water supply and the very thick unsaturated zone beneath the septic system leach field reduce the risk of groundwater contamination from pathogens, nitrate or total dissolved solids to a less than significant level.
- **Whether the project would place structures 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:** The project will place a substantial number of structures in the floodplain in the form of SunCatchers. No structural buildings are proposed to be located in areas susceptible to flooding resulting from a 100-year storm. Conditions of Certification **SOIL&WATER-3** (Stormwater Damage Monitoring and Response Plan) will ensure that structures within the floodplain are protected and that redirected flows are designed such that they not cause adverse impacts. No adverse impacts to site structures due to flooding are expected.
- **Whether the project would 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:** The Project's retention basins are designed to intercept and temporarily retain flows as large as those resulting from a 100-year storm. The basins are proposed to be excavated into the ground, with flows blocked by a dam fitted with a low flow pass through pipe. Based on the current design, there is not enough comprehensive detail provided to analyze the adequacy of the basins and the design of the dams to protect the project from flooding. Condition of Certification

SOIL&WATER-8 will ensure that the flood control basin dams are designed such that they not cause adverse impacts from dam structure failure.

Additionally, three drainages traverse the private property located near the center of the project and enter the project site without mitigation measures identified or proposed. This would leave portions of the project subject to significant adverse impact due to flooding. Any proposed designs to mitigate these potential flood-related impacts must comply with requirements set forth in Conditions of Certification **SOIL&WATER-1**, **-2**, **-3** and **-8**, which will ensure that no adverse impacts due to flooding will occur.

C.7.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage Alternative would essentially be a 275 MW solar facility located within the boundaries of Phase 2 of the proposed 850 MW project. This alternative's boundaries and the revised locations of the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 1**.

C.7.5.1 SETTING AND EXISTING CONDITIONS

The Reduced Acreage Alternative would consist of 11,000 SunCatchers (rather than the proposed 34,000) with a net generating capacity of approximately 275 MW (rather than the proposed 850 MW) occupying approximately 2,600 acres of land (rather than the proposed 6,215). This alternative would retain 31 percent of the proposed SunCatchers and would affect 33 percent of the land of the originally proposed project.

The boundaries of the Reduced Acreage Alternative are shown in **Alternatives Figure 1**. This area was designed, in the proposed project configuration, to generate 350 MW, but has been reduced in capacity to the amount that could be carried by existing transmission systems. As a result, the components of the Reduced Acreage Alternative could be configured on the site to avoid sensitive cultural and biological resources, as well as desert washes.

Similar to the proposed project, the Reduced Acreage Alternative would transmit power to the grid through the Southern California Edison (SCE) Pisgah Substation and would require infrastructure including water storage tanks, transmission line, road access, main services complex, and substation (SES 2008a). For the purposes of the Reduced Acreage Alternative, it is assumed that Well #3 would supply water for the project. The water would be supplied as proposed for the Calico Solar Project.

As stated above, the Reduced Acreage Alternative is evaluated in this SSA because it would substantially reduce the impacts of the project. Additionally, the Reduced Acreage Alternative would allow the applicant to demonstrate the success of the Stirling engine technology and construction techniques, while minimizing impacts to the desert environment.

C.7.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Potential impacts identified for both the construction and operation phases of the project include impacts on soil erosion, sedimentation, flooding, water quality, and water supply. All of the potential impacts identified for the proposed project remain with the Reduced Acreage Alternative. However, due to the alternative's reduced physical size and reduction in number of SunCatchers, these potential impacts are proportionately reduced. The location of detention basins in Sections 32 and 33, Township 9 North, Range 6 East would be relocated adjacent to the northern boundary of the Reduced Acreage project area in Sections 5 and 6, Township 8 North, Range 6 East. Relocating these basins would require that they be redesigned and sized to handle increased watershed areas and different flow paths as appropriate.

C.7.5.3 CEQA LEVEL OF SIGNIFICANCE

There would be no change in the CEQA Level of Significance of impacts between the proposed project and the Reduced Acreage alternative.

C.7.6 AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

The analysis of the Donated and Acquired Lands Alternative has been moved to Section B.2 (Alternatives) of this document.

C.7.7 NO PROJECT / NO ACTION ALTERNATIVE

There are three No Project / No Action Alternatives evaluated as follows:

No Project / No Action Alternative #1: No Action on the Calico Solar Project application and on CDCA land use plan amendment

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

The results of the No Project / No Action Alternative would be the following:

- The impacts of the proposed project would not occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another renewable energy project.
- The benefits of the proposed project in displacing fossil fuel fired generation and reducing associated greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

If the proposed project is not approved, renewable projects would likely be developed on other sites in San Bernardino County, the Mojave Desert, or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are dozens of other wind and solar projects that have applications pending with BLM in the California Desert District.

No Project / No Action Alternative #2: No Action on the Calico Solar Project and amend the CDCA land use plan to make the area available for future solar development

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the project site.

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no soil erosion impacts or impacts to jurisdictional waters. As a result, this No Project/No Action Alternative would not result in the impacts to soils and water under the proposed project. However, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

No Project / No Action Alternative #3: No Action on the Calico Solar Project application and amend the CDCA land use plan to make the area unavailable for future solar development

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM and the BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no soil erosion impacts or impacts to jurisdictional waters. As a result, this No Project/No Action Alternative would not result in the impacts to soils and water under the proposed project. However, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

C.7.8 PROJECT-RELATED FUTURE ACTIONS – SOIL AND WATER RESOURCES

This section examines the potential impacts of future transmission line construction, line removal, substation expansion, and other upgrades that may be required by SCE as a result of the Calico Solar Project. The SCE upgrades are a reasonably foreseeable event if the Calico Solar Project is approved and constructed as proposed.

The SCE project will be fully evaluated in a future EIR/EIS prepared by the BLM and the California Public Utilities Commission. Because no application has yet been submitted and the SCE project is still in the planning stages, the level of impact analysis presented is based on available information. The purpose of this analysis is to inform the Energy

Commission and BLM, interested parties, and the general public of the potential environmental and public health effects that may result these and the types of mitigation measure that may be required to reduce or eliminate significant adverse impacts.

The project components and construction activities associated with these future actions are described in detail in Section B.3 of this SA/DEIS. This analysis examines the construction and operational impacts of two upgrade scenarios

- The **275 MW Early Interconnection Option** would include upgrades to the existing SCE system that would result in 275 MW of additional latent system capacity. Under the 275 MW Early Interconnection option, Pisgah Substation would be expanded adjacent to the existing substation, one to two new 220 kV structures would be constructed to support the gen-tie from the Calico Solar Project into Pisgah Substation, and new telecommunication facilities would be installed within existing SCE ROWs.
- The **850 MW Full Build-Out Option** would include replacement of a 67-mile 220 kV SCE transmission line with a new 500 kV line, expansion of the Pisgah Substation at a new location and other telecommunication upgrades to allow for additional transmission system capacity to support the operation of the full Calico Solar Project.

C.7.8.1 ENVIRONMENTAL SETTING

The environmental setting described herein incorporates both the 275 MW Early Interconnection and the 850 MW Full Build-Out options. The setting for the 275 MW Early Interconnection upgrades at the Pisgah Substation and along the telecomm corridors is included within the larger setting for the project area under the 850 MW Full Build-Out option, which also includes the Lugo-Pisgah transmission corridor.

The SCE upgrades would be located within the Mojave River area in the southwestern part of the Mojave Desert, in San Bernardino County, California. Characteristic landforms in the Mojave Desert include broad alluvial fans, old dissected terraces, playas, the Mojave River and its flood plain, and scattered mountains. The Mojave River originates where the West Fork of the Mojave River joins the Deep Creek River. The river flows northward and then eastward past the City of Barstow. A flood plain 0.5 to 1.0-mile wide flanks the Mojave River along most of its course.

Natural resources in the Mojave River Area include soils, scenic resources, various mineral deposits, plants, and wildlife communities. Major minerals extracted in this area include gold, silver, feldspar, uranium, copper, iron, tungsten, turquoise, zeolite, barite, and clay. Limestone, sand, and gravel for cement and aggregate used for road construction are found at several locations throughout the area. The majority of the surface in the region is covered by Quaternary-age unconsolidated surficial deposits. These deposits are comprised primarily of alluvial, fluvial, lacustrine, and aeolian derived material (SES 2008a). Soils on the flood plains of the Mojave River are nearly level. Soils on mountainside areas are moderately steep to steep and gently sloping to moderately sloping in the valleys. Soils in the vicinity of the Proposed Project were formed from parent material of mixed alluvium and colluvium derived from a variety of rock types, primarily igneous and metamorphic.

Land classified as grazing land comprises approximately 76 percent of the agricultural resources within the boundaries of the soil surveys of the Mojave River Area (SES

2008a). Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance occur in the vicinity of the project and make up approximately 3 percent of the land in the project area (SES 2008a).

Soils Resources

The U.S. Department of Agriculture, Natural Resource Conservation Service has published soil surveys for the San Bernardino County Mojave River Area, the West Central Mojave Desert and Marine Corps Air Ground Combat Center Twentynine Palms located in the vicinity of the project area. Detailed reports of the soils present at the northeastern end of the project area near I-40 are not available (SES 2008a). Soils are grouped into mapping units that represent a unique natural landscape. Typically, a map unit consists of one or more major soils and the soils in any map unit may differ from place to place in slope, depth, drainage, and other characteristics that affect management. Because of the large project area, general map units have been grouped for broad interpretive purposes. The western half of the Lugo-Pisgah No. 2 500 kV transmission corridor area would be located within the San Bernardino County Mojave River Area. The San Bernardino County Mojave River Area is comprised of three groups of soil types. The central part of the Lugo-Pisgah No. 2 500 kV transmission line would be located within the West Central Mojave Desert soil survey. Two major soil groupings are identified within this area. Approximately 6 miles of the eastern portion of the Lugo-Pisgah No. 2 500 kV route would pass through the Marine Corp Ground Combat Center Twentynine Palms soil survey area. This area also contains three general types of soil groups (SES 2008a).

Agricultural Resources. The majority of the Lugo-Pisgah No. 2 500 kV transmission corridor is located on areas designated as Grazing Land. Approximately 3 miles near the center of the transmission corridor would pass through and adjacent to an area designated as Farmland of Statewide Importance of less than 1,000 acres. The nearest Prime Farmland and Farmland of Local Importance are approximately 1.6 miles and 1.1 miles south of the transmission line, respectively. Where the line reaches the eastern edge of the Mojave River, approximately 4.6 miles southeast of Hesperia, the transmission line passes adjacent to approximately 206 acres of an area designated as Farmland of Local Importance. The nearest Prime Farmland and Farmland of Statewide Importance are approximately 0.4 miles and 0.7 miles north, respectively (SES 2008a).

Water Resources

Surface Water Resources. Due to the arid nature of the region, surface water is very scarce in the project area. Streams originate high in the mountains ranges (Ord, Granite, Fry, Rodman, and Cady) that surround the project area and may have perennial flow at higher altitudes. As the streams descend to the valley bottoms where the majority of the proposed transmission line would be constructed, virtually no water exists in the streambeds or rivers, except locally after infrequent, heavy cloudbursts. The proposed transmission line would cross numerous dry washes and ephemeral streambeds. The proposed transmission line would cross Lucerne Lake and Rabbit Lake which are actually large playas. Depending on the year, these playas may contain water from runoff for as much as two months of the year. The proposed transmission line would cross the Mojave River south of Hesperia. The Mojave River originates in the San Bernardino and San Gabriel Mountains and has perennial flow in its upper reaches and near Victorville in the vicinity of Camp Cady and in Afton Canyon. In these places, hard rock barriers force the groundwater to the surface. However, where the proposed transmission line would cross the Mojave River, the flow is ephemeral. No floodplains would be affected by the proposed transmission line. Surveys would be conducted to identify any wetlands or Waters of the U.S. that would be regulated by the United States Army Corps of Engineers.

Groundwater Resources. The proposed transmission line corridor includes sections of the Colorado River and South Lahontan Hydrologic regions as defined by DWR (SES 2008a). The boundary between the two hydrologic regions is a series of mountain ranges (Granite, Rodman, and Ord) that divide those watersheds draining south towards the Colorado River and those draining north. Many of the alluvial valleys in these hydrologic regions are underlain by groundwater aquifers. In most of the smaller basins, the groundwater is found in unconfined alluvial aquifers. Some of the larger basins, or near dry lakes (Lucerne Lake and Rabbit Lake), aquifers may be separated by aquitards that create confined groundwater conditions. The basins range in depth from tens to hundreds of feet in smaller basins and up to thousands of feet in the larger basins. The aquifers range in thickness from tens to hundreds of feet (SES 2008a). The chemical character of the groundwater in these hydrologic regions is variable, but commonly is characterized by calcium or sodium bicarbonate. Typically, the edges of the valleys contain lower TDS than groundwater found beneath the central part of the valleys or near dry lakes. Drinking water standards are most often exceeded for TDS, fluoride, or boron content.

Waters of the United States and State Jurisdictional Waters. The project area encompasses four regional watershed hydrologic units: Bessemer, Johnson, Lucerne Lake, and Mojave (see **Soil & Water Table 8**). Using Google Earth aerial images, Calico Solar identified 346 drainage features that would cross the existing and/or proposed transmission corridor (SES 2008a).

Soil & Water Table 8
Regional Watershed Hydrologic Units
of Proposed Transmission Line Corridor

Regional Hydrologic Unit	Acreage
Bessemer	1,546 acres
Johnson	491 acres
Lucerne Lake	5,385 acres
Mojave	6,057 acres
Total Acreage	**13,479 acres**

Source: SES 2008a

Waters of the U.S. The Mojave River is an intrastate water that may be considered jurisdictional by the U.S. Army Corps of Engineers. Four crossings of the Mojave River are vegetated waters that may be federal jurisdictional waters of the U.S. within an ordinary high water mark (OHWM) as defined by 33 CFR 328.3(e). These four areas are sparsely vegetated (<1 percent) along the fringe of the river with willow (*Salix* sp.) and other riparian vegetation. While final jurisdiction over the Mojave River has not yet been determined by the U.S. Army Corps of Engineers, a preliminary jurisdictional determination was implemented and it is assumed that the U.S. Army Corps would take jurisdiction over this feature.

The U.S. Army Corps may also want to assert jurisdiction over three locations at crossings of the California Aqueduct. A total of 339 other drainage features were determined to be federally non-jurisdictional because they are isolated waters and there is no apparent or likely significant nexus to foreign or interstate commerce. Many of these drainage features also lack an OHWM.

Waters of the State. A total of 41 drainage features were determined to be waters of the state pursuant to Section 1600 of the California Fish and Game Code and the Porter Cologne Water Quality Act. These include the four aforementioned locations that cross sparsely vegetated (<1 percent) areas of the Mojave River, the three aforementioned locations that traverse sections of the California Aqueduct, and 34 isolated, intrastate waters that fall under CDFG and RWQCB jurisdiction because of the presence of riparian vegetation (e.g., willows) and/or an OHWM.

Other Drainage Features. A total of 305 other drainage features (e.g., swales) were determined to be non-jurisdictional under federal and state regulations because they lacked an OHWM and/or well-defined bed, bank, and channel.

C.7.8.2 ENVIRONMENTAL IMPACTS

For the proposed 500 kV route, new 500 kV lattice steel towers would be installed in the existing and new ROW. Most of the structure sites would likely require minor to substantial grading and new or re-developed access and spur roads. A portion of the 40- to 100-acre expanded Pisgah Substation would consist of impervious materials such as concrete foundations and asphalt concrete paving.

Soils Resources

Construction activities would involve earth disturbance that would increase the potential for erosion. Work sites using larger truck-mounted equipment would likely be limited to areas near angle and/or dead-end towers. Temporary pull and tensioning sites for equipment setup would be susceptible to erosion from minor soil disturbance and compaction as a result of the vehicular traffic and hilly terrain. Impacts associated with soil erosion include increased soil loss and increased sediment yields downstream from disturbed areas. During construction, erosion impacts could result from disturbance or stripping of soils in the area of temporary roadways, which would be subject to wind and water erosion. Minimal erosion would be expected post-construction because the only soil disturbance during operation would be from periodic inspection and maintenance activities when needed. Potential impacts to the project may be caused by flash floods in the existing channels.

Storm Water and Sediment

Construction and operation of the proposed project, including the grading, filling, and rerouting of ephemeral streams, would disturb approximately 8,200 acres of land and increase the transport of storm water and colloidal sediment outside of the project area. Smaller scale projects previously constructed in the project vicinity include the BNSF railroad track, a power transmission line and Interstate Highway 40. Storm water and sediment transport impacts from these developments have been less than significant.

Agricultural Resources. The transmission line would pass adjacent to or through areas designated as Farmland of Statewide Importance and Farmland of Local Importance. These areas account for approximately 1,100 acres, less than 2 percent of the total acreage of the full build-out option. Thus, the project is not anticipated to contribute to conversion or curtailment of agricultural land use due to the relatively small agricultural areas that the transmission line would pass through (SES 2008a).

Water Resources

The proposed transmission line would only have one major river crossing at the Mojave River. Depending on the transmission route that would be chosen, the crossing would be between 700 and 1,300 feet. This distance would be spanned without affecting the riverbed or the riparian habitat on either side of the river. The proposed transmission line would also cross Rabbit Lake and Lucerne Lake and would span any water bodies or sensitive riparian areas. The rest of the proposed transmission line only crosses dry washes or ephemeral streambeds that would be spanned. Access roads would be designed to minimize impacts to jurisdictional wetlands and Waters of the U.S. Construction activities associated with new structures would not occur within any watercourses; therefore, impacts to water quality for construction and operation of the transmission lines would be less than significant. Implementation of mitigation for temporary erosion control measures would ensure less than significant impacts to soils associated with new structure construction.

Groundwater resources would not be impacted because water tables are located in formations below any of the construction. Transmission facilities would involve no water use during operation, so groundwater availability would be unaffected. The appropriate mitigation measures discussed below would ensure that contaminants would not enter the groundwater supply.

C.7.8.3 MITIGATION

The CWA (33 U.S.C. Section 1251 *et seq.*), formerly the Federal Water Pollution Control Act of 1972, regulates discharges through the NPDES permit process (CWA Section 402). In California, the NPDES program is administered by the SWRCB. Pursuant to NPDES permit requirements, SCE would be required to prepare and adhere to a SWPPP that would minimize construction erosion. During construction activities, measures would be in place to insure that contaminates would not be discharged from the construction site. The SWPPP would define areas where hazardous materials, such as concrete, would be stored; where trash would be placed; where rolling equipment would be parked, fueled and serviced and where construction materials such as reinforcing bars and structural steel members would be staged. Erosion control during grading of the unfinished site and during subsequent construction would be in place and monitored as specified by the SWPPP. A silting basin(s) would be established to capture silt and other materials which might otherwise be carried from the site by rainwater surface runoff.

In addition to conformance with SCE's SWPPP, for temporary disturbance areas, similar mitigation measures to the following are recommended for implementation:

- On completing the work, all work areas except access trails should be scarified or left in a condition that would facilitate natural or appropriate vegetation, provide for proper drainage, and prevent erosion.
- Disturbance and removal of soils and vegetation should be limited to the minimum area necessary for access and construction.
- Vehicles should be inspected daily for fluid leaks before leaving the staging area.
- Implement spill controls and cleanup as needed and as specified in permits and work plans and according to SCE's guidelines for hazardous waste handling. Spill-control and cleanup procedures and materials should be at hand during construction, and workers should be trained in their use.
- Nonbiodegradable debris should not be deposited in the ROW.

The additional following suggested mitigation measures or similar should be implemented for earth disturbance activities associated with work on tower footings:

- Removed topsoil should be segregated and stockpiled for reuse if practicable.
- All soil excavated for structure foundations should be backfilled and tamped around the foundations, and used to provide positive drainage around the structure foundations.
- Use of ground-disturbing mechanical equipment to remove vegetation should be avoided on slopes over 40 percent, unless the threat of erosion would be minimal because of bedrock, or reseeding would be performed.
- All activity should be minimized during winter and other wet periods to prevent damage (excessive rutting, unacceptable erosion of fines from road surface, excessive soil compaction).
- Where soil has been severely disturbed and the establishment of vegetation is needed to minimize erosion, appropriate measures, as approved by the land manager, should be implemented to establish an adequate cover of grass or other vegetation as needed. Soil preparation, seeding, mulching, and fertilizing should be repeated as necessary to secure soil stabilization and revegetation acceptable to the land manager.
- Grading should be minimized to the extent possible. When required, grading should be conducted away from watercourses/washes to reduce the potential for material to enter the watercourse.
- Grading operations should be consistent with the San Bernardino County Grading Ordinance. SCE should prepare and implement a detailed Erosion Control Plan before construction, which may be a component of the SWPPP.
- Disturbed areas that would not be covered with structures (e.g., buildings or collectors) or pavement following grading and/or cut-and-fill operations should be stabilized. Stabilization methods should include moisturizing and compacting and/or application of polymeric soil stabilizers.

- Should SCE need to relocate or construct a structure or access/spur road, SCE should consult with the United States Army Corps of Engineers (USACE) to locate all new structures and access roads outside floodplains to the extent feasible.
- Sediment control devices, such as placement of native rock, should be used at all dry wash crossings.
- Run-off control structures, diversion ditches, and erosion-control structures should be cleaned, maintained, repaired, and replaced whenever necessary.
- All discharge water created by construction (e.g., concrete washout, pumping for work area isolation, vehicle wash water, drilling fluids) should be treated before discharge.

The following mitigation measures should be implemented for construction activities in and around any water bodies or desert washes associated with the new tower footings, if necessary:

- Wetland delineation surveys should be conducted before each phase of project construction to identify jurisdictional wetlands and Waters of the U.S.
- Mitigation for the permanent loss of jurisdictional wetlands or Water of the U.S. should be provided per agreement with the US Army Corps of Engineers.
- Access ways should be located to avoid wetlands, where practical; or if they are linear, to cross them at the least sensitive feasible point.
- Any discharge of material (displaced soils and, in certain circumstances, vegetation debris) within waters of the United States may be subject to US Army Corps of Engineers regulations under the Clean Water Act.
- If wet areas cannot be avoided, SCE should use wide-track and/or balloon tire vehicles and equipment and or timber mats.
- Excavated material or other construction materials should not be stockpiled or deposited near or in stream banks or other watercourse perimeters.
- All fill or rip-rap placed within a stream or river channel should be limited to the minimum area required for access or protection of existing SCE facilities.

SCE should be required to coordinate with grazing operators to ensure that agricultural productivity and animal welfare are maintained both during and after construction to the maximum extent feasible. Coordination efforts should address issues including, but not necessarily limited to:

- Interference with access to water (e.g., provide alternate methods for livestock access to water)
- Impairment of cattle movements (e.g., provide alternate routes; reconfigure fencing/gates)
- Removal and replacement of fencing (e.g., during construction install temporary fencing/barriers, as appropriate, and following construction restore equal or better fencing to that which was removed or damaged)

- Impacts to facilities such as corrals and watering structures, as well as related effects such as ingress/egress, and management activities (e.g., replacement of damaged/removed facilities in kind; provide alternate access)

During operation cattle would likely be free to move across the transmission ROW and thus impacts to agricultural resources during operation would be less than significant.

C.7.8.4 CONCLUSION

Significant environmental impacts to soil and water resources would be avoided by implementing best management practices, the SWPPP, and/or similar mitigation, as listed above. The project would not cause a displacement of agricultural land use, and neither construction nor operation of the transmission line would cause a significant impact to agricultural resources.

C.7.9 CUMULATIVE IMPACT ANALYSIS

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 (California Code Regulation, Title 14, section 15130). NEPA states that cumulative effects could result from individually minor but collectively significant actions taking place over a period of time (40 CFR §1508.7). There is the potential for future development in the Lavic Valley area and throughout the southern Mojave Desert region. Cumulative impacts can occur if implementation of the proposed project could combine with those of other local or regional projects. The locations of existing and reasonably foreseeable developments in the Lavic Valley area are presented in the Cumulative Scenario section of this document, including **Cumulative Scenario Figure 3**.

C.7.9.1 GEOGRAPHIC EXTENT

The area of cumulative effect varies by resource. For example, air quality impacts tend to disperse over a large area, while traffic impacts are typically more localized. For this reason, the geographic scope for the analysis of cumulative impacts must be identified for each resource area.

The analysis of cumulative effects considers a number of variables including geographic (spatial) limits, time (temporal) limits, and the characteristics of the resource being evaluated. The geographic scope of each analysis is based on the topography surrounding the Calico Solar Project and the natural boundaries of the resource affected, rather than jurisdictional boundaries. The geographic scope of cumulative effects will often extend beyond the scope of the direct effects, but not beyond the scope of the direct and indirect effects of the proposed action and alternatives.

In addition, each project in a region will have its own implementation schedule, which may or may not coincide or overlap with the Calico Solar Project's schedule. This is a consideration for short-term impacts from the Calico Solar Project. However, to be conservative, the cumulative analysis assumes that all projects in the cumulative scenario are built and operating during the operating lifetime of the Calico Solar Project.

C.7.9.2 EXISTING CUMULATIVE CONDITIONS

The project site and surrounding vicinity is undeveloped desert. No known users of groundwater exist in the project site vicinity. The BNSF railroad and I-40 are existing structures in the site vicinity. Stormwater runoff is deflected by these structures and constrained to flow through culverts and trestles. This stormwater ultimately flows westerly along I-40 and contributes surface waters to Troy Dry Lake. Project stormwater management, as proposed by the applicant, could prevent stormwater runoff, in addition to existing conditions, from the project to contribute additional flows to the drainage and ultimately to Troy Dry Lake. The applicant must provide adequate design in order than an analysis of the stormwater management system can be made.

C.7.9.3 FUTURE FORESEEABLE PROJECTS

The intensity, or severity, of the cumulative effects should consider the magnitude, geographic extent, duration and frequency of the effects (CEQ 1997). The magnitude of the effect reflects the relative size or amount of the effect; the geographic extent considers how widespread the effect may be; and the duration and frequency refer to whether the effect is a one-time event, intermittent, or chronic (CEQ 1997).

Each discipline evaluates the impacts of the proposed project on top of the current baseline; the past, present (existing) and reasonably foreseeable or probable future projects in the Calico Solar vicinity as illustrated in **Cumulative Impacts Figure 3 (Newberry Springs/Ludlow Area Existing and Future/Foreseeable Projects)** and **Cumulative Impacts Tables 2 and 3**.

Reasonably foreseeable projects that could contribute to the cumulative effects scenario depend on the extent of resource effects, but could include projects in the immediate Ludlow area as well as other large renewable projects in the California, Nevada, and Arizona desert regions. These projects are illustrated in **Cumulative Impacts Figures 1, 2,** and **3**. As shown in the map and table, there are a number of projects in the immediate area around the Calico Solar Project whose impacts could combine with those of the proposed project. As shown on **Cumulative Impacts Figure 1** and in **Cumulative Impacts Table 1**, solar and wind development applications for use of BLM land have been submitted for approximately 1 million acres of the California Desert Conservation Area. Additional BLM land in Nevada and Arizona also has applications for solar and wind projects.

Soil & Water Table 9
Renewable Energy Projects in the California Desert District

BLM Field Office	Number of Projects & Acres	Total MW
SOLAR ENERGY		
Barstow Field Office	18 projects 132,560 acres	12,875 MW
El Centro Field Office	7 projects 50,707 acres	3,950 MW

BLM Field Office	Number of Projects & Acres	Total MW
Needles Field Office	17 projects 230,480 acres	15,700 MW
Palm Springs Field Office	17 projects 123,592 acres	11,873 MW
Ridgecrest Field Office	4 projects 30,543 acres	2,835 MW
TOTAL – CA Desert District	63 projects 567,882 acres	47,233 MW
WIND ENERGY		
Barstow Field Office	25 projects 171,560 acres	n/a
El Centro Field Office	9 projects (acreage not given for 3 of the projects) 48,001 acres	n/a
Needles Field Office	8 projects 115,233 acres	n/a
Palm Springs Field Office	4 projects 5,851 acres	n/a
Ridgecrest Field Office	16 projects 123,379 acres	n/a
TOTAL – CA Desert District	62 projects 433,721 acres	n/a

Source: Renewable Energy Projects in the California Desert Conservation Area identifies solar and wind renewable projects as listed on the BLM California Desert District Alternative Energy Website (BLM 2009)

Soil & Water Table 10
Renewable Energy Projects on State and Private Lands

Project Name	Location	Status
SOLAR PROJECTS		
Abengoa Mojave Solar Project (250 MW solar thermal)	San Bernardino County, Harper Lake	Under environmental review
Rice Solar Energy Project (150 MW solar thermal)	Riverside County, north of Blythe	Under environmental review
3 MW solar PV energy generating facility	San Bernardino County, Newberry Springs	MND published for public review
Blythe Airport Solar 1 Project (100 MW solar PV)	Blythe, California	MND published for public review
First Solar's Blythe (21 MW solar PV)	Blythe, California	Under construction
California Valley Solar Ranch (SunPower) (250 MW solar PV)	Carrizo Valley, San Luis Obispo County	Under environmental review
LADWP and OptiSolar Power Plant (68 MW solar PV)	Imperial County, SR 111	Under environmental review
Topaz Solar Farm (First Solar) (550 MW solar PV)	Carrizo Valley, San Luis Obispo County	Under environmental review
AV Solar Ranch One (230 MW solar PV)	Antelope Valley, Los Angeles County	Under environmental review

Project Name	Location	Status
Bethel Solar Hybrid Power Plant (49.4 MW hybrid solar thermal and biomass)	Seeley, Imperial County	Under environmental review
Mt. Signal Solar Power Station (49.4 MW hybrid solar thermal and biomass)	8 miles southwest of El Centro, Imperial County	Under environmental review
WIND PROJECTS		
Alta-Oak Creek Mojave Project (up to 800 MW)	Kern County, west of Mojave	Under environmental review
PdV Wind Energy Project (up to 300 MW)	Kern County, Tehachapi Mountains	Approved
Solano Wind Project Phase 3 (up to 128 MW)	Montezuma Hills, Solano County	Under environmental review
Hatchet Ridge Wind Project	Shasta County, Burney	Under construction
Lompoc Wind Energy Project	Lompoc, Santa Barbara County	Approved
Pacific Wind (Iberdrola)	McCain Valley, San Diego County	Under environmental review
TelStar Energies, LLC (300 MW)	Ocotillo Wells, Imperial County	Under environmental review
GEOTHERMAL PROJECTS		
Buckeye Development Project	Geyserville, Sonoma	Under environmental review
Orni 18, LLC Geothermal Power Plant (49.9 MW)	Brawley, Imperial County	

Source: CEQAnet [http://www.ceqanet.ca.gov/ProjectList.asp], November 2009.

Soil & Water Table 11
Existing Projects in the Newberry Springs/Ludlow Area

ID	Project Name	Location	Agency/ Owner	Status	Project Description
1	Twentynine Palms Marine Corps Air Ground Combat Center (MCAGCC)	Morongo Basin (to the south of project site)	U.S. Marine Corps	Existing	The Marine Corps' service-level facility for Marine Air Ground Task Force training. It covers 596,000 acres to the south of the Calico project site and north of the city of Twentynine Palms
2	SEGS I and II	Near Daggett (17 miles west of project site)	Sunray Energy, Inc.	Existing	Solar parabolic trough facilities generating 13.8 MW and 30 MW, respectively.

ID	Project Name	Location	Agency/ Owner	Status	Project Description
3	CACTUS (formerly Solar One and Solar Two)	Near Daggett (to the west of project site)	University of California Davis	Existing	A non-working 10 MW solar power tower plant converted by UC Davis into an Air Cherenkov Telescope to measure gamma rays hitting the atmosphere. The site is comprised of 144 heliostats. This project had its last observational run in 2005. SCE has requested funds from the California Public Utilities Commission to decommission the Solar Two project. (UC Davis 2009)
4	Mine	2 miles west of project site along I-40		Existing	Small-scale aggregate operation (SES 2009a, p. 5.3-12)
5	Mine	14 miles west of project site along I-40		Existing	Larger aggregate mining operation that produced less than 500,000 tons per year in 2005 (SES 2008a, p. 5.3-12)

Source: These projects were identified through a variety of sources including the project AFC (SES 2008a, Section 5.18) and websites of the San Bernardino County Land Use Services Department, BLM, Energy Commission and individual projects.

Cumulative Impacts to Soil and Storm Water

Construction and operation of the Calico Solar Project would result in both temporary and permanent changes to the soil and storm water drainage patterns at the Project site. Without the use of BMPs that would be incorporated into a final DESCP and construction SWPPP, these changes could incrementally increase local soil erosion and storm water runoff. However, as discussed above, these potential impacts would be prevented or reduced to a level of less than significant through the implementation of BMPs, a final DESCP, and construction SWPPP, and compliance with all applicable erosion and storm water management LORS. Similarly, compliance with these LORS and **SOIL&WATER-1**, **-2** and**-3**, would ensure that the Calico Solar Project's contribution to cumulative impacts would not be cumulatively considerable.

Cumulative Impacts to the Basin Balance

As discussed above, during construction and operation of the Calico Solar Project, the groundwater demand would average 150 AFY during construction and 20.4 AFY during operation. Because of subsurface flow between basins, the groundwater system that would be affected by groundwater pumping for the project includes the Lavic Valley, Broadwell Valley and Bristol Lake Basins. Six projects listed in Cumulative Impacts Table 1 would be located within that area and would consume groundwater. These include a reactivated cinder quarry and an expansion of the Twentynine Palms Marine Corps base. The water requirements for those projects are not known. The remaining four projects are solar power projects. Two of those projects would be dry cooled and have small water requirements similar to those of the Calico Solar Project: the Stirling Energy Systems Solar Three Project (application withdrawn but replaced by another renewable energy project ROW application with the BLM) adjacent to the west boundary of the Calico Solar Project and the Bright Source (power tower) project in the Broadwell Valley. The remaining two proposed solar power projects appear to use solar trough technology, but the proposed method of cooling was unclear. If the projects use wet cooling, groundwater consumption per megawatt-hour of energy production would be on the order of ten times larger than dry-cooled plants such as the Calico Solar Project. For example, wet-cooling of parabolic trough solar power plants require an average of 930 gallons of water per megawatt-hour of electricity generated (National Renewable Energy Laboratory 2010). A wet-cooled parabolic trough plant the size of the Calico Solar Project (850 MW) operating 2,500 hours per year would consume 6,000 AFY of water, or 300 times more than the Calico Solar Project. Dry-cooled parabolic trough plants typically consume 80 gallons per megawatt-hour of energy produced, which is still 30 times larger than water use for the Calico Solar Project (a closed-loop system that uses hydrogen instead of water as the circulating fluid). From the standpoint of efficient use of scarce water resources, the incremental impact of the Calico Solar Project groundwater use is small compared to the potential impact of any wet-cooled projects.

If all four of the other solar projects are as water-efficient as the Calico Solar Project, their combined consumptive use of groundwater (approximately 100 AFY during operation) would be small compared to total groundwater recharge to the Lavic-Broadwell-Bristol Lake groundwater system. For example, groundwater consumption for those projects is 25- to 50-percent of the recharge in just the Lavic Lake Basin, and therefore probably insignificant relative to the entire Lavic-Broadwell-Bristol Lake groundwater system which receives substantially more than 200 to 400 acre-feet per year of recharge.

Cumulative Impacts to Wells

The cumulative impact on groundwater levels caused by groundwater pumping to supply the four additional solar projects in the Lavic-Broadwell-Bristol Lake basin area shown in **Cumulative Impacts Table 1** depends on the type of technology and cooling method selected for those plants. If all four were as water-efficient as the Calico Solar project, water level declines at Bristol Lake and nearby wells would be less than 1 inch. A single wet-cooled plant with a generating capacity as large as the Calico Solar Project (850 MW) would more than double estimated groundwater pumping from the three basins and potentially cause significant impacts.

C.7.10 COMPLIANCE WITH LORS

Clean Water Act

Staff has determined that the proposed project would satisfy the requirements of the RWQCB with the adoption of the following Conditions of Certification: 1) Development of the DESCP in accordance with **SOIL&WATER-1**; 2) Development of a Storm Water Damage Monitoring and Response Plan in accordance with **SOIL&WATER-3** and 3) Compliance with wastewater discharge requirements in accordance with **SOIL&WATER-2** and as specified in **Soil & Water Appendix B, C**, and **D**. In addition, the applicant would be required to comply with California Department of Fish and Game's Streambed Alteration Agreement requirements in accordance with Condition of Certification **BIO-27**.

Public Resources Code, Sections 25300 through 25302

Through compliance with Conditions of Certification **SOIL&WATER-4**, information required by staff to conduct assessments and forecasts of potable and industrial water consumption by power plants is achieved. The Commission also promotes "all feasible means" of water conservation and "all feasible uses" of alternative water supply sources (*Section 25008*).

California Water Code Section 6000 to 6004.5 and 6025.5

The applicant has not provided information that the debris basins are in compliance with the State of California Department of Water Resources, Division of Safety of Dams (DOSD). Through compliance with **SOIL&WATER-8** and **GEO-2** and **-3**, information required by staff to analyze the applicant's compliance with these regulations can be made.

California Code of Regulations, Title 23, Division 2, Chapter 1, Article 303

The applicant has not provided evidence that the developer has appropriate Water Rights that are required before an application for the construction or enlargement of a DOSD Jurisdictional dam can be approved.

Energy Commission Policy

Sources of Policy

The Energy Commission has four 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") and the State Water Resources Control Board ("SWRCB" or "Board") resolutions (in particular Resolutions 75-58 and 88-63).

California Constitution

California's interest in conserving water is so important to our thirsty state that in 1928, the common law doctrine of reasonable use became part of the state Constitution. Article X, Section 2 calls for water to be put to beneficial use, and that "waste or unreasonable use or unreasonable *method of use* be prevented." (Cal. Const., art. X, § 2; emphasis added.) The article also limits water rights to reasonable use, including reasonable methods of use. (*Ibid*.) Even earlier in the 20th Century, a state Supreme Court case firmly established that groundwater is subject to reasonable use. (*Katz v. Walkinshaw* (1903) 141 Cal. 116.) Thus, as modern technology has made dry-cooling of power plants feasible, the Commission may regard wet-cooling as an unreasonable method of use of surface or groundwater, and even as a wasteful use of the state's most precious resource.

Warren-Alquist Act

Section 25008 of the 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 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).

San Bernardino County Ordinance 3872 (Code Title 3, Division 3, Chapter 6, Article 5)

To help protect groundwater resources in San Bernardino County, the County enacted Ordinance 3872. This ordinance requires a permit to locate, construct, operate, or maintain a new groundwater well within the unincorporated, unadjudicated desert region of San Bernardino County. CEQA compliance must also be completed prior to issuance of a permit. The article does not apply to "groundwater wells located on Federal lands unless otherwise specified by inter-agency agreement." The BLM and County entered into a MOU that provides that the BLM will require conformance with Article 5 for all projects proposing to use groundwater from beneath public lands. The MOU provides that the County and BLM will work cooperatively together to ensure conformance with applicable LORS by project developers on BLM land. As part of meeting the requirements of the County's permitting process, the County may require the project owner to prepare a groundwater monitoring plan in accordance with the County's "*Guidelines for Preparation of a Groundwater Monitoring Plan*" dated January 1998. Condition of Certification **SOIL&WATER-7** would require the project owner to ensure that all onsite groundwater wells would be installed in accordance with the County of San Bernardino requirements and to submit a well construction packet to the County for comment and written evaluation. The project owner would also be required to submit well completion reports to the DWR in accordance with the DWR well completion reporting requirements.

Calico Solar Project

The applicant for the Calico Solar Power Project proposes the use of 34,000 SunCatchers, each containing a single Stirling engine. The Stirling engines are designed to use closed loop air cooled radiators, which achieves maximum water conservation associated with cooling. Other than site dust suppression, workforce potable consumption and sanitary needs and washing mechanical parts prior to conducting routine maintenance, water use would be limited to mirror washing and hydrogen gas generation. Water is the only feasible means of washing the mirrors which must be clean to maintain efficiency of Stirling Engine power plant output. During operation, the applicant estimates approximately 20.4 acre-feet of water will be required each year. The applicant pursued numerous potential sources of water for the project and concluded that groundwater is the only available source of water in the area.

In March 2010, the applicant discovered a water bearing zone beneath the site and constructed a well that produced a volume and rate that is sufficient to supply both construction and operation water. Analytical test results conducted on water samples collected from the well indicate groundwater contains a TDS concentration of 1,340 mg/L which exceeds secondary drinking water standards (1,000 mg/L TDS).

The quality of site groundwater is regarded as impaired but well below the SWRCB Resolution 88-63 guidance which considers groundwater with a TDS concentration of 3,000 mg/L a potential drinking water source.

Alternative water supplies (including recycled waste water) were considered, but use of alternative water supplies was considered infeasible.

Although potential impacts from the use of evaporation ponds could be mitigated consistent with state and local LORS, this method of wastewater disposal is not consistent with the Energy Commission's policy that encourages the use of ZLD systems that are designed to eliminate wastewater discharge and inherently conserve water. The Applicant did not propose the use of a ZLD system. However, staff believes ZLD technology is economically infeasible for this project given the low rate of wastewater that would be produced.

State, SWRCB and Energy Commission water policies encourage the use of the least amount of the lowest quality water feasibly available. As discussed in Section C.7.4.2, site groundwater contains elevated concentration of TDS. Other sources of water were considered and evaluated, and were considered unfeasible for this project. Therefore, due to the degraded nature of site groundwater, the low volume of water required for project operation, the absence of a need for water used in power plant cooling and the relatively high output expected to be generated (850 MW), staff believes the proposed project complies with the State, SWRCB and Energy Commission water policies.

C.7.11 NOTEWORTHY PUBLIC BENEFITS

Staff has not identified any noteworthy public benefits associated with hydrology, water use, and water quality.

C.7.12 FACILITY CLOSURE

According to Section 3.12 of the applicant's project description, the solar generating facility is expected to have a lifespan of 40 years. At any point during this time, temporary or permanent closure of the solar facility could occur. Temporary closure would be a result of necessary maintenance, hazardous weather conditions, or damage due to a natural disaster. Permanent closure would be result of damage that is beyond repair, adverse economic conditions, or other significant reasons.

Both temporary and permanent closures would require the applicant to submit to the Energy Commission and BLM a contingency plan or a decommissioning plan, respectively. A contingency plan would be implemented to ensure compliance with applicable LORS, and appropriate shutdown procedures depending on the length of the cessation. A decommissioning plan would be implemented to ensure compliance with applicable LORS, removal of equipment and shutdown procedures, site restoration, potential decommissioning alternatives, and the costs and source of funds associated with decommissioning activities.

After the end of the project's useful life, it would be decommissioned as described in the applicant's Draft Closure, Revegetation, and Rehabilitation Plan. The facility would be removed to a depth of 3 feet below grade, original contours restored, and the site revegetated. However, the removal of the existing facility could cause substantial disturbance to soil and water resources. The project closure would require many of the same resource protection plans as required for construction, and thus, staff concludes that the impacts to soil and water resources would be less than significant.

C.7.13 RESPONSE TO AGENCY AND PUBLIC COMMENTS

Responses to Agency and Public Comments are provided in Appendix F.

C.7.14 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

DRAINAGE EROSION AND SEDIMENTATION CONTROL PLAN

SOIL&WATER-1 Prior to site mobilization, the project owner shall obtain the CPM's approval for a site specific Drainage, Erosion and Sediment Control Plan (DESCP) that ensures protection of water quality and soil resources of the project site and all 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 necessary 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 is 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 the specific identification of 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. With regard to erosion risk and stormwater runoff, debris and detention basins shall be installed which are sized and located to intercept storm water flow from off-site areas as it enters the project site. On-site roadways and other infrastructure shall be designed and located to avoid existing and proposed flow paths to the extent feasible.
- **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). Separate BMP implementation schedules shall be provided for each project element for each phase of construction. This scheduling should require the installation of debris basins, detention/ infiltration basins, swales, and related storm water management facilities before construction commences on each phase.
- **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, conditions, and provisions from the County of San Bernardino, California

Department of Fish and Game (CDFG), and Lahontan Regional Water Quality Control Board (RWQCB).

- **Monitoring Plan:** Monitoring activities shall include routine measurement of the volume of accumulated sediment in the onsite drainage ditches, and storm water diversions and the requirements specified in **Soil and Water Appendix B, C, and D**.

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 clearly show approval by the chief building official (CBO). In addition, the project owner shall do all of the following:

a. No later than thirty (30) days prior to start of site mobilization, the project owner shall submit a copy of the DESCP to the County of San Bernardino, the RWQCB, and the CMP for review and comment. The CPM shall consider comments received from San Bernardino County and RWQCB.

b. 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.

c. Once operational, the project owner shall provide in the annual compliance report information on the results of storm water BMP monitoring and maintenance activities.

d. Provide the CPM with two (2) copies each of all monitoring or other reports required for compliance with San Bernardino County, CDFG, and RWQCB.

WASTE DISCHARGE REQUIREMENTS

SOIL&WATER-2 The project owner shall comply with the Waste Discharge Requirements for discharge of storm water associated with construction activity that are presented in **Soil and Water Appendices B**, **C**, **D** and **E** and submit the appropriate compliance fee to the LRWQCB. The project owner shall develop, obtain compliance project manager (CPM) approval of, and implement a Storm Water Pollution Prevention Plan (SWPPP) for the construction of the Calico Solar Project site, laydown area, and all linear facilities. In addition, the project owner shall comply with the Waste Discharge Requirements regarding the monitoring and reporting associated with the operation of waste water evaporation ponds.

Verification: At least 30 days prior to site mobilization, the project owner shall submit to the CPM and LRWQCB, a copy of the construction SWPPP for review and CPM approval prior to site mobilization. The project owner shall also submit to the CPM evidence of payment to LRWQCB of the appropriate compliance fee. The project owner shall retain a copy of the SWPPP on site. The project owner shall submit to the CPM copies of all correspondence between the project owner and the LRWQCB regarding the Waste Discharge Requirements for the discharge of storm water associated with construction activity within 10 days of its receipt or submittal. The project owner shall submit copies to the CPM of all correspondence between the project owner and the LRWQCB regarding the Requirements of Waste Discharge of process water and storm water associated with industrial activity within 10 days of its receipt or submittal. Copies of correspondence shall include the Notice of Intent sent by the project owner to the SWRCB.

STORM WATER DAMAGE MONITORING AND RESPONSE PLAN

SOIL&WATER-3 The project owner shall ensure that all SunCatcher pole foundations are designed to withstand storm water scour from surface erosion and/or channel migration based on a Pole Foundation Stability Report to be completed by a Professional Engineer and Professional Geologist. The Pole Foundation Stability Report shall establish a Minimum Depth Stability Threshold. The project owner shall also develop a Storm Water Damage Monitoring and Response Plan to evaluate potential impacts from storm water, including pole foundations that fail due to storm water flow or otherwise break and scatter mirror debris and other SunCatcher components on to the ground surface. The Storm Water Damage Monitoring and Response Plan shall include the following elements:

- Detailed maps showing the installed location of all SunCatcher pole foundations within each project phase, including existing and proposed drainage channels.
- Each SunCatcher pole foundation should be identified by a unique ID number marked to show initial ground surface at its base, and the depth to the tip of the pole below ground.
- Minimum Depth Stability Threshold to be maintained of SunCatcher pole foundations to meet long-term stability for applicable wind, water and debris loading effects;
- Above and below ground construction details of a typical installed SunCatcher pole foundation.
- 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.

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.
- SunCatcher Pole Foundations within Drainages or Subject to Drainage Overflow: Inspect for tilting, mirror damage, depth of scour compared to foundation 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 mirror glass.
- Constructed Diversion Channels: Inspect for scour and structural integrity issues caused by erosion, and for sediment and debris buildup.

Short-Term Incident-Based Response:

- Security and Tortoise Exclusion Fence: repair damage, and remove build-up of sediment and debris.
- SunCatcher Pole Foundations: Remove broken glass, damaged structures, and wiring from the ground, and for foundations no longer meeting the Minimum Depth Stability Threshold, either replace/reinforce or remove the SunCatcher 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 SunCatcher Pole Foundations no longer meeting the Minimum Depth Stability Threshold or remove the SunCatchers 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 approved right-of-way. For activities outside of the approved right-of-way, the applicant will notify BLM and acquire environmental review and approval before field activities begin.

Verification: At least thirty (30) days prior to commercial operation, the project owner shall submit to the CPM a copy of the Pole Foundation Stability Report and the Storm Water Damage Monitoring and Response Plan for review and approval prior to commercial operation. The project owner shall retain a copy of these documents onsite at the power plant at all times. The project owner shall prepare an annual summary of the number of pole foundations failed, cause of the failures, and cleanup and mitigation performed for each failed pole foundation.

CONSTRUCTION AND OPERATIONS WATER USE

SOIL&WATER-4 The proposed project's use of groundwater for all construction activities shall not exceed 145 AFY. The proposed project's use of groundwater for all operational activities shall not exceed 21 AFY. 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 day the total volume(s) of water supplied to the project from the water source. The metering devices shall be operational for the life of the project.

Verification: At least thirty (30) days prior to the start of construction of the proposed project, the project owner shall submit to the CPM a copy of evidence that metering devices have been installed and are operational.

Beginning six (6) months after the start of construction, the project owner shall prepare a semi-annual summary of amount of water used for construction purposes. The summary shall include the monthly range (daily minimum and daily maximum) and monthly average of daily water usage in gallons per day.

The project owner shall prepare an annual summary, 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 AF. For years subsequent to the initial year of operation, the annual summary 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.

SEPTIC SYSTEM AND LEACH FIELD REQUIREMENTS

SOIL&WATER-5 Prior to the start of construction, the project owner shall provide the design of a sanitary waste septic system that complies with the County of San Bernardino requirements for the construction and operation of the project's proposed sanitary waste septic system and leach field to the CPM for review and approval.

Project operation shall not commence until documentation equivalent to the County's required wastewater treatment system permits are issued by the County and approved by the CPM.

The project owner shall remain in compliance with the County requirements for the life of the project.

Verification: The Project owner shall submit all necessary information and the appropriate fee to the County of San Bernardino to ensure that the project has complied with the county's sanitary waste disposal facilities requirements. A written assessment prepared by the County of San Bernardino confirming that the design of the project's sanitary waste septic system conforms with county requirements must be provided to the CPM for review and approval thirty (30) days prior to the start of site construction.

A written assessment prepared by the County of San Bernardino of the project's compliance with county's sanitary waste disposal facilities requirements must be provided to the CPM for review and approval sixty (60) days prior to the start of power plant operation.

DECOMMISSIONING PLAN

SOIL&WATER-6 The Project owner shall identify likely decommissioning scenarios and develop specific decommissioning plans for each scenario that will identify actions to be taken to avoid or mitigate long-term impacts related to water and wind erosion after decommissioning. Actions may include such measures as a decommissioning SWPPP, revegetation and restoration of disturbed areas, post-decommissioning maintenance, collection and disposal of project materials and chemicals, and access restrictions.

Verification: At least 30 days prior to the start of site mobilization, the project owner shall submit decommissioning plans to the CPM for review and approval prior to site mobilization. The project owner shall amend these documents as necessary, with approval from the CPM, should the decommissioning scenario change in the future.

GROUNDWATER LEVEL MONITORING AND REPORTING PLAN

SOIL&WATER-7 The project owner shall submit a Groundwater Level Monitoring and Reporting Plan to San Bernardino County and to the CPM for review and approval in accordance with the County of San Bernardino Code Title 3, Division 3, Chapter 6, Article 5 (Desert Groundwater Management Ordinance).

The Groundwater Level Monitoring and Reporting Plan shall provide detailed methodology for monitoring background and site groundwater levels.

Monitoring shall be conducted prior to construction, during construction, and throughout project operation. The primary objective for the monitoring is to establish pre-construction and project related groundwater level trends that can be quantitatively compared against observed and simulated trends near the project pumping well and dedicated monitoring wells. Water level measurements in the project's water supply well shall represent non-pumped conditions, and be collected a minimum of four hours after pump shut-down.

Prior to project construction, monitoring shall commence to establish pre-construction base-line conditions and shall incorporate any existing monitoring and reporting data collected in the project area. The monitoring network shall be designed to incorporate any ongoing monitoring and reporting program currently occurring in the Lavic Lake and Lower Mojave groundwater basins. The monitoring network shall be comprised of wells screened to measure water levels representing the water-bearing zone from which the project water supply well will extract groundwater.

Verification: The project owner shall complete the following:

1. At least two (2) months prior to power plant construction, a Groundwater Level Monitoring and Reporting Plan shall be submitted to the County of San Bernardino for review and comment before completion of Condition of Certification **SOIL& WATER-3**, and a copy of the County's comments and the plan shall be submitted 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 man-made 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 one (1) month prior to construction, a Groundwater Level Network Report shall be submitted to the CPM. The report shall include a scaled map showing the final monitoring well network. 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, any newly constructed monitoring wells shall be permitted and constructed consistent with San Bernardino County and State specifications.

4. At least one (1) week prior to project construction, all water level monitoring data shall be provided to the CPM. The data transmittal shall include an assessment of pre-project water level trends, a summary of available climatic information (monthly average temperature and rainfall records from the nearest weather station), and a comparison and assessment of water level data.

5. After project construction and during project operations, the project owner shall submit the monitoring data annually to the CPM. The summary 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. 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. As part of this assessment, the project owner shall calculate water level trends and complete a 5-year projection of future water levels based on these trends and an evaluation of water supply reliability.

STORMWATER CONTROL/FLOOD PROTECTION DESIGN PLANS

SOIL&WATER-8 The project owner shall submit two (2) copies of the 30-percent, 60-percent and 90-percent design drawings for the grading and drainage facilities to the CPM for review and comment. The 30-percent, 60-percent and 90-percent design drawings for the grading and drainage facilities shall be accompanied by a basis of design report to convey and support the design approach.

To prepare the grading and drainage facilities drawings and accompanying basis of design report, the project owner shall do the following:

1. Conduct an analysis to quantify the design discharges and associated volumes of water, debris, and sediment associated with the 100-year storm at the apex of the fan under current watershed conditions.
2. Conduct a geomorphic and hydraulic analysis to determine the maximum design storm that can be routed through the site utilizing existing fluvial washes that will not result in significant damage to proposed site infrastructure.
3. Conduct a geomorphic and biologic analysis to determine the minimum design storm that can be routed through the site utilizing existing fluvial washes that will provide the necessary sediment load through the site and “downstream areas” to maintain existing sensitive habitat needs, as described in the *Geomorphic Assessment of Calico Solar Project Site*. This analysis must consider and address the need for fine sand to support

the existing sensitive habitat and the potential episodic nature of the associated dune complex evolution that depends upon El Niño events (i.e., wet winters occurring approximately every 3 to 7 years) delivering sediment to the lower fan and the accompanying La Niña events (i.e., dry winters occurring approximately every 3 to 7 years) eroding and transporting fine sands to these dunes through wind action.

4. Determine the pass through design storm that can be routed through the site unimpeded to deliver the necessary sediment load through the site to maintain existing sensitive habitat needs in “downstream areas” and not result in significant damage to proposed site infrastructure.
5. Size, locate, and design each detention basin to allow the pass through design storm to move through the site unimpeded while capturing larger design storm flows and related sediment and debris to protect the proposed infrastructure.
6. Convey design of each basin by showing supporting calculations and design drawings to convey the basin in plan view, cross-sections, depth to spillway, amount of freeboard to top of basin, basin volume to spillway, description of sidewall slopes, method of providing pass through design storm and related sediment unimpeded, method of providing erosion protection of basin side walls, inlet design, outlet design, spillway design, spillway erosion control, combined outlet maximum flow, transition from outlet to existing downstream fluvial wash, tortoise fence location and design, maintenance of tortoise fence, maintenance of basin, maintenance of excess sediment in basin from larger flood flows.
7. The project owner shall apply for and receive approval from the Department of Water Resources Division of Safety of Dams (DSOD) for the plans and specifications for the construction of any dam(s) or reservoir(s) that are under DSOD jurisdiction prior to beginning construction.
8. For all flood control basin dams, the project owner shall provide at a minimum:
   - specific locations of basins and dams on appropriate scale map,
   - configuration of all basins and dams including basin-specific cross sections,
   - a description of all materials designed to be used in the construction of the dams,
   - footings designs,
   - designs of cutoff walls,
   - designs of keyways,
   - description and design of drainage pass though methods,
   - flow metering (ability to maintain maximum discharge to that of the maximum on-site flow design) technique and design,
   - method of and design of debris deflection (i.e., trash racks) for each basin,
   - emergency spillway design,

- pass through pipe outlet energy dissipation method and design, and
- basin inlet erosion protection.

9. In addition to the criteria discussed above, the basis of design report shall also follow the procedures outlined in the following documents as far as is applicable:

   a. San Bernardino County Drainage Manual and 2007 Development Code (amended, March 25, 2010).
   b. Federal Emergency Management Agency Guidelines for Determining Flood Hazards on Alluvial Fans and Guidelines and Specifications for Flood Hazard Mapping Partners.

   The project owner shall prepare a set of design specifications to supplement the 90-percent design drawings. Plans, specifications, computations and other data shall be prepared by persons properly licensed by the State of California. If the 60-percent plans or 90-percent plans and specifications do not comply with the appropriate Conditions of Certification, the necessary changes or revisions to the plans shall be made by the project owner. If the CPM finds that the work described in the plans and specifications conform to the Conditions of Certifications in the Energy Commission Decision and other pertinent LORS, then the project owner shall submit two (2) copies of the 100-percent set for CPM review and approval. All design drawings must be submitted on bound or stapled 24" x 36" size paper.

Verification: Prior to site mobilization, the project owner shall prepare preliminary (30-percent) grading and drainage facilities drawings and accompanying basis of design report for CPM review and approval. No later than 30 days after publication of the Energy Commission Decision, the 60-percent set of design drawings and accompanying basis of design report shall be submitted to the CPM for review and approval. The project owner shall submit the 90-percent design drawings and accompanying basis of design report to the CPM for review and approval after the person who originally drew the plan or their duly authorized agent addresses the CPM's 60-percent submittal comments and required changes. The 100-percent design drawings and specifications (construction documents) shall be signed and sealed by a Registered Professional Engineer in the State of California and submitted as the final, approved set of construction documents prior to site mobilization. Prior to initiation of site construction, the 100-percent design drawings and specifications (construction documents) shall be submitted along with the final basis of design report signed and sealed by a Registered Professional Engineer and a Registered Professional Geologist in the State of California to the CPM for review and approval.

WATER SUPPLY RELIABILITY

SOIL&WATER-9 The annual monitoring report required by **SOIL&WATER-7** shall include an evaluation of water supply reliability. Based on the results of this evaluation, the CPM may request the project owner develop and submit a Water Conservation and Alternative Water Supply Plan. The purpose of this plan is to curtail and minimize water use to remediate observed water level and storage declines in the water bearing zone utilized for the project until the proposed alternative supply is available.

Verification: The project owner shall provide a Water Conservation Plan within thirty (30) days after the request of the CPM. The plan shall be implemented immediately upon approval by the CPM. Part of this plan shall include suspension of mirror washing until the water supply has stabilized or an alternative supply is available to provide the water. The project owner shall submit a Notice of Completion to the CPM within thirty (30) days of securing the alternative supply. The Notice of Completion shall list each plan component and document that it has been completed. Part of the documentation shall include water use records that show the conservation savings achieved. If development of an alternative water supply was part of the plan, the project owner shall provide all documentation, permits, as-builts, and test results that may be required for the water supply. The Water Conservation Plan shall remain in effect until CPM approval of the project owner's Notice of Completion.

C.7.15 CONCLUSIONS

Based on the information provided to date, staff has determined that construction, operation, and decommissioning of the proposed Calico Solar Project (Calico, also known as the Stirling Energy Systems Solar 1 or the SES 1 project) could potentially impact soil and water resources. Where potential impacts have been identified, staff has proposed mitigation measures to reduce identified impacts to levels that are less than significant. The mitigation measures, as well as measures needed to ensure conformity with applicable laws, ordinances, regulations and standards, are included as conditions of certification. Staff's conclusions, based on analysis of the information submitted to date, are as follows:

1. The proposed project would be located in the Mojave Desert of San Bernardino County in an area characterized by braided stream channels, flash flooding, alluvial fan conditions, low rainfall, sparse vegetation, and the potential for wind erosion/ deposition.
2. The project proposes to place 34,000 solar dishes, known as SunCatchers, on individual pole foundations within areas known to be subject to flash flooding and erosion. Project-related changes to the braided and alluvial fan stream hydraulic conditions could result in on-site erosion, stream bed degradation or aggradation, and erosion and sediment deposition impacts to adjacent land. SunCatchers within the stream courses could be subject to destabilization by stream scour. Impacts to soils related to wind erosion and runoff-borne erosion are potentially significant, as are impacts to surface water quality from sedimentation and the introduction of foreign materials, including potential contaminants, to the project area. Compliance with laws, ordinances, regulations and standards and Conditions of Certification **SOIL&WATER-1, SOIL&WATER-2, SOIL&WATER-3** and **SOIL&WATER-5** will mitigate these potential impacts to a level less than significant.
3. The applicant completed a hydrologic study and hydraulic modeling of the major stream channels on the project site. The applicant has proposed the construction of large debris basins in channels upstream of the proposed solar array. The most recently-submitted design indicates that dams will be constructed to temporarily retain flows in the basins. The applicant has not submitted the comprehensive detail

that staff needs to analyze the ability of the basins to retain maximum flows and protect the project from flooding. As a result, staff has recommended adoption of Conditions of Certification **GEO-2** and **-3**, which contain performance standards that ensure that the design of the debris basin dams will comply with current engineering practices and existing regulations, and prevent significant impacts. However, any proposed design must comply with requirements set forth in Conditions of Certification **SOIL&WATER-1, -2, -3** and **-8**, which will ensure that no adverse impacts due to flooding will occur.

4. Basins or other form of flood protection have not been addressed for the three drainages that traverse private property near the center of the project and enter the proposed solar array. Impacts due to flooding in these areas are potentially significant without adequate mitigation. This condition leaves portions of the project subject to significant adverse impact due to flooding.

5. The applicant's Draft Drainage, Erosion, and Sedimentation Control Plan may mitigate the potential on site project-related storm water and sediment impacts. However, the calculations and assumptions used to evaluate potential storm water and sedimentation impacts in the Draft Plan are imprecise and have limitations and uncertainties associated with them such that the magnitude of potential impacts that could occur cannot be determined precisely. As a result, staff drafted Conditions of Certification **SOIL&WATER-1, -2** and **-3** to define specific methods of design analysis, development of best management practices, and monitoring and reporting procedures to mitigate impacts related to flooding, erosion, sedimentation, and stream morphological changes.

6. The applicant has not provided information necessary to complete development of requirements for dredge and fill in waters of the state. Compliance with LORS, particularly the Clean Water Act requirements, will insure no adverse impacts to waters of the state.

7. Surface water and groundwater quality could be affected by construction activities and ongoing operational activities on the project site including mirror washing, vehicle use and fueling, storage of oils and chemicals, the proposed septic and leach field system for sanitary wastes, and wastes generated from the water treatment system. These impacts are potentially significant. Conditions of Certification **SOIL&WATER-1** (Drainage Erosion Sedimentation Control Plan), **SOIL&WATER-2** (Waste Discharge Requirements), **SOIL&WATER-3** (Storm Water Damage Monitoring and Response Plan) and **SOIL&WATER-5** (Septic System and Leach Field Requirements) will mitigate these potential impacts to a level less than significant. The applicant has not provided information necessary to complete development of requirements for discharges of brine waters to evaporation ponds or sanitary septic systems. However, staff has identified performance standards that will ensure no significant adverse impacts will occur, and included these performance standards in Conditions of Certification **SOIL&WATER-2,** and **-3** and **Soil and Water Appendix B.**

8. There is uncertainty in the long-term reliability of the proposed water supply. Condition of Certification **SOIL&WATER-9** is proposed to provide water conservation and plans for an alternative supply, if necessary, to ensure power plant and potable water demands are met for the project.

9. Dust control (during both construction and operation) and mirror washing (during operation) will comprise the primary water uses for the project. Daily maximum water use is estimated to be 43.7gallons per minute (gpm) during construction and 69.8 gpm during operation (maximum annual construction and operational water use is 142.4 AFY and 20.4 AFY, respectively). Condition of Certification **SOIL&WATER-4** ensures groundwater storage depletion and water level declines due to project groundwater use are less than significant by limiting annual construction water use to 145 AF and annual operational water use to 21 AF.

10. Water budget estimates and simulated drawdown due to proposed project pumping indicate groundwater storage depletion and water level declines will be less than significant. Condition of Certification **SOIL&WATER-4** limits annual groundwater use during construction and project operations. Condition of Certification **SOIL&WATER-7** shall confirm these findings by requiring groundwater level monitoring and reporting to document pre-project groundwater conditions and measure changes that occur as a result of groundwater use for project construction and operations.

11. Waste water will be generated as a byproduct of water treatment processes, equipment maintenance and from sanitary practices. Conditions of Certification **SOIL&WATER-2** and **-5** are proposed by staff to ensure impacts caused by generation and disposal of wastewater would be less than significant.

12. The proposed project would use air-cooled radiators fitted on each individual engine for heat rejection. Use of this technology would substantially reduce potential water use and is consistent with Energy Commission water policy.

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SOIL AND WATER RESOURCES – APPENDIX A
ACRONYMS USED IN THE SOIL AND WATER RESOURCES SECTION

AF	acre-feet
AFY	acre-feet per year
BFE	Base Flood Elevation
BNSF	Burlington North Santa Fe
BMP	Best Management Practices
Caltrans	California Department of Transportation
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
cfs	cubic feet per second
CPM	Compliance Project Manager
CLOMR	Conditional Letter of Map Revision
CSDD	Capitol Storm Design Discharge
CVWD	Coachella Valley Water District
CWA	Clean Water Act
CWC	California Water Code
DESCP	Drainage, Erosion, and Sediment Control Plan
DFIRM	Digital Flood Insurance Rate Map
DTSC	Department of Toxic Substances Control
DWA	Desert Water Agency
DWR	Department of Water Resources
FEMA	Federal Emergency Management Agency
FIS	Flood Insurance Study
FIRMS	Flood Insurance Rate Maps
FSA	Final Staff Assessment
gpd	Gallons per day
gpm	gallons per minute
IEPR	Integrated Energy Policy Report
KCWA	Kern County Water Agency
LORS	laws, ordinances, regulations, and standards
mg/l	milligrams per liter
MW	megawatt
MWD	Metropolitan Water District of Southern California
NFIP	National Flood Insurance Program
NOI	Notice of Intent

NPDES	National Pollutant Discharge Elimination System
NRCS	National Resources Conservation Services
NWS	National Weather Service
NOAA	National Oceanic and Atmospheric Administration
Porter-Cologne	Porter-Cologne Water Quality Control Act
PSA	Preliminary Staff Assessment
RCRA	Resource Conservation and Recovery Act
RWQCB	Regional Water Quality Control Board
SFHA	Special Flood Hazard Area
SPRR	Southern Pacific Railroad
SSG	Solar Steam Generator
STG	Steam Turbine Generator
SWP	State Water Project
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TDS	total dissolved solids
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
WQMP	Water Quality Management Plan
WSP	Water Supply Plan
WWTP	wastewater treatment plant
ZLD	zero liquid discharge

SOIL AND WATER RESOURCES – APPENDIX B
FACTS FOR WASTE DISCHARGE

CALICO SOLAR PROJECT
SAN BERNARDINO COUNTY
Prepared by staff of the
Lahontan Regional Water Quality Control Board
for the
CALIFORNIA ENERGY COMMISSION

1. Reason for Action and Regulatory Authority

   The Applicant filed an Application for Certificate (AFC) with the Energy Commission on December 2, 2008. The application was originally submitted by SES Solar One, LLC, SES Solar Three, LLC and SES Solar Six, LLC as the SES Solar One Project. In January 2010, the above entities merged into Calico Solar, LLC and the name of the SES Solar One Project changed to the Calico Solar Project (Project).

   The AFC proposed the construction and operation of an 850-megawatt (MW) solar power plant on private and federal lands using the Applicant's proprietary SES SunCatcher™ technology. The technology consists of an approximate 38-foot high by 40-foot wide solar concentrator dish that supports an array of curved glass mirror facets. The mirrors collect and focus solar energy onto the heat exchanger of a power conversion unit. The power conversion unit then converts the solar thermal energy into 25 kilowatts of electricity. This power is then supplied to the grid as groups of SunCatchers are constructed. Construction of the power plant is scheduled to occur in two phases. The first phase would be developed for 275 MW and include the installation of up to 11,000 SunCatchers. The second phase would expand the Project to a total of 34,000 SunCatchers for a cumulative 850 MW. In conjunction with Project construction, the Applicant proposes to discharge wastes, dredged, and/or fill material to State waters. Additionally, construction and operation of the Project have the potential to impact water quality.

   Under the Warren-Alquist Act, and Governor's Executive Order S-14-08, the California Energy Commission (Energy Commission) has the authority to streamline permitting for renewable energy generation facilities. The Energy Commission implements this "in lieu of" process by incorporating the regulatory requirements and conditions of the various local and State agencies in its certification process. In accordance with Water Code Section 13263, the Lahontan Water Board hereby "prescribes" the waste discharge requirements as adopted by the California Energy Commission for the Calico Solar Project. Because the Energy Commission has exclusive permitting authority over the Project under Public Resources Code section 25500, the Lahontan Water Board "prescribes" the waste discharge requirements for the sole purpose of authorizing the Lahontan Regional Board to enforce them and undertake associated monitoring, inspection, and annual fee collection as if the waste discharge requirements were adopted by the Lahontan Water Board.

   In a May 5, 2010 letter**,** the U.S. Army Corps of Engineers (USACE) determined that the drainages on the site are not waters of the United States (U.S.). However, the drainages affected by the Project are waters of the State, as defined by California Water Code (Water Code) section 13050, and are subject to State requirements in accordance with Water Code section 13260 and to the Water Quality Control Plan for the Lahontan Region (Basin Plan). All actions impacting or potentially impacting these drainages, including dredge and fill activities and construction and industrial activities, will be regulated through these requirements, which will be incorporated in the Energy Commission's certification process.

2. Waste Discharge Requirements History

The Project is a new facility. There are no previous Lahontan Regional Water Quality Control Board (Lahontan Water Board) actions for this Project or location. The final *Facts, Requirements, Groundwater Monitoring and Reporting Program* and *Surface Water Monitoring and Reporting Program* for waste discharges will address storm water, dredge and fill, and groundwater requirements for the Project. The Groundwater and Surface Water Monitoring Programs are not included in these draft documents but will be included with the final documents after the Applicant submits a Report of Waste Discharge.

3. Climate

The Mojave Desert has a typical desert climate, i.e., extreme daily temperature changes, low annual precipitation, strong seasonal winds, and mostly clear skies.

The annual highest temperature in the Mojave Desert exceeds 100 degrees Fahrenheit. Winter temperatures are more moderate, with mean maximum temperatures in the 60s and lows in the 30s.

Nearby Barstow has a total average annual precipitation of less than 5 inches. Nearly 70 percent of the precipitation occurs between November and March. However, occasional heavy precipitation occurs in the summer due to thunderstorms.

4. Site Geology

   a. Setting

   The Project is located in the Lavic Valley in the east-central portion of the Mojave Desert geomorphic province, which is characterized by broad expanses of desert with localized mountains and dry lakebeds. The Project area occupies a broad alluvial fan/plain and is bounded on the north by the Cady Mountains, Sleeping Beauty Peak to the east, Pisgah Crater to the south, and the Lake Manix and Troy Lake basins to the west. Surface geology beneath the Project consists primarily of Quaternary alluvium and fanglomerate overlying older Quaternary alluvium. Small outcrops of Tertiary basaltic and andesitic volcanic rock outcrops are located in the northeastern portion of the Project site. Small amounts of Holocene basalt from the Pisgah Crater eruption overlay the Quaternary alluvial deposits on the southwest and southeast edges of the Project site.

   The elevation of the Project ranges from approximately 1,800 feet to 2,860 feet above mean sea level with topography generally sloping from the Cady Mountains toward the local topographic low at the normally dry Troy Lake. Slopes range from two to five percent across the site except for the western portion where slopes reduce to one percent.

b. Faulting and Seismicity

The Project site is located within a structural area variously referred to in literature as the Barstow-Bristol trough, the Eastern California Shear Zone, and the Mojave Extensional Belt. All refer, fully or in part, to an area of the Mojave Desert Geomorphic Province, which is characterized by northwest-trending right-lateral strike-slip faulting which has accounted for approximately 40 miles of extensional faulting since the middle Miocene.

Thirty-two faults and fault segments were identified within 80 miles of the Project site. Of the these, two are located within 5 miles of the Project; the Lavic Lake and Pisgah-Buillon fault zones, both of which are designated Alquist-Priolo Earthquake Fault Zones. The Hector Mine Mw 7.1 earthquake of October 16, 1999 occurred along the apparent strike of both of these faults approximately 18 miles south of the Project area. This earthquake resulted in horizontal slip over an estimated 28 miles with a maximum displacement of approximately 17 feet. An unnamed Mw 5.1earthquake occurred within the Project boundaries near the northern end of the Pisgah-Bullion fault zone, approximately 1 mile west of the proposed control building site, on December 16, 2008.

Two other fault systems, the Cady fault and the Ludlow fault, also have the potential to cause ground shaking. The Cady Fault is an east-west-trending left-lateral strike-slip fault within the Cady Mountains approximately 3 miles north of the northern site boundary. Quaternary movement has been documented on the Cady Fault where it offsets older alluvium. Younger alluvium covers the eastern end of the Cady Fault suggesting no recent movement. The Ludlow Fault is a northwest-trending right-lateral strike-slip fault that extends to within approximately 12 miles of the eastern boundary of the proposed project site. Quaternary movement has been reported for the Ludlow Fault.

The potential for actual fault-related ground rupture at the Project is considered very low, but evidence of Holocene movement has been found on nearly every major fault in the Eastern California Shear Zone. Events such as the Hector Mine earthquake and the unnamed earthquake of December 16, 2008 show the proposed site could be subject to intense levels of earthquake related ground shaking in the future.

c. Soils

Two soil associations would primarily be affected by the Project; the Carrizo-Rositas-Gunsight and the Nickel-Arizo-Bitter associations. The Carrizo-Rositas-Gunsight soil association occupies the majority of the site, while the Nickel-Arizo-Bitter association is present over much of the southern portion of the site, south of the Burlington Northern Santa Fe rail lines. The Carrizo-Rositas-Gunsight soils have a loamy fine sand texture, are somewhat excessively drained, indicate a permeability of 6-20 inches per hour, and have a 0.15 erosion (K) factor. The Nickel-Arizo-Bitter soils have a gravelly sandy loam texture, are well drained, indicate a 2 to 6 inch per hour permeability, and have a 0.10 erosion (K) factor. Erosion values below 0.15 indicate low erosion potential whereas erosion values above 0.4 are highly erodible.

5. Groundwater

The Project is located in the portions of the Lavic Valley and Lower Mojave River Valley groundwater basins (Department of Water Resources [DWR] groundwater basins No. 7-14 and 6-40, respectively). The Lavic Valley basin is bounded by non water-bearing rocks of the Cady Mountains on the north and east, of the Bullion Mountains on the south and east, of the Lava Bed Mountains on the southwest. The Pisgah fault appears to be a groundwater divide between the two groundwater basins. Parts of the eastern and northern boundaries are drainage divides. In the northern part of the basin, surface drainage and groundwater flow is toward Hector Siding and in the southern part of the basin, surface drainage and groundwater flow is toward Lavic (dry) Lake.

DWR Bulletin No. 118 indicates that groundwater in the Lavic Valley basin is found in Quaternary alluvial and lacustrine deposits. However, results of Well #3 installation activities indicate that the groundwater in Well #3, screened from 552 to 802 feet below ground surface (bgs) and from 1,042 to 1,142 feet bgs, is derived from older Tertiary-age deposits including sandstones, claystones, fanglomerates derived from granite and volcanics that are currently exposed in the Cady Mountains, and volcanics. Holocene age alluvium consists of unconsolidated, well-sorted, fine- to coarse-grained sand, pebbles, and boulders with variable amounts of silt and clay deposited in washes and alluvial fans. Pleistocene age deposits are composed of gently tilted, unconsolidated to moderately consolidated, moderately well bedded gravel, sand, silt and clay. Recharge to the basin is from percolation of runoff from surrounding mountains through alluvial fans and washes. Subsurface flow from adjoining basins may also contribute to recharge. The southwest-trending Pisgah fault is the northwest boundary of the Lavic Valley groundwater basin, and water levels appear to drop eastward across the fault, which indicates that this fault is likely a barrier to groundwater flow. The Lavic Lake fault cuts through the southern part of the Lavic Valley groundwater basin, but it is not known whether this fault is a groundwater barrier.

6. Water Supply

The Applicant has proposed using Well #3, a 1,142 feet deep well located on APN 0529-281-34 that was completed in April 2010, as the primary water supply for the Project. Depth to water in Well #3 was approximately 343 feet bgs on April 18, 2010. Condition of Certification **SOIL&WATER**-**4** specifies that the Project shall not exceed 245 acre-feet per year (AFY) for all construction activities and 20 AFY for all operational activities. Pumping tests at Well #3 indicate that Well #3 can support the water demands of the Project and will not adversely affect water quality or groundwater levels during the Project. The Applicant will also submit a Groundwater Level Monitoring and Reporting Plan as required by Condition of Certification **SOIL&WATER-8** to ensure that no adverse affects are occurring because of the Project.

Water samples collected from Well #3 in April 2010 indicated arsenic and fluoride concentrations above primary maximum contaminant levels (MCLs) and iron, manganese, sulfate, specific conductance and total dissolved solids (TDS) concentrations above secondary MCLs. These results, including a 1,340 mg/L TDS concentration, indicate fresh water in Well #3; however, due to the MCL exceedences and TDS concentrations, the groundwater would not be suitable for drinking water, mirror washing, or hydrogen generation without some form of treatment. The Applicant has proposed treating the water at an onsite facility prior to use. Water from Well #3 would be transported to the Main Services Complex via an underground waterline where it would be treated utilizing a reverse osmosis system, which may include a de-mineralization stage for mirror washing and hydrogen generation usage.

7. <u>Surface Water</u>

   There are no perennial streams within the Project area. The Project site encompasses a series of coalesced alluvial fans that drain the Lava Bed Mountains to the south and the Cady Mountains to the north. Incised washes exist at the base of the Cady Mountains outside of the Project area. Sands transported to the valley floor by fluvial processes are redistributed by the wind to form a series of vegetated dunes adjacent to the larger washes.

   Surface water flow does not occur within the Project area during most years. When water does flow, it is usually the result of precipitation occurring during 5- to 10-year storm events. During high flows, surface water runoff across the site and from the surrounding hills generally flows southwesterly toward Troy Lake.

8. <u>Land Uses and Existing Site Conditions</u>

   The Project site is located on approximately 6,215 acres of land in San Bernardino County approximately 37 miles east of Barstow. The Project site consists primarily of public land managed by the Bureau of Land Management; however there are approximately 2,246 acres of undeveloped private land within the Project boundaries. This private land is under the jurisdiction of San Bernardino County and would not be part of the Project. There is also approximately 775 acres on the northeast portion of the Project that have been designated as Land and Water Conservation Fund mitigation lands.

   The Project site consists primarily of mostly undisturbed desert alluvial sands and desert flora. Existing on-site land uses include the Burlington Northern Santa Fe railroad right of way, several underground high pressure gas pipelines, and Southern California Edison's Pisgah Substation and overhead transmission lines. The surrounding area consists of undeveloped desert land and mountain terrain including wilderness study areas (WSA), areas of critical environmental concern (ACEC), and desert wildlife management areas (DWMA) along with small rural communities. The closest community is Newberry Springs located approximately 10 miles west of the Project. The Cady Mountain WSA is located directly adjacent to the northern Project boundary. The Pisgah ACEC is adjacent to the southeastern Project boundary. The Ord-Rodman DWMA is located adjacent to the southwestern Project boundary.

9. <u>Description of Direct Impacts to State Waters</u>

   The Project would directly or indirectly affect numerous ephemeral washes that occur on the Project site. The Applicant initially identified 1,099 acres of State waters on the Project site, with construction activities resulting in 356 acres of temporary impacts and 258 acres of permanent impacts. In total, this would result in direct impacts to 56% of the State jurisdictional drainages on site. However, because of the altered hydrology, the Project would result in impacts to all 1,099 acres of washes present on the site. In addition, washes located downstream of the project would be subject to impacts related to the modification of drainage patterns onsite. The attenuation of peak storm flows and the subsequent loss of sediment to the system from the detention basins can adversely affect biological resources dependent on these features. Since the initial evaluation, the Applicant has reduced the Project size and modified the drainage design resulting in lower State Water acreage and impact estimates. At this time, the Applicant has not provided revised estimates related to State Waters and impacts to account for the revised Project boundaries and design; however, these forthcoming estimates will be lower than originally proposed.

10. Mitigation and Monitoring Plan (and long-term management)

The Applicant has not proposed specific mitigation to reduce impacts to State Waters, nor provided updated calculations following the reduction of Project size; however, the CEC proposed Condition of Certification **BIO-27**, which includes acquisition of off-site waters, the implementation of Best Management Practices, and the replacement of lost smoke tree and catclaw acacia habitats as a potential mitigation measures. The Applicant can possibly meet the mitigation requirements of **BIO-27** with the implementation of **BIO-17**, which requires compensatory mitigation lands for desert tortoise. Condition of Certification **BIO-29** also requires a Channel Decommissioning and Reclamation Plan and financial assurances to guarantee an adequate level of funding to implement decommissioning and closure.

11. Storm Water Discharges

Under pre-development conditions, the Facility site has a low gradient (between 2 and 5 percent) and storm water moves primarily via sheet flow and shallow concentrated flow. These conditions may be permanently modified by Project construction.

The following will regulate waste discharges in storm water runoff and other discharges associated with Project construction activity and industrial storm water runoff.

The Applicant is to maintain pre-development infiltration, surface retention and recharge rates in order to minimize post-development impacts to offsite water bodies and underlying groundwater. The Applicant is required to avoid adverse effects of altering the hydrologic characteristics (hydromodification) of the Project by site design and construction practices in accordance with the following:

a. Construction Storm Water Management

The Applicant estimates that Project construction will occur in two phases. Construction is tentatively scheduled to occur over an approximate five-year period beginning in 2010 through 2013 for Phase I and from 2013 through 2015 for Phase II. Construction activities will include the installation and connection of the SunCatcher™ solar groups; the building of the Main Services Complex and associated facilities; construction of access roads and laydown areas; installation of transmission towers and cable; trenching for underground water and hydrogen pipelines; and infrastructure improvements. Work associated with the above-activities include site preparation and grading; foundation construction; erection of major equipment and structures; installation of piping and pumps, electrical systems and control systems; and startup/testing.

Erosion and sedimentation control will be implemented to retain sediment on-site and to prevent violations of water quality standards. Site drainage during construction will follow predevelopment flow patterns, with discharge ultimately occurring at the Burlington Northern Santa Fe right of way and at the westernmost property boundary. A primary component of storm water management involves the construction of detention basins along the northern Project boundary to intercept flows from the Cady Mountains and provide for storm peak attenuation of the surface flows, thus protecting the Project from flooding, sediment deposition, and scour.

Fifteen days prior to beginning construction activities, the Applicant will submit design documents, including the proposed drainage structures and the grading plan; an erosion and sedimentation control plan; related calculation and specifications; and soils, geotechnical, or foundation investigation reports, for review and approval as specified in Condition of Certification Civil-1. Site drainage will be managed in accordance with the best management practices (BMPs) as described in the *Final Storm Water Pollution Prevention Plan* (SWPPP), *Biological Resources Mitigation Implementation and Monitoring Plan* (BRMIMP) and *Final Drainage, Erosion, and Sediment Control Plan* (DESCP).

b. Post-Construction Storm Water Management

The Applicant proposes to manage storm water, erosion and sedimentation at the completed Facility through a comprehensive system of source controls, treatment BMPs, and site design. At a minimum, the Applicant proposed to adhere to San Bernardino County's detention and retention requirements. Site drainage will be managed in accordance with the BMPs as described in the Final SWPPP, BRMIMP and Final DESCP.

Onsite storm water will be diverted to detention areas distributed throughout the Facility. The detention areas will be designed to retain the 100-year on-site runoff and debris flows and retain 4-years of average sediment accumulation for the area or subarea they are designed to serve. After the 4-years average sediment accumulation is captured, the sediment will be removed from the basins and distributed on-site.

Off-site storm water flow will be intercepted prior to entering the Project by a series of large debris basin constructed along the northern boundary of the Project. The basins will be sized to retain the storm water discharge and associated debris resulting from the 100-year storm.

12. Receiving Waters

The receiving waters are the minor surface waters of the Troy Valley Hydrologic Area (Hydrologic Subunit 628.62) and groundwaters of the Lavic Valley and Lower Mojave River Valley groundwater basins (Department of Water Resources [DWR] groundwater basins No. 7-14 and 6-40, respectively).

13. <u>Lahontan Basin Plan</u>

The Lahontan Water Board adopted a Water Quality Control Plan for the Lahontan Basin (Basin Plan), which became effective on March 31, 1995. These requirements implement the Basin Plan.

14. <u>Beneficial Uses -Surface Waters</u>

The Basin Plan designates beneficial uses for surface waters in each watershed of the Lahontan region. Beneficial uses of surface waters within the Facility area and vicinity that could be impacted by the Facility include:

a. municipal and domestic water supply (MUN),
b. agricultural supply (AGR),
c. groundwater recharge (GWR),
d. water contact recreation (REC-1),
e. non-contact water recreation (REC-2),
f. warm freshwater habitat (WARM),
g. cold freshwater habitat (COLD),
h. wildlife habitat (WILD).

15. <u>Beneficial Uses -Groundwaters</u>

The Basin Plan designates beneficial uses for groundwaters in each watershed of the Lahontan region. Beneficial uses of groundwaters within the Facility area and vicinity that could be impacted by the Facility include:

a. municipal and domestic water supply (MUN),
b. agricultural supply (AGR),
c. industrial surface supply (IND),
d. freshwater replenishment (FRSH).

16. <u>Non-Degradation</u>

The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16 (*Statement of Policy with Respect to Maintaining High Quality of Waters in California*). Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings or facts. The Basin Plan implements, and incorporates by reference, state antidegradation policies. The permitted discharge is consistent with the antidegradation provision of Resolution No. 68-16 because no degradation is proposed.

In accordance with State Water Board Resolution No. 68-16 and the Basin Plan, the following conditions must be met prior to any degradation of water of the State:

a. Any change in water quality must be consistent with maximum benefit to the people of the State;

b. The degradation will not unreasonably affect present and anticipated beneficial uses;

c. The degradation will not result in water quality less than that prescribed in the Basin Plan;

d. Discharges must use the best practicable treatment or control to avoid pollution or nuisance and maintain the highest water quality consistent with maximum benefit to the people of the State.

17. Other Considerations and Requirements for Discharge

Pursuant to Water Code section13241, these requirements take into consideration:

a. Past, present, and probable future beneficial uses of water.

These requirements identify past, present and probable future beneficial uses of water as described in Facts Nos. 14 and 15. The proposed discharge will not adversely affect present or probable future beneficial uses of water, including domestic water supply, agricultural supply, industrial supply, and freshwater replenishment.

b. Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto.

Facts Nos. 6 through 10 describe the environmental characteristics and quality of water from this hydrographic unit.

c. Water quality conditions that could reasonably be achieved through the coordinated control of all factors that affect water quality in the area.

These requirements will not result in any significant changes to groundwater quality. Adverse effects to surface water quality will be minimized.

d. Economic considerations.

These requirements authorize the Discharger to implement closure and post-closure maintenance actions at the Facility as proposed by the Discharger. These requirements accept the Discharger's proposed actions as meeting the best practicable control method for protecting water quality from impacts from the Facility.

e. The need for developing housing within the region.

The Discharger is not responsible for developing housing within the region.

f. The need to develop and use recycled water.

The Energy Commission and the Discharger are currently evaluating the feasibility of using recycled water as the water source for Facility operations.

SURFACE IMPOUNDMENTS

18. Description of Surface Impoundments (evaporation ponds)

The Applicant has not provided a Report of Waste Discharge (ROWD) associated with the proposed surface impoundments, but did provide general details within the AFC and the May 2010 Applicant’s Supplement. The Applicant proposed two surface impoundments to be used for the disposal of wastewater generated by the reverse osmosis water treatment system. The Applicant assumes that the wastewater will be classified as a “designated waste” and will need to comply with the requirements for Class II surface impoundments set forth in California Code of Regulation (CCR) title 27. Each pond is estimated to cover approximately one-half acre in surface area and will be designed to contain one year of wastewater discharge. Wastewater will be directed to each pond on an alternating basis, with accumulated bottom solids being tested and disposed of after undergoing the evaporation process. The construction design, inspection, maintenance, and associated monitoring program for the surface impoundments should be included within the forthcoming ROWD and demonstrate compliance with CCR title 27.

19. Surface Impoundments Construction Design

The Applicant has yet to submit a Report of Waste Discharge describing the construction design of the surface impoundments; however, any proposed design must comply with requirements set forth in CCR title 27 including requirements to contain the 1,000-year, 24-hour precipitation storm event (CCR, title 27, section 20310) while maintaining the mandatory 2-foot freeboard requirement.

20. Leachate Collection and Removal System (LCRS)

In accordance with CCR, title 27, section 20340, LCRS are required for Class II surface impoundments. The construction design, inspection and maintenance requirements for the LCRS should be included within the forthcoming ROWD.

21. Action Leakage Rate of Surface Impoundment Liners

The Action Leakage Rate (ALR) is the allowable leakage from the primary liner system above which a spill prevention, control, and countermeasure (SPCC) plan actions are triggered. According to Code of Federal Regulations, title 40, section 264.222, the ALR is defined as "…the maximum design flow rate that the leak detection system can remove without the fluid head on the bottom liner exceeding 1 foot." The ALR must also include an adequate safety margin to allow for variability in the containment system design (e.g., liner and collection pipe slope, interstitial fill hydraulic conductivity, thickness of drainage material, etc.). The estimated ALR for the surface impoundments has not been provided. Any ALR will need to have field verification because this rate will vary depending on actual drainage material used and its hydraulic conductivity. A final ALR will be submitted to the California Energy Commission based on field analysis. Flow totalizer monitoring at each surface impoundment sump will be required to determine the leakage rate through the primary liner. If the leakage rate exceeds the ALR, then the appropriate actions in the SPCC Plan will be implemented.

GROUNDWATER MONITORING NETWORK

22. Groundwater Monitoring Network (GMN)

The Applicant has not submitted a ROWD containing description of the proposed monitoring programs. Any proposed monitoring program needs to comply with CCR title 27, section 20415.

MONITORING PROGRAMS

23. Statistical Methods

Statistical analysis of monitoring data is necessary for the earliest possible detection of a statistically significant evidence of a release of waste from the Facility. CCR, title

27 requires statistical data analysis. Any proposed Monitoring and Reporting Programs (MRPs) needs to include methods for statistical analysis. The monitoring parameters to be listed in the MRPs are believed to be the best indicators of a release from the Facility.

24. Detection Monitoring Program

Pursuant to CCR, title 27 section 20420, the Applicant needs to propose a detection monitoring program for the Facility. The detection monitoring program for the surface impoundments may consist of LCRS monitoring, a moisture detection network, and monitoring wells to evaluate the presence of the constituents of concern. The program to monitor the LCRS and water bearing media for evidence of a release, as well as the monitoring frequency should be specified in the MRP.

25. Evaluation Monitoring Program

An Evaluation Monitoring Program is required, pursuant to CCR, title 27 section 20425, to evaluate evidence of a release if detection monitoring and/or verification procedures indicate evidence of a release.

26. Corrective Action Program

A Corrective Action Program (CAP) to remediate detected releases from the surface impoundments or land treatment unit may be required pursuant to CCR, title 27, section 20430, if results of an EMP warrant a CAP.

27. Closure and Post-Closure Maintenance Plan for the Surface Impoundments

The Applicant must submit a preliminary closure plan for the surface impoundments.

28. Reasonably Foreseeable Release for the Surface Impoundments

The Applicant must submit a CAP to address a reasonably foreseeable release.

29. Narrative and Numerical Water Quality Objectives

The Basin Plan incorporates narrative and numerical water quality objectives that apply to all ground and surface waters within the Lahontan Region. In general, where more than one objective is applicable, the stricter objective applies.

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SOIL AND WATER RESOURCES – APPENDIX C
REQUIREMENTS FOR WASTE DISCHARGE

I. DISCHARGE SPECIFICATIONS

A. Storm Water Discharges

Waste in discharges of storm water must be reduced or prevented to achieve the best practicable treatment level using controls, structures, and management practices. The Applicant shall comply with all requirements (with the exception of purely administrative requirements, e.g., filing a Notice of Intent) contained in State Water Board's *Waste Discharge Requirements For Discharges of Storm Water Discharges Associated With Construction Activity, General Permit No. CAS00002* and *Waste Discharge Requirements For Discharges of Storm Water Associated With Industrial Activities, General Permit No. CAS00001* and all subsequent revisions and amendments.

These requirements do not preclude the Applicant from requirements imposed by municipalities, counties, drainage districts, and other local agencies regarding discharges of storm water to separate storm sewer systems or other water, conveyances and water bodies under their jurisdiction.

B. Receiving Water Limitations

Surface Water and Groundwater Objectives

Receiving water limitations are narrative and numerical water quality objectives contained in the Water Quality Control Plan for the Lahontan Basin (Basin Plan) for all surface waters and groundwaters of the Lahontan Region. As such, they are required to be met. The discharge of waste to surface waters shall not cause, or contribute to, a violation of the following water quality objectives for waters of the Troy Valley Hydrologic Unit.

a. <u>Ammonia</u>

Ammonia concentrations shall not exceed the values listed in Tables 3-1 to 3-4 of the Basin Plan for the corresponding conditions in these tables. Tables 3-1 to 3-4 of the Basin Plan are incorporated into these requirements by reference.

b. <u>Bacteria, Coliform</u>

i. Waters shall not contain concentrations of coliform organisms attributable to anthropogenic sources, including human and livestock wastes.

ii. The fecal coliform concentration during any 30-day period shall not exceed a log mean of 20/100 milliliter (ml), nor shall more than 10 percent of all samples collected during any 30-day period exceed 40/100 ml. The log mean shall ideally be based on a minimum of not less than five samples collected as evenly spaced as practicable during any 30-day period. However, a log mean concentration exceeding 20/100 ml, or one sample exceeding 40/100 ml, for any 30-day period shall indicate violation of this objective even if fewer than five samples were collected.

c. Biostimulatory Substances

Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect the water for beneficial uses.

d. Chemical Constituents

i. Waters designated as MUN (a beneficial use of surface water of the Troy Valley Hydrologic Unit) shall not contain concentrations of chemical constituents in excess of the maximum contaminant level (MCL) or secondary MCL based upon drinking water standards specified in provisions of the CCR, Title 22, Division 4, Chapter 15, hereby incorporated by reference into these requirements. This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect.

ii. Waters shall not contain concentrations of chemical constituents in amounts that adversely affect the water for beneficial uses.

e. Chlorine, Total Residual

For the protection of aquatic life, total chlorine residual shall not exceed either a median value of 0.002 milligrams per liter (mg/L) or a maximum value of 0.003 mg/L. Median values shall be based on daily measurements taken within any six-month period.

f. Color

Waters shall be free of coloration that causes nuisance or adversely affects the water for beneficial uses.

g. Dissolved Oxygen

i. The dissolved oxygen concentration as percent saturation shall not be depressed by more than 10 percent, nor shall the minimum dissolved oxygen concentration be less than 80 percent of saturation.

ii. For waters with the beneficial uses of WARM (a beneficial use of surface water in the Troy Valley Hydrologic Area), the minimum dissolved oxygen concentration shall not be less than that specified in Table 3-6 of the Basin Plan. Table 3-6 of the Basin Plan is incorporated herein by reference.

h. Floating Materials

i. Waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect the water for beneficial uses.

ii. The concentrations of floating material shall not be altered to the extent that such alterations are discernible at the 10 percent significance level.

i. Oil and Grease

i. Waters shall not contain oils, greases, waxes or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect the water for beneficial uses.

ii. The concentration of oils, greases, or other film or coat generating substances shall not be altered.

j. Pesticides

i. For the purposes of these requirements, pesticides are defined to include insecticides, herbicides, rodenticides, fungicides, piscicides and all other economic poisons. An economic poison is any substance intended to prevent, repel, destroy, or mitigate the damage from insects, rodents, predatory animals, bacteria, fungi, or weeds capable of infesting or harming vegetation, humans, or animals (California Agriculture Code 12753).

ii. Pesticide concentrations, individually or collectively, shall not exceed the lowest detectable levels, using the most recent detection procedures available. There shall not be an increase in pesticide concentrations found in bottom sediments. There shall be no detectable increase in bioaccumulation of pesticides in aquatic life.

iii. Waters designated as MUN shall not contain concentrations of pesticides or herbicides in excess of the limiting concentrations set forth in the CCR, Title 22, Division 4, Chapter 15. This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect.

k. pH

i. In fresh waters with designated beneficial use of WARM, changes in normal ambient pH levels shall not exceed 0.5 pH units.

ii. The California Energy Commission recognizes that some waters of the Lahontan Region may have natural pH levels outside of the 6.5 to 8.5 range. Compliance with the pH objective for these waters will be determined on a case-by-case basis.

l. Radioactivity

i. Radionuclides shall not be present in concentrations, which are deleterious to human, plant, animal, or aquatic life nor which result in the accumulation of radionuclides in the food web to an extent, which presents a hazard to human, plant, animal, or aquatic life.

ii. Waters designated as MUN shall not contain concentrations of radionuclides in excess of the limits specified by the more restrictive of the CCR Title 22 Division 4, Article 5 sections 64441 et seq. This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect.

m. Sediment

The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect the water for beneficial uses.

n. Settleable Materials

Waters shall not contain substances in concentrations that result in deposition of material that causes nuisance or that adversely affects the water for beneficial uses. The concentration of settleable materials shall not be raised by more than 0.1 milliliter per liter.

o. Suspended Materials

i. Waters shall not contain suspended materials in concentrations that cause nuisance or that adversely affect the water for beneficial uses.

ii. The concentration of total suspended materials shall not be altered to the extent that such alterations are discernible at the 10 percent significance level.

p. Taste and Odor

Waters shall not contain taste or odor-producing substances in concentrations that impart undesirable tastes or odors to fish or other edible products of aquatic origin, that cause nuisance, or that adversely affect the water for beneficial uses. The taste and odor shall not be altered.

q. Temperature

i. The natural receiving water temperature of all waters shall not be altered unless it can be demonstrated to the satisfaction of the California Energy Commission that such an alteration in temperature does not adversely affect the water for beneficial uses.

ii. For waters designated WARM, water temperature shall not be altered by more than 5 degrees Fahrenheit above or below the natural temperature.

r. Toxicity

i. All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life.

ii. The survival of aquatic life in surface waters subjected to a waste discharge, or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge, or when necessary, for other control water that is consistent with the requirements for “experimental water” as defined in the most recent edition of *Standard Methods for the Examination of Water and Wastewater* (American Public Health Association, et al.).

s. Turbidity

i. Waters shall be free of changes in turbidity that cause nuisance or adversely affect the water for beneficial uses. Increases in turbidity shall not exceed natural levels by more than 10 percent.

ii. The discharge of waste to groundwaters shall not cause, or contribute to, a violation of the following water quality objectives for waters of the Lavic Valley and Lower Mojave River Valley Groundwater Basins.

a. Bacteria, Coliform

In groundwaters designated as MUN (a beneficial use of groundwater of the Lavic Valley and Lower Mojave River Valley Groundwater Basins), the median concentration of coliform organisms over any seven-day period shall be less than 1.1/100 milliliters.

b. Chemical Constituents

i. Groundwaters designated as MUN shall not contain concentrations of chemical constituents in excess of the maximum contaminant level (MCL) or secondary MCL based upon drinking water standards specified in provisions of the CCR, Title 22, Division 4, Chapter 15, hereby incorporated by reference into these requirements. This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect.

ii. Groundwaters shall not contain concentrations of chemical constituents in amounts that adversely affect the water for beneficial uses.

c. Radioactivity

Groundwaters designated as MUN shall not contain concentrations of radionuclides in excess of the limits specified by the more restrictive of the CCR Title 22 Division 4, Article 5 sections 64441 et seq. This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect.

d. Taste and Odor

Waters shall not contain taste or odor-producing substances in concentrations that cause nuisance or that adversely affect beneficial uses. For groundwaters designated MUN, at a minimum, concentrations shall not exceed adopted secondary MCLs based upon drinking water standards specified in provisions of the CCR, Title 22, Division 4, Chapter 15, hereby incorporated by reference into these requirements. This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect.

II. PROHIBITIONS AND REQUIREMENTS

The discharge of wastes and fill associated with the Facility must not violate the following waste discharge prohibitions. These waste discharge prohibitions do not apply to discharges of storm water when wastes in the discharge are controlled through the application of management practices or other means and the discharge does not cause a violation of water quality objectives. The California Energy Commission expects that control measures will be implemented in an iterative manner as needed to meet applicable receiving water quality objectives.

A. Regionwide Prohibitions

1. The discharge of waste[i] which causes violation of any narrative water quality objective contained in the Basin Plan, including the Nondegradation Objective, is prohibited.
2. The discharge of waste which causes a violation of any numeric water quality objective contained in the Basin Plan is prohibited.
3. Where any numeric or narrative water quality objective contained in the Basin Plan is already being violated, the discharge of waste which causes further degradation or pollution is prohibited.
4. The discharge of untreated sewage, garbage, or other solid wastes into surface waters of the Region is prohibited. (For the purposes of this prohibition, “untreated sewage” is that which exceeds secondary treatment standards of the Federal Water Pollution Control Act, which are incorporated in the Basin Plan in Section 4.4 under “Surface Water Disposal of Sewage Effluent.”)
5. For municipal[ii] and industrial[iii] discharges:
    a. The discharge, bypass, or diversion of raw or partially treated sewage, sludge, grease, or oils to surface waters is prohibited.
    b. The discharge of wastewater except to the designated disposal site (as designated in waste discharge requirements) is prohibited.
    c. The discharge of industrial process wastes[iv] to surface waters designated for the Municipal and Domestic Supply (MUN) beneficial use is prohibited. The discharge of industrial process wastes to surface waters not designated for the MUN use may be permitted if such discharges comply with the General Discharge Limitations in Section 4.7 of the Basin Plan and if appropriate findings under state and federal anti-degradation regulations can be made.

    Prohibitions 5(b) and 5(c) do not apply to industrial storm water. For control measures applicable to industrial storm water, see Section 4.3 of this Basin Plan, entitled “Stormwater Runoff, Erosion, and Sedimentation.”

Definitions:

[i] “Waste” is defined to include any waste or deleterious material including, but not limited to, waste earthen materials (such as soil, silt, sand, clay, rock, or other organic or mineral material) and any other waste as defined in the California Water Code § 13050(d).

[ii] “Municipal waste” is defined in Section 4.4 of the Basin Plan.

[iii] “Industry” is defined in Section 4.7 of the Basin Plan.

[iv] “Industrial process wastes” are wastes produced by industrial activities that result from one or more actions, operations, or treatments which modify raw material(s) and that may (1) add to or create within the effluent, waste, or receiving water a constituent or constituents not present prior to processing, or (2) alter water temperature and/or the concentration(s) of one or more naturally occurring constituents within the effluent, waste or receiving water. Certain non-stormwater discharges may occur at industrial facilities that are not considered to be industrial process wastes for the purposes of Prohibition 5(c). Examples include: fire hydrant flushing, atmospheric condensates from refrigeration and air conditioning systems, and landscape watering.

Prohibitions 5(b) and 5(c) do not apply to surface water disposal of treated ground water. For control measures applicable to surface water disposal of treated ground water, see Lahontan Regional Board Order No. 6-93-104, adopted November 19, 1993 (Basin Plan Appendix B).

B. Facility Discharge Prohibitions

1. Activities and waste discharges associated with the Facility must not cause or threaten to cause a nuisance or pollution as defined in Water Code section 13050.
2. The discharge, including discharges of fill material, must be limited to that described in the California Energy Commission's Conditions of Certification.
3. The discharge or deposition of any wastes into channels, surface water, or any place where it would be discharged or deposited where it would be eventually transported to surface waters, including the 100-year floodplain, must not contain or consist of any substance in concentrations toxic to animal or plant life.
4. The discharge or deposition of any wastes into channels, surface water, or any place where it would be discharged or deposited where it would be eventually transported to surface waters, including the 100-year floodplain, must not contain or consist of oil or other floating materials from any activity in quantities sufficient to cause deleterious bottom deposits, turbidity, or discoloration in surface waters.
5. The discharge of waste, as defined in the Water Code, that causes violation of any narrative water quality objective contained in the Basin Plan is prohibited.
6. The discharge of waste that causes violation of any numeric water quality objective contained in the Basin Plan is prohibited.
7. Where any numeric or narrative water quality objective contained in the Basin Plan is already being violated, the discharge of waste that causes further degradation or pollution (as defined in Water Code Section 13050) is prohibited.
8. The discharge of septic tank pumpings (septage) or chemical toilet wastes to other than a sewage treatment plant or a waste hauler is prohibited.

C. Requirements

1. The Applicant shall develop a final Storm Water Pollution Prevention Program (SWPPP) in accordance with the State Water Board's *General Permit No. CAS00001* and *General Permit No. CAS00002*. This SWPPP, or any future revision to this SWPPP, shall be implemented after approval by the Compliance Project Manager (CPM)
2. The Applicant must, at all times, maintain appropriate types and sufficient quantities of material on site to contain any spill or inadvertent release of materials that may cause a condition of pollution or nuisance if the materials reach waters of the State.

3. Discharges of wastewater generated by the Facility's operations, including cooling water, are not allowed to be released to the offsite environment.
4. The Applicant must permit California Energy Commission staff or their authorized representative upon presentation of credentials:
   a. Entry onto Facility premises.
   b. Access to copy any record required to be kept under the terms and conditions of the Conditions of Certification.
   c. Inspection of any treatment equipment, monitoring equipment, or monitoring method required by the Conditions of Certification.
   d. Sampling of any discharge or surface water covered by the Conditions of Certification.
5. The Applicant must immediately notify the California Energy Commission and Water Board by telephone whenever an adverse condition occurs as a result of this discharge. Such a condition includes, but is not limited to, a violation of the conditions of the Conditions of Certification, a significant spill of petroleum products or toxic chemicals, or damage to control facilities that would cause noncompliance. A written notification of the adverse condition must be provided to the California Energy Commission within two weeks of occurrence. The written notification must identify the adverse condition, describe the actions necessary to remedy the condition, and specify a timetable, subject to any modifications by California Energy Commission staff, for the remedial actions.
6. The Applicant must comply with the Monitoring and Reporting Program for Surface Water and the Monitoring and Reporting Program for Groundwater, to be included in these requirements after the Applicant submits a Report of Waste Discharge to the Lahontan Water Board.

III. PROVISIONS

A. Special Provisions for Fill Impacts to State Waters

1. Detailed final grading plans must be provided to the California Energy Commission a minimum of 60 days prior to commencement of construction activities.
2. Construction equipment must be clean and free from oil, grease, and loose metal material and must be removed from service if necessary to protect water quality.
3. No debris, cement, concrete (or wash water therefrom), oil or petroleum products must be allowed to enter into or be placed where it may be washed from the Facility site by rainfall or runoff into waters of the State. When operations are completed, any excess material must be removed from the Facility work area and any areas adjacent to the work area where such material may be transported into waters of the State as defined in Water Code section 13050.
4. No equipment may be operated in areas of flowing or standing water; no fueling, cleaning, or maintenance of vehicles or equipment must take place

within any areas where an accidental discharge to waters of the State may occur; construction materials and heavy equipment must be stored outside of the flow of the waters of the State. When work within the boundaries of waters of the State is necessary, the entire streamflow must be diverted around the work area, temporarily, as needed to control waste discharge.

B. Special Provisions for Storm Water

1. The Applicant must ensure that storm water discharges and non-storm water discharges do not cause or contribute to an exceedance of any applicable water quality standards.
2. At least 60 days prior to commencement of construction activities, the Applicant must develop and implement a Construction Area Monitoring Program (CAMP) in accordance with the Monitoring Program and Reporting Requirements for Surface Water.
3. Post-construction storm water flows emanating from the Facility site must not exceed predevelopment levels. Runoff from newly constructed impervious areas that is greater than background levels must be treated and detained to predevelopment runoff levels. Methods such as *low impact development* may be used to achieve this requirement (see State Board Resolution No. 2008-0030). Detention and/or infiltration facilities for a 10-year, one-hour storm event fulfills this requirement for the purposes of these requirements.
4. The Applicant must implement Best Management Practices (BMPs) to prevent or reduce the discharge of wastes associated with water contacting construction materials or equipment.
5. The Applicant must provide effective cover, mulch, fiber blankets, or other erosion control for soils disturbed by construction activities.
6. **The Applicant must provide BMPs for erosion stabilization for all areas of disturbed soil regardless of time of year, including erosion from rainfall, non-storm water runoff, and wind.**
7. The Applicant must stabilize from erosion all finished slopes, open space, utility backfill, and graded or filled lots within two weeks from when excavation or grading activity has been completed.
8. The Applicant must control runon from offsite areas, route flows away from disturbed areas in a manner that does not cause onsite or offsite erosion, and provide controls to minimize runon and problems from storm water flows into active or disturbed Facility areas from offsite areas.
9. The Applicant must, at all times, maintain effective perimeter controls and stabilize all construction entrances/exits sufficiently to control erosion and soil or sediment discharges from the site.
10. The Applicant must properly install and effectively maintain all BMPs for storm drain inlets and perimeter controls, runoff control BMPs, and stabilized entrances/exits.

11. The Applicant must ensure that construction activity traffic to and from the Facility is limited to entrances and exits that employ effective controls to prevent offsite tracking of soil.
12. The Applicant must ensure that all storm drain inlets and perimeter controls, runoff control BMPs, and pollutant control at entrances/exits are maintained and protected from activities that could reduce their effectiveness.
13. The Applicant must comply with the following source control requirements:
    a. Maintain vegetative cover to the extent possible by developing the Facility in a way that reduces the amount of soil exposed to erosion at any time.
    b. Inspect and remove accumulated deposits of soil at all inlets to the storm drain system at frequent intervals during rainy periods.
    c. Provide buffer strips and/or vegetation protection fencing between the active construction area and any water bodies.
    d. Provide “good housekeeping” measures for construction materials, waste management, vehicle storage and maintenance, and landscape materials at all times including, but not limited to, the list of required measures in Attachment B of the Monitoring and Reporting Program for Surface Water, that will be made a part of these requirements.
14. The Applicant must maintain, in perpetuity, post-construction control and treatment measures for storm water, or must identify in writing to the California Energy Commission, the entity that is legally responsible for maintaining the post-construction controls at the Facility site.
15. The Applicant shall have in place adequate emergency response plans in order to clean up any spill or release of any waste at the Facility.

C. Special Provisions for the Surface Impoundments

1. There shall be no discharge, bypass, or diversion of wastewater from the collection, conveyance, or disposal facilities to adjacent land areas or surface waters.
2. All facilities used for the collection, conveyance, or disposal of waste shall be adequately protected against overflow, washout, inundation, structural damage, or a significant reduction in efficiency resulting from a storm or flood having a recurrence interval of once in 100 years. The surface impoundments shall be designed and maintained with the capacity to capture the 1,000-year, 24-hour storm.
3. The release of wastewater shall not cause the presence of the groundwater monitoring parameters to be listed in the Monitoring and Reporting Programs to be in excess of background levels.
4. The discharge, storage or evaporative accumulation of hazardous waste to waste management units at the Facility is prohibited.
5. Only wastewater from the reverse osmosis water treatment system shall be discharged to the surface impoundments.

6. The flow of wastewater to the surface impoundments shall not exceed a total of [to be determined] million gallons per day for any consecutive 12 month period.
7. The maximum average daily flow rate of wastewater to the surface impoundments shall not exceed [to be determined] million gallons per day.
8. The discharge of wastewater at the facility except to the authorized disposal sites (i.e., the surface impoundments) of these requirements is prohibited.
9. All lined facilities shall be effectively sealed to prevent the exfiltration of liquids.
10. For this project, "effectively sealed" facilities are the surface impoundments that are designed and constructed in accordance with the requirements of CCR, title 27.
11. The vertical distance between the liquid surface elevation and the highest part of a surface impoundment dike (i.e., the freeboard), or the invert of an overflow structure, shall not be less than 2 feet.

D. Special Provisions for the Leachate Collection and Removal System

1. If liquids are detected in the leachate collection and removal system (LCRS) sumps at a rate equal to or greater than the verified “Action Leakage Rate,” then the Applicants shall comply with the notice of evidence of response to exceeding the action leakage rate requirements presented in the appropriate section of the Monitoring and Reporting Program for Groundwater to be included with these requirements after the Applicant submits a Report of Waste Discharge to the Lahontan Water Board.
2. If liquids are detected in the LCRS sumps at rates greater than the “Rapid and Large Leakage Rate,” the Applicants shall immediately notify the California Energy Commission and cease the discharge of waste to the affected impoundment. Discharges of waste to the affected impoundment shall be prohibited until the appropriate repairs are made.
3. The depth of leachate in the leachate collection sump shall be kept at the minimum needed to ensure efficient sump dewatering pump operation.
4. The LCRS shall be operated to function without clogging throughout the life of the project including closure and post closure maintenance periods.
5. The LCRS shall be tested at least once annually to demonstrate proper operation.
6. The LCRS shall be capable of removing twice the maximum anticipated daily volume of leachate from the surface impoundments.
7. Any leachate collected in any LCRS shall be returned to the surface impoundments.

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SOIL AND WATER RESOURCES – APPENDIX D
MONITORING AND REPORTING PROGRAM FOR SURFACE WATER

I. MONITORING

A. General Requirements

1. The applicant must comply with the “General Provisions for Monitoring and Reporting,” which is attached to and made part of this Monitoring and Reporting Program (Attachment A).
2. The applicant must comply with the “Good Housekeeping Best Management Practices,” which is attached to and made part of this Monitoring and Reporting Program (Attachment B).

B. Construction Site Storm Event Water Monitoring

The applicant must monitor site precipitation continuously and keep a record of storm events that produce more than 0.5 inch of precipitation at the site.

During storms and/or within one business day after each 0.5 inch of precipitation from a storm event, the applicant must visually observe and document observations of storm water discharges from the site to both the unnamed wash and to Pine Tree Creek.

For visual observations, the applicant must look for and document the presence or absence of floating and suspended materials, a sheen on the surface, discolorations, turbidity, odors, and source(s) of any observed pollutants.

The applicant must visually observe and document observations of the discharge of stored or contained storm water that is discharged subsequent to a storm event. The applicant is only required to visually observe such discharges if they occur under daylight conditions. Stored or contained storm water that will likely discharge after operating hours due to anticipated precipitation must be observed prior to the discharge to determine whether controls and BMPs are in place and functioning as required.

For the purposes of these requirements, a “potential storm event” is defined as any storm event with a 30 percent or greater chance of precipitation as predicted by the National Weather Service’s nearest weather station for the local climate zone. Forty-eight (48) hours prior to each potential storm event, the applicant must visually observe and implement appropriate corrective action for (1) all storm water drainage areas, to identify any spills, leaks, or uncontrolled pollutant sources, (2) all Best Management Practices (BMPs; see Attachment B), to identify whether they have been properly installed and maintained, and (3) any storm water storage and containment areas, to detect leaks and ensure maintenance of adequate freeboard.

Within one business day after each storm event that produces precipitation of 0.5 inch or more, the applicant must conduct a post-storm event inspection to:

1. identify whether BMPs were adequately designed, implemented, and effective,

2. identify if and where additional BMPs are needed, where BMPs are in need of maintenance, and
3. photograph each discharge location and the associated BMPs.

Within one business day after the initial 0.5 inch of precipitation from a storm event, and every 1 inch thereafter, the applicant must collect and analyze samples of storm water discharged from each detention basin.

If no discharge occurs from a basin, no sample is required, but the absence of discharge must be documented.

Storm water sampling and analyses must be performed in accordance with the following requirements:

1. The applicant must analyze the samples for pH and turbidity.
2. The applicant is not required to physically collect samples or conduct visual observations during dangerous weather conditions or outside of scheduled site operation hours.

The applicant must perform sampling of storm water discharges from all drainage areas associated with construction activity. The storm water discharge collected and observed must represent the worst quality storm water discharge in each drainage area based on visual observation of the water and upstream conditions. For example, if there has been concrete work recently in an area, or drywall scrap is exposed to the rain, a pH sample must be taken of drainage from the relevant work area. Similarly, if muddy water is flowing through some parts of a silt fence, samples must be taken of the muddy water even if most water flowing through the fence is clear.

C. Construction Site Monitoring

1. On a daily basis, the applicant must inspect all public and private paved roads serving the Facility and daily remove, by vacuuming or sweeping, visible accumulations of sediment or other construction activity-related materials that are deposited on the roads. All inspections under this provision must be documented in writing.
2. The applicant must ensure that inspections and observations at locations where runoff may discharge from the Facility site are performed weekly, and at least once each 24-hour period during extended storm events, to identify any problems and/or BMPs that:
    a. need maintenance to operate effectively,
    b. have failed, or
    c. are inadequate to achieve effective control.
3. The applicant must visually observe construction areas and each drainage area for the presence of (or indication of prior) non-storm water discharges and their sources to ensure that all BMPs are in place and effective.
    a. One visual observation must be conducted quarterly in each of the following periods: January – March, April – June, July – September, and

October – December. Visual observations are only required during daylight hours (sunrise to sunset).

b. Visual observations must document the presence of evidence of any non-storm water discharge, pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.), and source. The applicant must maintain on-site records indicating the personnel performing the visual observation, the dates and approximate time each drainage area and non-storm water discharge was observed, and the response taken to eliminate non-storm water discharges and to reduce or prevent pollutants from contacting non-storm water discharges.

4. The applicant must monitor and report runon from surrounding areas that may contribute to exceedances or excursions from requirements (violations).

D. Post-Construction Monitoring

On a semi-annual basis, the applicant must inspect and document inspections of post-construction treatment controls at the Facility site. Maintenance must be provided to address any controls that are not in compliance with requirements.

E. Receiving Water Monitoring

1. Receiving water sampling must occur at the following:

   a. 200 feet upstream of the Facility site in the natural watercourse.

   b. 200 feet downstream of the Facility site in the natural watercourse.

   c. Midpoint between the upstream and downstream samples.

   d. 50 feet downstream of each outfall into the above creeks.

2. Twice monthly and at no less than 10-day intervals from November through May of each year, the applicant must sample the Facility's receiving waters, with grab samples for the following constituents:

   a) Turbidity,
   b) Temperature,
   c) Dissolved Oxygen,
   d) Suspended Solids,
   e) Total Dissolved Solids, and
   f) pH.

   If no water is present (documented by photographs), no sampling is required.

3. The applicant must also sample the receiving waters for the above parameter(s) when discharge from any detention basin occurs.

II. REPORTING

A. Required Program Reports

1. The applicant must develop and implement a Construction Area Monitoring Program (CAMP), as described in II.C, below, and provide the CAMP to the CPM 60 days prior to commencement of construction activities. The CAMP must include receiving water monitoring locations as required above.

2. The applicant must provide a Sampling and Analysis Plan (SAP) as referenced in I.A, above, to the California Energy Commission 60 days prior to commencement of construction activities.

B. Construction Area Management Plan

1. The CAMP must be developed and implemented to address the following objectives:
   a. To demonstrate that the site is in compliance with these requirements;
   b. To determine whether immediate corrective actions, additional BMP implementation, or Storm Water Pollution Prevention Plan (SWPPP) revisions are necessary to reduce pollutants and wastes in storm water discharges and non-storm water discharges; and
   c. To determine whether BMPs included in the SWPPP are effective in preventing or reducing pollutants in storm water discharges.
2. The applicant must develop a written site-specific CAMP that includes all monitoring procedures and instruction, location maps, forms, and checklists as required in these requirements and this MRP. This CAMP must be made a part of a revised SWPPP that is to be kept and used on the Facility site.

C. Storm Water Pollution Prevention Plan Annual Report

1. The applicant must prepare and provide an annual report no later than June 30 of each year.
2. The Annual Report must include a summary and evaluation of all sampling and analysis results, original laboratory reports, a summary of all corrective actions taken during the compliance year, identification of any recommended compliance activities or corrective actions that were not implemented.
3. The Annual Report must include all records and reports of visual observations and sample collection exceptions, the analytical method, method reporting unit, and method detection limit of each analytical parameter. Analytical results that are less than the method detection limit must be reported as “less than the method detection limit.”

D. Records

1. The applicant must maintain records on-site of all visual observations, personnel performing the observations, observation dates, weather condition, locations observed, and corrective actions taken in response to the observations.
2. All inspections and observations pursuant to Section I.C. above must be documented in writing and must include:
   a. Inspector’s name, title, and signature.
   b. Inspection date and date the inspection report was written.
   c. Weather information: estimate of beginning of storm event, duration of event, time elapsed since last storm, and approximate amount of rainfall (inches).

d. A list and description of BMPs evaluated and any deficiencies noted. If there are no deficiencies, the report must indicate (under penalty of perjury) that the Facility is in compliance with these discharge requirements.

e. Report the presence of noticeable odors or any visible sheen on the surface of any discharges.

f. Corrective actions required, including any changes necessary to comply with requirements, and implementation dates for completing corrective actions.

g. Photographs taken during the inspection.

3. Records of all storm water monitoring information and copies of all reports (including Annual Reports) required by these requirements must be retained for a period of at least five years from the date of the sample, measurement, report, or application. This period may be extended when requested by the CPM. Records must be retained on-site while construction is ongoing. The records must include:

   a. The date, place, time of facility inspections, sampling, visual observation, and/or measurement, including precipitation;

   b. The individual(s) who performed the facility inspections, sampling, visual observations, and or measurement;

   c. The date and approximate time of analyses;

   d. The individual(s) and company who performed the analysis;

   e. A summary of all analytical results from the last five years, the method detection limits and reporting units, and the analytical techniques or methods used;

   f. Quality assurance/quality control records and results;

   g. Non-storm water discharge inspections and visual observations and storm water discharge visual observation records; and

   h. Visual observation and sample collection exception records.

ATTACHMENT A
GENERAL PROVISIONS FOR MONITORING AND REPORTING

1. SAMPLING AND ANALYSIS

a. All analyses shall be performed in accordance with the current edition(s) of the following documents:

   i. Standard Methods for the Examination of Water and Wastewater

   ii. Methods for Chemical Analysis of Water and Wastes, EPA

b. All analyses shall be performed in a laboratory certified to perform such analyses by the California State Department of Health Services or a laboratory approved by the Compliance Project Manager (CPM). Specific methods of analysis must be identified on each laboratory report.

c. Any modifications to the above methods to eliminate known interferences shall be reported with the sample results. The methods used shall also be reported. If methods other than EPA-approved methods or Standard Methods are used, the exact methodology must be submitted for review and must be approved by the CPM prior to use.

d. The applicant shall establish chain-of-custody procedures to insure that specific individuals are responsible for sample integrity from commencement of sample collection through delivery to an approved laboratory. Sample collection, storage, and analysis shall be conducted in accordance with an approved Sampling and Analysis Plan (SAP). The most recent version of the approved SAP shall be kept at the facility.

e. The applicant shall calibrate and perform maintenance procedures on all monitoring instruments and equipment to ensure accuracy of measurements, or shall insure that both activities will be conducted. The calibration of any wastewater flow measuring device shall be recorded and maintained in the permanent log book described in 2.b, below.

f. A grab sample is defined as an individual sample collected in fewer than 15 minutes.

g. A composite sample is defined as a combination of no fewer than eight individual samples obtained over the specified sampling period at equal intervals. The volume of each individual sample shall be proportional to the discharge flow rate at the time of sampling. The sampling period shall equal the discharge period, or 24 hours, whichever period is shorter.

2. OPERATIONAL REQUIREMENTS

a. <u>Sample Results</u>

   The applicant shall maintain all sampling and analytical results including: strip charts; date, exact place, and time of sampling; date analyses were performed; sample collector's name; analyst's name; analytical techniques used; and results of all analyses. Such records shall be retained for a minimum of three years. This period of retention shall be extended during the course of any unresolved litigation regarding this discharge, or when requested by the California Energy Commission.

b. Operational Log

An operation and maintenance log shall be maintained at the facility. All monitoring and reporting data shall be recorded in a permanent log book.

3. REPORTING

a. For every item where the requirements are not met, the applicant shall submit a statement of the actions undertaken or proposed which will bring the discharge into full compliance with requirements at the earliest time, and shall submit a timetable for correction.

b. All sampling and analytical results shall be made available to the CPM upon request. Results shall be retained for a minimum of three years. This period of retention shall be extended during the course of any unresolved litigation regarding this discharge, or when requested by the CPM .

c. The applicant shall provide a brief summary of any operational problems and maintenance activities to the California Energy Commission with each monitoring report. Any modifications or additions to, or any major maintenance conducted on, or any major problems occurring to the wastewater conveyance system, treatment facilities, or disposal facilities shall be included in this summary.

d. Monitoring reports shall be signed by:

    i. In the case of a corporation, by a principal executive officer at least of the level of vice-president or his duly authorized representative, if such representative is responsible for the overall operation of the facility from which the discharge originates;

    ii. In the case of a partnership, by a general partner;

    iii. In the case of a sole proprietorship, by the proprietor; or

    iv. In the case of a municipal, state or other public facility, by either a principal executive officer, ranking elected official, or other duly authorized employee.

e. Monitoring reports are to include the name and telephone number of an individual who can answer questions about the report.

ATTACHMENT B
GOOD HOUSEKEEPING BEST MANAGEMENT PRACTICES

1. Good housekeeping measures for construction materials include:
   a. Maintaining an inventory of the products used and/or expected to be used and the end products that are produced and/or expected to be produced.
   b. Covering and berming loose stockpiled construction materials (i.e., soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.).
   c. Storing chemicals in watertight containers or in a bermed storage shed (completely enclosed), with appropriate secondary containment.
   d. Minimizing contact of construction materials with precipitation.
   e. Implementing BMPs to reduce or prevent the offsite tracking of loose construction and landscape materials.

2. Good housekeeping measures for waste management include:
   a. Preventing disposal of any rinse/wash waters or materials into the storm drain system.
   b. Berming sanitation facilities (e.g., Porta-Potties) and preventing them from being kept within the curb and gutter or on sidewalks or adjacent to a storm drain.
   c. Cleaning or replacing sanitation facilities and inspecting them regularly for leaks and spills.
   d. Covering waste disposal containers when they are not in use and preventing them from overflowing.
   e. Berming and securely protecting stockpiled waste material from wind and rain at all times unless actively being used where spill would enter surface drainage systems.
   f. Addressing procedures to deal with hazardous and non-hazardous spills.
   g. Preparing and implementing a spill response and implementation plan prior to commencement of construction activities, including:
      i. Locations of on-site equipment and materials for cleanup of spills and leaks.
      ii. Procedures to follow in the event of spill or leak that includes immediate cleanup.
      iii. Locations and procedures of disposing of waste materials.
      iv. Identification of and training for spill response personnel.
   h. Lining and berming of concrete washout areas so there is no leakage or overflow into the underlying soil and onto the surrounding areas. Washout areas must be positioned away from drain inlets and waterways and be clearly labeled.

3. Good housekeeping measures for vehicle storage and maintenance include:
   a. Not allowing oil, grease, or fuel to leak in to the soil.

b. Placing all equipment or vehicles to be fueled, maintained and/or stored in a designated area fitted with appropriate BMPs.

c. Cleaning leaks immediately and disposing of leaked materials and sorbents properly.

d. Fix leaks immediately or remove equipment for service.

4. To assess the potential pollutant sources and identify all areas of the site where good housekeeping or additional BMPs are necessary to reduce or prevent pollutants in storm water discharges and non-storm water discharges, the applicant must assess and report on the following:

   a. The quantity, physical characteristic (liquid, powder, solid, etc.), and locations of each potential pollutant source handled, produced, stored, recycled, or disposed of at the site.

   b. The degree to which pollutants associated with those materials may be exposed to and mobilized by contact with storm water.

   c. The direct and indirect pathways that pollutants may be exposed to storm water discharges and non-storm water discharges. This must include an assessment of past spills or leaks, non-storm water discharges, and discharges from adjoining areas.

   d. Sampling, visual observation, and inspection records.

   e. Effectiveness of existing BMPs to reduce or prevent pollutants in storm water discharges and non-storm water discharges.

SOIL AND WATER RESOURCES – APPENDIX E
MONITORING AND REPORTING PROGRAM FOR GROUNDWATER (TWO SURFACE IMPOUNDMENTS)

I. WATER QUALITY PROTECTION STANDARD

Water Quality Protection Standard is required by Title 27 of the California Code of Regulations (CCR, title 27) to assure the earliest possible detection of a release from the Beacon Solar Energy Project (Beacon) to underlying soil and/or groundwater. The Water Quality Protection Standard shall consist of the list of constituents of concern, the concentration limits, the Point of Compliance and all Monitoring Points. This Water Quality Protection Standard shall apply during the operation, closure, post-closure maintenance period, and during any compliance period.

II. MONITORING

A. Flow Monitoring of Discharges to the Surface Impoundments (the two evaporation ponds)

Discharge to the surface impoundments is primarily derived from wastewater from the water treatment reverse osmosis stream. Wastewater from this source will be discharged to the surface impoundments.

The applicant shall monitor the following:

1. The volume, in gallons per day (gpd), of wastewater delivered to the surface impoundments;
2. The cumulative total of wastewater flow delivered to the surface impoundments, in million gallons per month; and
3. The maximum daily flow rate, in gpd, delivered to the surface impoundments each month.

B. Monitoring of Wastewater Discharges to the Surface Impoundments

Semi-annually, the applicant shall record the following:

1. The sources of wastewater delivered to the surface impoundments;
2. The amount and types of chemical additives added to the water that may be discharged to the surface impoundments; and
3. The analytical results of a composite wastewater grab sample that shall be collected and analyzed for the parameters in Table II-1.

Wastewater Sampling Parameters
Table II-1

Parameter	U.S. EPA or Standard Method	Reporting Limit Goal	Units
Ammonia (as N)	350.1	100	µg/L
Aluminum	200.7	20	µg/L
Arsenic	6020	2	µg/L
Antimony	6020	10	µg/L
Barium	6020	5	µg/L
Beryllium	6020	2	µg/L
Boron	200.7	140	µg/L
Cadmium	6020	5	µg/L
Calcium	200.7	40,000	µg/L
Chloride	300.0	14,000	µg/L
Chromium (total)	6020	5	µg/L
Cobalt	6020	5	µg/L
Copper	6020	5	µg/L
Cyanide (total)	SM 4500	10	µg/L
Fluoride	300.0	500	µg/L
Iron	200.7	20	µg/L
Lead	6020	3	µg/L
Magnesium	200.7	10,000	µg/L
Manganese	200.7	15	µg/L
Mercury	7470A	0.2	µg/L
Molybdenum	6020	10	µg/L
Nickel	6020	5	µg/L
Nitrate as nitrogen	300.0	1,000	µg/L
Nitrite as nitrogen	SM 4500	4	µg/L
Phosphate (total)	365.3	100	µg/L
Potassium	200.7	3,000	µg/L
Selenium	6020	10	µg/L
Silver	6020	5	µg/L
Sodium	200.7	10,000	µg/L
Strontium	200.7	500	µg/L
Sulfate	300.0	100.000	µg/L
Thallium	6020	10	µg/L
Total dissolved solids	SM 2540C	10,000	µg/L
Total alkalinity (as $CaCO_3$)	SM 2320B	100,000	µg/L
Vanadium	6020	5	µg/L
Zinc	6020	10	µg/L
Biphenyl	8015M	500	µg/L
Diphenyl oxide	8015M	500	µg/L
Cyclohexamine (20-40%)	8015M	500	µg/L
Morpholine (1-10%)	8015M	500	µg/L
pH	Field	+/- 0.1	pH units
Temperature	Field	+/- 0.1	° F or °C

µg/L = micrograms per liter

C. Surface Impoundment Monitoring

1. Dikes and Liners

   a. Daily, the freeboard shall be measured from the top of the lowest part of the dike to the wastewater surface. If the surface impoundment is dry, indicate that it is empty of wastewater.

   b. Monthly, the integrity of the dikes and liners shall be inspected. Should the inspection indicate any damage to the dikes or liners or if an unauthorized discharge has occurred, or is likely to occur, the California Energy Commission shall be notified within 48 hours, followed by confirmation in writing.

2. Leachate Collection and Removal System (LCRS)

   a. Weekly, visual inspection for liquid in the leachate collection detection sumps for each surface impoundment shall be conducted. The results of those inspections shall be recorded in a permanent log book.

   b. All volume of liquid pumped out of the leakage detection sumps for each surface impoundment shall be recorded along with date, time and discharge location, in a permanent log book kept on-site.

3. Surface Impoundment Wastewater Monitoring

   Semi-annually, at each surface impoundment, liquid grab samples shall be collected at three (3) sample locations in the surface impoundments spaced approximately equidistant. The collected samples shall be composited into one sample by the laboratory and analyzed to determine the quantification of the parameters in Table II-1.

4. Surface Impoundment Sludge Monitoring

   Annually, in the last quarter of each year, three (3) representative grab samples of the bottom sludge in each surface impoundment, if present, shall be collected, composited and analyzed for the parameters in Table II-2.

Surface Impoundment Sludge Monitoring
Table II-2

Parameters	Unit
CCR title 22 metals (CAM 17)- Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Lead, Mercury, Molybdenum, Nickel, Selenium, Silver, Thallium, Vanadium, Zinc	Milligrams per kilogram (mg/kg)

D. Detection Monitoring

Using approved statistical or non-statistical data analysis methods approved in these requirements, and in compliance with CCR, title 27, the applicant shall, for each monitoring event, compare the concentration of each monitoring parameter with its respective concentration limit to determine if there has been a release from the surface impoundments. Monitoring shall be completed in compliance with this Section D as further described below.

1. Unsaturated Zone Monitoring – Neutron Probe

   a. Quarterly, the applicant shall check for moisture below the surface impoundment liners using a neutron moisture probe calibrated for use at the site. If moisture content is detected above 30 percent by volume, field verification testing shall be performed and the applicant shall notify the California Energy Commission and report physical evidence of a release (see notification procedures below). Field verification testing may include a combination of additional neutron analysis, laboratory analysis of liquids drawn from the neutron probe casing and visual observation to verify existence of a release.

   b. Annually, the applicant shall submit documentation of instrument calibration and performance checks. Performance checks shall be a comparison of quarterly results of neutron moisture. Pre testing with earlier tests made under comparable conditions to verify proper operation of equipment must be documented.

2. Groundwater Monitoring

   A Groundwater Monitoring Network (GMN) shall include three categories of monitoring wells: (1) background wells (located upgradient of the surface impoundments); (2) detection wells (located adjacent to the surface impoundments); and (3) compliance wells. The detection wells are comprised of three proposed wells (MW-1 through MW-3) located immediately adjacent to the surface impoundments. The Point of Compliance as defined in CCR, title 27, section 20405 is "a vertical surface located at the hydraulically down gradient limit of the Unit that extends through the uppermost aquifer underlying the Unit."

   a. Semi-annually, samples shall be collected in the groundwater monitoring network as proposed in the June 2009 ROWD and analyzed for the parameters listed in Table II-3.

   The results of the analysis shall be reported in a semi-annual report in tabular and graphical form. Each such graph shall be plotted with raw data at a scale appropriate to show trends or variations in water quality. For graphs showing the trends of similar constituents, the scale shall be the same. The data shall also be used to construct an Upper Tolerance Limit to determine evidence of a release and shall be used to evaluate data from the previous three quarters for evidence of a release.

Monitoring Well Sampling Parameters
Table II-3

Parameter	U.S. EPA or Standard Method	Reporting Limit Goal	Units
Ammonia (as N)	350.1	100	µg/L
Aluminum	200.7	20	µg/L
Arsenic	6020	2	µg/L
Antimony	6020	10	µg/L
Barium	6020	5	µg/L
Beryllium	6020	2	µg/L
Boron	200.7	140	µg/L
Cadmium	6020	5	µg/L
Calcium	200.7	40,000	µg/L
Chloride	300.0	14,000	µg/L
Chromium (total)	6020	5	µg/L
Cobalt	6020	5	µg/L
Copper	6020	5	µg/L
Cyanide (total)	SM 4500	10	µg/L
Fluoride	300.0	500	µg/L
Iron	200.7	20	µg/L
Lead	6020	3	µg/L
Magnesium	200.7	10,000	µg/L
Manganese	200.7	15	µg/L
Mercury	7470A	0.2	µg/L
Molybdenum	6020	10	µg/L
Nickel	6020	5	µg/L
Nitrate as nitrogen	300.0	1,000	µg/L
Nitrite as nitrogen	SM 4500	4	µg/L
Phosphate (total)	365.3	100	µg/L
Potassium	200.7	3,000	µg/L
Selenium	6020	10	µg/L
Silver	6020	5	µg/L
Sodium	200.7	10,000	µg/L
Strontium	200.7	500	µg/L
Sulfate	300.0	100.000	µg/L
Thallium	6020	10	µg/L
Total dissolved solids	SM 2540C	10,000	µg/L
Total alkalinity (as $CaCO_3$)	SM 2320B	100,000	µg/L
Vanadium	6020	5	µg/L
Zinc	6020	10	µg/L
pH	Field	+/- 0.1	pH units
Temperature	Field	+/- 0.1	° F or °C

b. Semi-annually, the groundwater potentiometric surface shall be illustrated on a 8.5" x 11" copy of a site plan showing the static water level, in feet below ground surface; the monitoring well locations; the location of the surface impoundments; and the groundwater gradient under each surface impoundment.

c. Prior to sampling, each monitoring well shall be sufficiently purged in accordance with generally accepted sampling practices in order to obtain a representative ground water sample. If any monitoring well is dry for more than a year, a new or modified monitoring well shall be installed.

Groundwater samples must be collected after the wells have been purged in accordance with California Environmental Protection Agency guidance document, *Representative Sampling of Groundwater for Hazardous Substances*, revised February 2008 (see: http://www.dtsc.ca.gov/SiteCleanup/upload/SMP_Representative_Sampling_GroundWater.pdf). The required stability parameters and criteria from this guidance are summarized in Table II-4.

Table II-4
Stabilization Parameters and Criteria

Parameter	Criteria
temperature	± 3% of reading (minimum of ± 0.2 C)
pH	+/- 0.1
specific electrical conductance	+/- 3%
Oxidation-reduction potential	+/- 10 millivolts
dissolved oxygen	+/- 0.3 milligrams per liter

III. DATA ANALYSES

All data analyses methods (statistical or non-statistical) shall meet the requirements of CCR, title 27, section 20415, subdivision (e)(9).

A. General Non-statistical Methods

Evaluation of data will be conducted using non-statistical methods to determine if any new releases from the surface impoundments or land treatment unit have occurred. Non-statistical analysis shall be as follows.

1. Physical Evidence

   Physical evidence can include dike or berm(s) damage or loss, unexplained volumetric changes in the surface impoundments, groundwater mounding, or soil discoloration. Each annual report shall comment on the absence or presence of physical evidence of a release.

2. Time Series Plots

   Each annual report must include time series plot for groundwater monitoring parameters. Time series plots are not required for parameters that have never been detected above their method detection limit (as specified by the applicable USEPA Method) or if there are less than four quarters of data. Evidence of a release may include trends of increasing concentrations of one or more constituent over time.

B. General Statistical Analysis Methods

For Detection Monitoring, the applicant shall use statistical methods to analyze the constituents of concern listed in Table 11-4 of this Monitoring and Reporting Program that exhibit concentrations that equal or exceed their respective method detection limit in at least ten percent of applicable historical samples. The applicant may propose and use any statistical method that meets the requirements of CCR, title 27, section 20415, subdivision (e)(7). The report titled "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities" (USEPA, 1989) or subsequent versions may also be used to select the statistical test to use for comparing detection monitoring well data to background monitoring data. All statistical methods and programs proposed by the applicant are subject to CPM approval and must be in compliance with CCR, title 27.

IV. RECORD KEEPING AND REPORTING REQUIREMENTS

A. Scheduled Reports to be filed with the California Energy Commission

A detection monitoring report shall be submitted to the CPM of the California Energy Commission. The content of the detection monitoring report shall be as follows:

1. results of sampling analysis, including statistical limits or each monitoring point;
2. a description and graphical presentation of the velocity and direction of ground water flow under or around the Waste Management Units, based upon water level elevations taken during the collection of the water quality data submitted in the report;
3. a map or aerial photograph showing the locations of observation stations, monitoring points, and background monitoring points;
4. an evaluation of the effectiveness of the leachate collection and recovery system, and of the runoff/runon control facilities; and
5. a letter transmitting the essential points in each report, including a discussion of any requirement violations found since the last report was submitted, and describing actions taken or planned for correcting those violations. If the applicant has previously submitted a detailed time schedule for correcting requirement violations, a reference to the correspondence transmitting this schedule will be satisfactory. If no violations have occurred since the last submittal, this shall be stated in the letter of transmittal.

B. Unscheduled Reports To Be Filed

1. Release from the Surface Impoundments

   The applicant shall perform the procedures contained in this subsection whenever there is evidence of a release from the surface impoundments.

   The applicant shall immediately notify the CPM verbally whenever a determination is made that there is physical or statistically significant evidence of a release (as determined in compliance with CCR, title 27, section 20164) from a surface impoundment. This verbal notification shall be followed by written notification via certified mail within seven days of such determination. Upon such notification, the applicant may initiate verification procedures or demonstrate that another source other than the Impoundment caused evidence of a release (see below). The notification shall include the following information:

a. the surface impoundment that may have released or be releasing wastewater;

b. general information including the date, time, location, and cause of the release;

c. an estimate of the flow rate and volume of waste involved;

d. a procedure for collecting samples and description of laboratory test to be conducted;

e. identification of any subsurface water bearing zone affected or threatened;

f. a summary of proposed corrective actions; and

For statistically significant evidence of a release (as determined in compliance with CCR, title 27, section 20164) – monitoring parameters and/or constituents of concern that have indicated statistically significant evidence of a release from the surface impoundments; or

For physical evidence of a release – physical factors that indicate physical evidence of a release.

2. Exceeding the Action Leakage Rate

   The applicant shall immediately notify the CPM verbally within twenty-four hours whenever a determination is made that there is a fluid volume in the LCRS sumps in excess of the Action Leakage Rates. This verbal notification shall be followed by written notification via certified mail within seven days of such determination. This written notification shall be followed by a technical report via certified mail within thirty days of such determination. The technical report shall describe the actions taken to abate the adverse condition, and shall describe any proposed future actions to abate the adverse condition.

3. Evaluation Monitoring

   Pursuant to California Water Code section 13267, subdivision (b), the applicant shall, within 90 days of verifying a release, submit to the CPM an amended Report of Waste Discharge proposing an evaluation monitoring program (CCR, title 27, sections 20420, subdivision (k)(5) and 20425). If applicant decides not to conduct verification procedures, or decides not to make a demonstration that a source other than the surface impoundments or land treatment unit are responsible for the release, the release will be considered verified.

4. Preliminary Engineering Feasibility Study Report

   The applicant shall, within 180 days of verification of a release or detection, submit to the CPM a Preliminary Engineering Feasibility Study pursuant to CCR, title 27, section 20420, subdivision (k)(6), that shall contain either corrective action measures that could be taken to achieve background concentration or demonstrate that the waste management units are not the cause of the detection.

V. REPORTING REQUIREMENTS

A. General Provisions

The applicant shall comply with the "General Provisions for Monitoring and Reporting" which is attached to and made part of this Monitoring and Reporting Program.

B. Semi-Annual Report

Beginning on January 30, 2011, a Semi-annual Monitoring Report, including the preceding monitoring information, shall be submitted to the CPM. Subsequent semi-annual monitoring reports shall be submitted to the CPM by January 30 and June 30 of each year.

C. Annual Report

Beginning on June 30, 2011, and by June 30 of each year, the applicant shall submit an Annual Report to the CPM including the preceding information and with the following information:

a. Evidence that adequate financial assurance for closure, post-closure, and reasonably foreseeable releases is still in effect and may include a copy of the renewed financial instrument or a copy of the receipt for payment of the financial instrument;

b. evidence that the amount is still adequate or increase the amount of financial assurance by the appropriate amount if necessary, due to inflation, a change in the approved closure plan, or other unforeseen events; and

c. a review of the closure plan and a statement that the closure activities described are still accurate or an updated closure plan.

D. Data Analysis Report

The applicant shall, by **June 30 of every year**, submit to the CPM a Data Analysis Report as specified in Section III (Data Analysis) of this Monitoring and Reporting Program.

E. Electronic Submittal of Information

Pursuant to CCT title 23, section 3890, the applicant shall submit reports, including soil, vapor and water data, prepared for the purpose of subsurface investigation or remediation of a discharge of waste to land subject to Division 2 of Title 27 electronically over the internet to the State Water Resources Control Board's Geotracker system. This requirement is in addition to, and not superseded by, any other applicable reporting requirement.

GENERAL PROVISIONS FOR MONITORING AND REPORTING

1. SAMPLING AND ANALYSIS

a. All analyses shall be performed in accordance with the current edition(s) of the following documents:

   i. Standard Methods for the Examination of Water and Wastewater

   ii. Methods for Chemical Analysis of Water and Wastes, EPA

b. All analyses shall be performed in a laboratory certified to perform such analyses by the California State Department of Health Services or a laboratory approved by the CPM. Specific methods of analysis must be identified on each laboratory report.

c. Any modifications to the above methods to eliminate known interferences shall be reported with the sample results. The methods used shall also be reported. If methods other than EPA-approved methods or Standard Methods are used, the exact methodology must be submitted for review and must be approved by the CPM.

d. The applicant shall establish chain-of-custody procedures to insure that specific individuals are responsible for sample integrity from commencement of sample collection through delivery to an approved laboratory. Sample collection, storage, and analysis shall be conducted in accordance with an approved Sampling and Analysis Plan (SAP). The most recent version of the approved SAP shall be kept at the facility.

e. The applicant shall calibrate and perform maintenance procedures on all monitoring instruments and equipment to ensure accuracy of measurements, or shall insure that both activities will be conducted. The calibration of any wastewater flow measuring device shall be recorded and maintained in the permanent log book described in 2.b, below.

f. A grab sample is defined as an individual sample collected in fewer than 15 minutes.

g. A composite sample is defined as a combination of no fewer than eight individual samples obtained over the specified sampling period at equal intervals. The volume of each individual sample shall be proportional to the discharge flow rate at the time of sampling. The sampling period shall equal the discharge period, or 24 hours, whichever period is shorter.

2. OPERATIONAL REQUIREMENTS

a. Sample Results

   The applicant shall maintain all sampling and analytical results including: strip charts; date, exact place, and time of sampling; date analyses were performed; sample collector's name; analyst's name; analytical techniques used; and results of all analyses. Such records shall be retained for a minimum of three years. This period of retention shall be extended during the course of any unresolved litigation regarding this discharge, or when requested by the CPM.

b. Operational Log

   An operation and maintenance log shall be maintained at the facility. All monitoring and reporting data shall be recorded in a permanent log book.

3. REPORTING

a. For every item where the requirements are not met, the applicant shall submit a statement of the actions undertaken or proposed which will bring the discharge into full compliance with requirements at the earliest time, and shall submit a timetable for correction.

b. All sampling and analytical results shall be made available to the CPM upon request. Results shall be retained for a minimum of three years. This period of retention shall be extended during the course of any unresolved litigation regarding this discharge, or when requested by the CPM.

c. The applicant shall provide a brief summary of any operational problems and maintenance activities to the CPM with each monitoring report. Any modifications or additions to, or any major maintenance conducted on, or any major problems occurring to the wastewater conveyance system, treatment facilities, or disposal facilities shall be included in this summary.

d. Monitoring reports shall be signed by:

   i. In the case of a corporation, by a principal executive officer at least of the level of vice-president or his duly authorized representative, if such representative is responsible for the overall operation of the facility from which the discharge originates;

   ii. In the case of a partnership, by a general partner;

   iii. In the case of a sole proprietorship, by the proprietor; or

   iv. In the case of a municipal, state or other public facility, by either a principal executive officer, ranking elected official, or other duly authorized employee.

e. Monitoring reports are to include the name and telephone number of an individual who can answer questions about the report.

SOIL AND WATER RESOURCES – APPENDIX F
RESPONSE TO AGENCY AND PUBLIC COMMENTS

The responses to comments below are grouped by subject area and are numbered for reference.

Waters of the State

Comment (California Unions for Reliable Energy). The applicant has not yet proposed specific mitigation to reduce impacts to State waters during construction of the proposed project. However, it is expected that the applicant will submit a formal application to the CDFG that contains Best Management Practices designed to minimize the potential effects to State waters.

1. **Response.** The applicant has not provided information necessary to complete development of requirements for dredge and fill in waters of the State. Compliance with LORS, particularly the Clean Water Act requirements, will ensure no adverse impacts to waters of the State. In addition, staff drafted Conditions of Certification **SOIL&WATER-1**, **-2**, and **-3** to define specific methods of design analysis, development of best management practices, and monitoring and reporting procedures to mitigate impacts related to flooding, erosion, sedimentation, and stream morphological changes.

Comment (California Unions for Reliable Energy). Requirements for discharges of…dredge and fill in waters of the state…are pending receipt of information to be submitted by the applicant. Once this information has been submitted, requirements will be developed and included in the SSA.

2. **Response.** See Response 1.

Comment (Sierra Club). According to the SA/DEIS, the Applicant has yet to provide "information necessary to complete development of requirements for dredge and fill in waters of the state." SA/DEIS C.7-2. Staff asserts that they are unable to "complete development of requirements that will be included in Condition of Certification Soil-&-Water- 2," also known as the Waste Discharge Requirements, until this information is provided. Id. Under NEPA, BLM is required to take a hard look at the environmental consequences of a proposed action, which requires agencies to consider the relevant factors and the important aspects of their actions.

3. **Response.** Condition of Certification **SOIL&WATER-2** [Waste Discharge Requirements] is intended to ensure impacts from storm water discharge associated with construction activity are less than significant. The applicant has not provided information necessary to complete development of requirements for dredge and fill in waters of the State. Compliance with LORS, particularly the Clean Water Act requirements, will insure no adverse impacts to waters of the State. In addition, staff drafted Conditions of Certification **SOIL&WATER-1** and **-3** in addition to **SOIL&WATER-2** to define specific methods of design analysis, development of best management practices, and monitoring and reporting

procedures to mitigate impacts related to flooding, erosion, sedimentation, and stream morphological changes.

Comment (Sierra Club). The project is located on a large alluvial fan that supports numerous drainages flowing from the Cady Mountains. SA/DEIS C.2-17. The watershed is 43 square miles, and could produce substantial flood flows in a major storm. *Id*. The Applicant originally asserted that there were no waters of the state on the site, but they relied on CRAM methodology which is not suitable for determining jurisdictional status. *Id*. Staff found plentiful drainages with well-defined bank and vegetation indicative of desert washes. SA/DEIS C.2-18. The impacts to at least 258 acres of state waters would be permanent, and would also impact desert wash communities downstream of the project. SA/DEIS C.2-95. Staff properly concludes that "direct and indirect impacts of the project to approximately 1099 acres of State jurisdictional waters to be significant." SA/DEIS C.2-97. The public, and the agencies, have no way to ascertain how these impacts will be mitigated because "the applicant has not yet proposed specific mitigation." *Id*. It is improper for the agency to "expect[…] that the applicant will submit a formal application to the CDFG." *Id*. Under NEPA regulations, this information must be presented "before decisions are made." 40 C.F.R 1501.1(b). As such, the analysis as to impacts to state waters is insufficient.

4. Response. See Response 3.

Comment (Center for Biological Diversity). Over half of the existing 1,099 acres are Waters of the State that would either be temporarily or permanently impacted – 614 acres total. Once again, because of unavailable data, the DEIS concludes that "the drainage report does not provide sufficient information to establish the post-project flooding conditions or to determine the potential impacts to vegetation outside the project area" (DEIS at C.2-97). The DEIS continues that the attenuation of storm flows and loss of sediment to the system coupled with the level of maintenance expected to occur on the site, all 1,099 acres of the ephemeral washes on the project site and portions of the washes downstream of the project boundaries would be adversely affected by the proposed project.

5. Response. See Response 3.

Water Quality Degradation

Comment (California Unions for Reliable Energy). Requirements for discharges of brine waters to evaporation ponds…and sanitary septic systems, are pending receipt of information to be submitted by the applicant. Once this information has been submitted, requirements will be developed and included in the SSA.

6. Response. The applicant has not provided information necessary to complete development of requirements for discharges of brine waters to evaporation ponds or sanitary septic systems. However, staff has identified performance standards that will ensure no significant adverse impacts will occur, and included these performance standards in staff's Conditions of Certification **SOIL&WATER-2** and **-3** and **Soil and Water Appendix B**.

Comment (Sierra Club). The applicant has failed to provide "information necessary to complete development of requirements for discharges of brine waters to evaporation ponds or sanitary septic systems." SA/DEIS C.7-2. This information is also necessary for completion of the Waste Discharge Requirements. Id. Not only is the discharge information vital, but the information concerning evaporation ponds is also key because of the harmful impact the toxins released from the evaporation ponds may have on wildlife. SA/DEIS C.2-40.

7. **Response**. See Response 6.

Comment (Sierra Club). Four of the main conclusions of the SA/DEIS are based on adherence to requirements not yet created because of a lack of information. The SA/DEIS clearly states that development of these Waste Discharge Requirements is vital to the conclusions reached regarding environmental effects because compliance with these requirements will ensure: no adverse alteration of drainage patterns, "no violation of water quality standards or waste discharge requirements", "that the project not create or contribute runoff water that exceeds existing or planned storm water-drainage system capacity or provides substantial additional sources of polluted runoff, "no degradation of surface water or groundwater quality."

8. **Response**. Staff analyzed the project and identified potential impacts and their significance. Condition of Certification **SOIL&WATER-2** [Waste Discharge Requirements] is based on these conclusions and intended to ensure impacts from the discharge of storm water are less than significant. Compliance with LORS, particularly the Clean Water Act requirements, will ensure no adverse impacts to waters of the State. In addition, staff drafted Conditions of Certification **SOIL&WATER-1 and -3** in addition to **SOIL&WATER-2** to define specific methods of design analysis, development of best management practices, and monitoring and reporting procedures to mitigate impacts related to flooding, erosion, sedimentation, and stream morphological changes.

<u>Unknown Pumping Impacts</u>

Comment (Patrick C. Jackson). The SA/DEIS does not comply with the California Environmental Quality Act (CEQA) Guidelines (CCR 2006) in that it does not indicate if the Project:

> . . . substantially depletes groundwater supplies or interferes substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of preexisting nearby wells would drop to a level which would not support land uses or planned uses for which permits have been granted.

The SA/DEIS indicates the Project's proposed water supply would be the Cadiz Burlington Northern Santa Fe (BNSF) well located approximately 64 miles from the Calico Solar Project site. The Applicant's Supplement "describes a change in the primary water supply to groundwater from a well located adjacent to the Project site." The Applicant's Supplement states, "pumping of the well at the prescribed rates will have no significant impact to water levels in the area, as the ZOI is relatively small and will not affect wells that may be present in the basin that are approximately 10 miles away." The Applicant's Supplement does not quantify "significant" or describe if "pumping of the well" will deplete groundwater supplies or interfere with the groundwater recharge beneath the adjacent privately owned lands.

9. **Response**. The water required for construction and operational use will be obtained from a well located on private property adjacent to the Project site. Staff considered the potential impacts of the project's proposed groundwater use on the basin water budget and groundwater levels. Staff estimated the volumetric water budget ("Basin Balance") using information from the literature and provided by the project applicant. Staff employed standard well hydraulic equations and representative aquifer parameter values to estimate project pumping effects on groundwater levels (i.e., drawdown and well interference due to pumping).

Staff concluded water use would have a less than significant impact on the groundwater balance and the availability of groundwater to other basin users. The average annual water use during construction (150 AFY) is 38-75 percent of the estimated recharge to the Lavic Valley Basin (200 to 400 AFY), and average water use over the life of the project (31 AFY) is only 6-13 percent of this estimated recharge. No other local users are known to rely on that recharge. The water use is less than 1 percent of the yield of the greater Lavic-Broadwell-Bristol Lake groundwater system, given the range of estimates of yield for the Bristol Lake Basin (5,000 AFY). Historical well construction data and recently observed water levels suggest a significant column of water exists in wells typical for the area (the standing water column in the proposed water supply well is 800 feet). The maximum simulated drawdown from project construction and operational water use is less than 4 feet and therefore likely insignificant.

The project would not interfere with the quantity of groundwater recharge because in desert basins percolation on the valley floor is essentially zero. Ephemeral runoff would be redirected upon reaching the site, but not eliminated. Therefore, the opportunity for percolation of runoff would remain essentially unchanged.

Comment (California Unions for Reliable Energy). To evaluate the potential cumulative impacts of the Cadiz Water Conservation and Storage Project and existing agricultural uses, additional information is needed on how the project and groundwater basin would be managed. Soil and Water Resources staff is currently evaluating the feasibility of this source. Thus, at this time, staff cannot conclude that the proposed source of water would represent a reliable supply of water for the project.

10. **Response**. The water required for construction and operational use will be obtained from a well located on private property adjacent to the Project site. Aquifer testing indicated the well is capable of producing at least 100 gpm over a 24-hour period without incurring excessive drawdown.

Comment (California Unions for Reliable Energy). On May 14, 2010, the Applicant filed an AFC Supplement with a change of the Project's "primary water supply to onsite wells." The AFC includes "an environmental assessment of the use of groundwater and transport of water from the well to the Project via an underground waterline." The SA does not include an analysis of the environmental impacts associated with using groundwater from this site because the SA was released nearly two months before the Applicant informed the Commission of the new water supply…The SA must fully describe and evaluate all potentially significant impacts associated with the Project's newly proposed groundwater supply.

11. **Response**. See Response 9.

Comment (San Bernardino County). Calico Solar should be required to comply with all of the County requirements prior to utilizing a proposed water source. The SA/DEIS does not fully analyze the availability of water from the BNSF well. It also is not clear how the CEC will regulate the BNSF well usage.

12. **Response**. The water required for construction and operational use will be obtained from a well located on private property adjacent to the Project site.

Comment (Sierra Club). The DEIS originally analyzed the environmental impact associated with the use of groundwater from the Cadiz Valley aquifers. Staff concluded the impact would not be significant as recharge is expected to outpace pumping, and because the applicant would be required to comply with mitigation measures to assure that no significant environmental impact would occur. These conclusions are suspect as very little current information was provided on the capacity of the Cadiz well to serve the Project without affecting seeps and springs important to wildlife and the Mojave National Preserve. . . Even more troubling is the new proposal by the Applicant to use an on-site well for the Project's water needs. The applicant recently submitted a supplement to the Application for Certification changing its source of groundwater to a new well drilled adjacent to the project site. Supplemental Application for Certification 1-3. The environmental impact associated with this well and the use of its groundwater was not included in the DEIS, nor has it been made available to the public. . . All of this must be analyzed by the BLM in order to allow them to make an informed decision on the approval of this project.

13. **Response**. See Response 9.

Comment (BNSF). BNSF is concerned the potential drawdown of the groundwater basin by the newly proposed water well may cause subsidence which might adversely affect rail track alignment, creating a safety issue. While the SA/DEIS briefly addresses the issue of possible subsidence due to groundwater pumping at p. C.4-12 (Geology and Paleontology), BNSF suggests that the analysis be expanded.

14. **Response**. In some deep alluvial basins, groundwater withdrawal from confined aquifers caused substantial dewatering (water level declines of 100 feet or more) and compaction of fine-grained sediment beds resulting in land surface subsidence. Staff estimated the maximum water level decline from project groundwater use is less than 4 feet and therefore unlikely to cause substantial dewatering and compaction of fine-grained sediment beds and land surface subsidence.

Comment (Center for Biological Diversity). The BLM must ensure that if any groundwater on site is proposed to be used for the proposed project (and cumulative projects) *over the life of the proposed projects* such use will not impair those values in the wilderness that depend on water resources (including perennial, seasonal, and ephemeral creeks, springs and seeps as well as any riparian dependent plants and wildlife).

15. **Response**. There are no active wells known to be operating in the basin, and no springs are shown on maps. Although the Lavic Valley Basin contains a playa (Lavic [dry] Lake), it is not a discharge playa, which means it is formed by ponding of surface water runoff only and is not a location where groundwater discharges by evaporation. Water levels in several wells near the lake bed prior to 1970 were approximately 50 feet below the surface of the lake bed, and water levels near the site are about 300 feet below land surface. These depths are too great to support phreatophytic vegetation.

Comment (Center for Biological Diversity). BLM must examine the federal reserved water rights within the area affected by the proposed project (including the Cadiz area where water is now proposed to be obtained) and other proposed projects in this area that may use significant amounts of groundwater. This examination must include a survey of the any water sources potentially affected by the proposed water use for the proposed project. The BLM must ensure that any springs, seeps, creeks or other water sources on public land and particularly within the wilderness areas are not degraded by the proposed projects' use of water and continue meet the needs of the existing wildlife and native vegetation that depend on those water resources.

16. **Response**. The water required for construction and operational use will be obtained from a well located on private property adjacent to the Project site. See Response 15 regarding water use effects to wildlife and vegetation.

Alluvial Fan Issues

Comment (Sierra Club). The project is located on an alluvial fan. SA/DEIS C.7-1, 35, 37. The onsite debris and retention basins propose to capture only 100 year storm flows. SA/DEIS C.7-28, 35, 36. However, it is well known that alluvial fans present unique and severe flood hazards. Even the SA/DEIS acknowledges "the proposed project does constitute an unusual circumstance. Compared to other projects previously constructed on active alluvial fans, the proposed project is of a very large scale." SA/DEIS C.7-35. Thus, because of the location and enormous scale of the project actual impacts are unknown. This uncertainty is unacceptable under NEPA because it fails to provide the reviewer with an accurate project description or assessment of potential impacts… Recently, the California Department of Water Resources established, and Federal Emergency Management Agency funded, an Alluvial Fan Task

Force…One of the foremost recommendations of the Task Force was to plan for more than the normal 100 year flood…That recommendation was not followed here.

17. **Response**. Compliance with Conditions of Certification **SOIL&WATER-1** (DESCP); **SOIL&WATER-2** (Waste Discharge Requirements); **SOIL&WATER-3** (Stormwater Damage Monitoring and Response Plan) require compliance with LORS and will ensure that the project not create or contribute runoff water that exceeds existing or planned storm water-drainage system capacity or provides substantial additional sources of polluted runoff. The limitation cited by the Alluvial Fans Task Force of using the 100-year flood to represent future extreme runoff and debris flow volumes is noted.

Comment (Sierra Club). The SA/DEIS fails to identify, analyze and mitigate the hazards unique to alluvial fans, such as shorter duration localized storms, massive debris flows, increased flows after fire events, and so forth, instead of properly addressing this serious hazard.

18. **Response.** See Response 17.

Comment (Sierra Club). The question of project impacts to percolation and groundwater received scant mention and virtually no analysis. The SA/DEIS mentions that the project debris basins may evaporate water that otherwise percolated, but there is no adequate quantification or analysis of that potentially significant impact to groundwater supplies, given the project footprint of nearly 13 square miles. SA/DEIS B.1-10.

19. **Response**. Most of the area's precipitation occurs during the winter season when evaporation losses are at their minimum, but nevertheless can be significant. Surface water flow does not occur on-site in most years, but when runoff does occur it is generally conveyed along the railroad right of way and I-40 road embankment where numerous ponding areas occur as a result of the embankments, dikes, berms, and culverts.

The applicant has proposed the construction of large debris basins in channels upstream of the proposed solar array to temporarily retain flows that originate upslope of the project site. The total area covered by these basins is reportedly 600 acres. Water that would have infiltrated if otherwise not retained by either the proposed debris basins or existing ponding areas can indeed be lost to evaporation. However, it is not likely the evaporation losses from the temporary retention of upslope runoff in debris basins would be greater than the evaporation from the existing downslope ponding areas. Therefore, the opportunity for percolation of runoff would likely remain essentially unchanged.

Comment (Sierra Club). Possible consequences associated with the construction and operation of the project, which would be located on several undeveloped alluvial fans, include increased soil erosion, substantial depletion or degradation of groundwater resources, dispersal of contaminants to soil or groundwater and an increase in downstream flooding. SA/DEIS C-7.27, .31, .34, .35. The SA/DEIS is inadequate because conclusions regarding the significance of the environmental impacts of the

Proposed Project and its alternatives discussed above are drawn without vital information.

20. **Response**. See Response 17 that addresses soil erosion and contaminant dispersal, and Response 19 that addresses potential changes to recharge and depletion of groundwater resources.

Licensing, Permitting and Documentation Requirements

Comment (San Bernardino County). With regard to water usage, the County policy is to require a groundwater assessment report if a project anticipates using 10 acre feet per year (AFY) or more of groundwater. The project appears to fall into that category for both construction phases and for operations.

21. **Response**. Condition of Certification **SOIL&WATER-7** requires submittal of the Groundwater Level Monitoring and Reporting Plan to San Bernardino County and to the CPM for review. The Groundwater Level Monitoring Plan approval shall be in accordance with the County of San Bernardino Code Title 3, Division 3, Chapter 6, Article 5 (Desert Groundwater Management Ordinance).

Comment (San Bernardino County). Not only would [hauling water from BNSF] be subject to the San Bernardino County Desert Groundwater Management Ordinance, BNSF is not a licensed water purveyor and does not have a water district authority nor a district boundary. Several approvals would be necessary including an updated well permit and water purveyor permit from County Environmental Health Division, and possibly approval from the County Local Agency Formation Commission (LAFCO) to create a district boundary. All of this requires analysis to comply with CEQA. The export of large volumes of water via rail could require a County Conditional Use Permit.

22. **Response**. The water required for construction and operational use will be obtained from a well located on private property adjacent to the Project site.

Comment (San Bernardino County). Although the SA/DEIS acknowledges the San Bernardino County Desert Groundwater Management Ordinance, Mitigation Measure Soil & Water No. 8 does not require approval from the County but only review and comment, similar to the CEC conditioning for Bright Source.

23. **Response**. See Response 21.

Comment (Sierra Club). Staff noted “many defined drainages,” in the project area, but the Applicant has not yet prepared a Streambed Alteration Agreement. SA/DEIS C.2-10.

24. **Response**. See Response 1.

Comment (Sierra Club). Decommissioning Plan…[and] Groundwater Level Monitoring and Reporting Plan…have not been developed due to missing critical data.

25. **Response**. See Response 21 relative to the Groundwater Level Monitoring and Reporting Plan. Condition of Certification **SOIL&WATER-6** would ensure that decommissioning impacts are minimized to an insignificant level.

Water Rights

Comment (Center for Biological Diversity). The Center is also concerned that the discussion in the DEIS is also incomplete because it fails to address any potential water rights that could arguably be created from use of groundwater by the proposed project on these public lands. While the Center recognizes that this issue may involve somewhat complex legal issues, at minimum, the BLM must address this question and to ensure that any water rights that could *arguably* be created will be conveyed back to the BLM owner and run with the land at the end of the proposed project ROW term. The BLM must provide a mechanism to insure that in no case will the use of water for the proposed project on these public lands result in water rights accruing to the project applicant that it could arguably convey to any third party. Therefore, any water rights *arguably* created by groundwater pumping on these public lands for the proposed project must not ultimately accrue to any third party for use *off-site or on-site* in the future for any other project. Moreover, BLM should ensure that the applicant will not use the groundwater associated with the project off-site for any purpose.

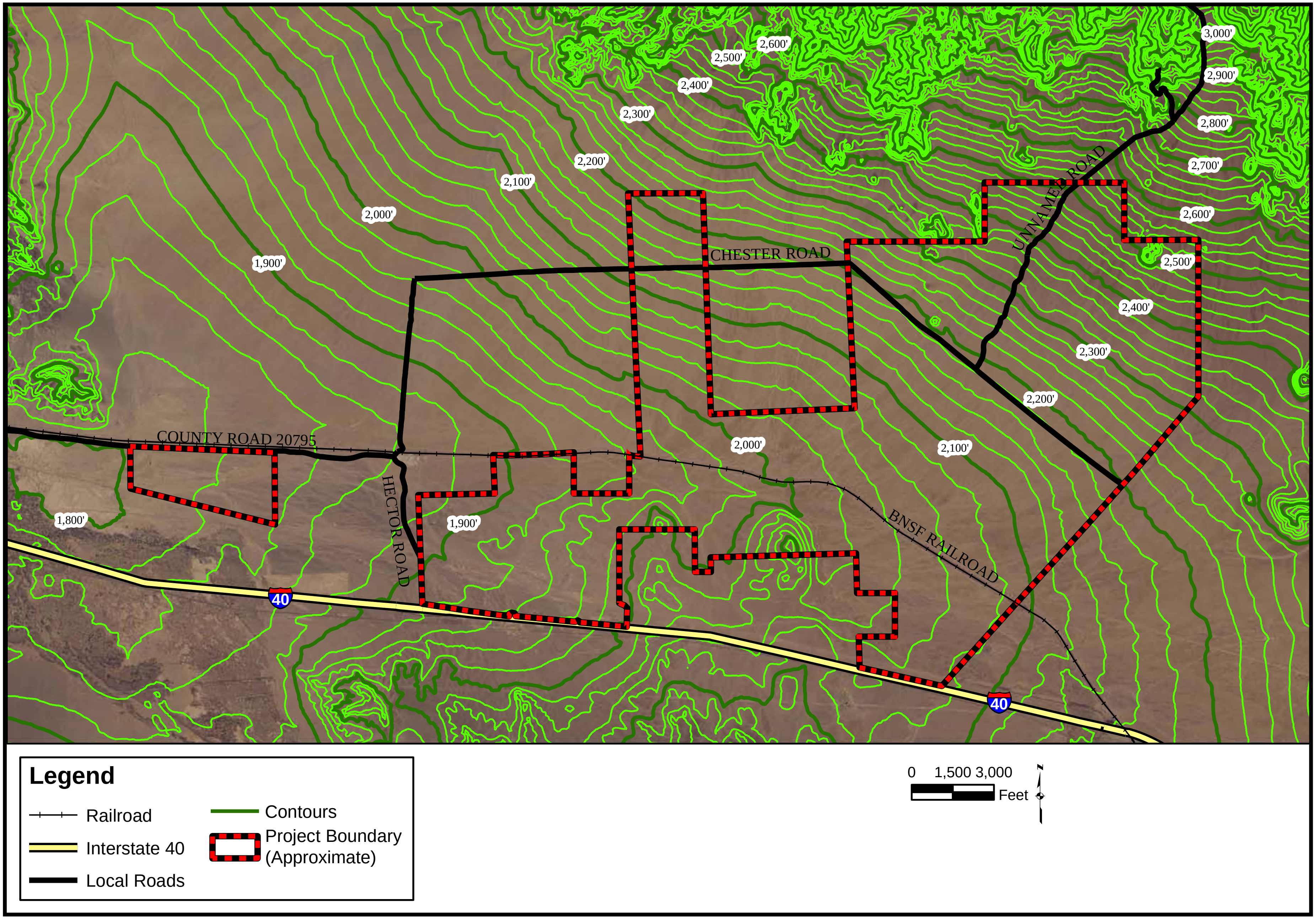
26. **Response**. The water required for construction and operational use will be obtained from a well located on private property adjacent to the Project site.

Alternative Projects

Comment (Sierra Club). The water analyses for two of the alternative projects are also inadequate due to lack of information. The same information missing for the Proposed Project water analysis is also missing for the Reduced Acreage Alternative and the Avoidance of Donated and Acquired Lands Alternative…the analyses go one step further and fail to even mention Waste Discharge Requirements for either of these two alternatives.

27. **Response**. All of the potential impacts identified for the proposed project remain with the Reduced Acreage Alternative. However, due to the alternative's reduced physical size and reduction in number of SunCatchers, these potential impacts are proportionately reduced. See Responses 8 and 9 that summarizes staff's assessment of potential impacts to water quality, groundwater storage, and water levels and related Conditions of Certification designed to ensure potential impacts are less than significant. Avoidance of Donated and Acquired Lands Alternative is addressed in Section B of this report.

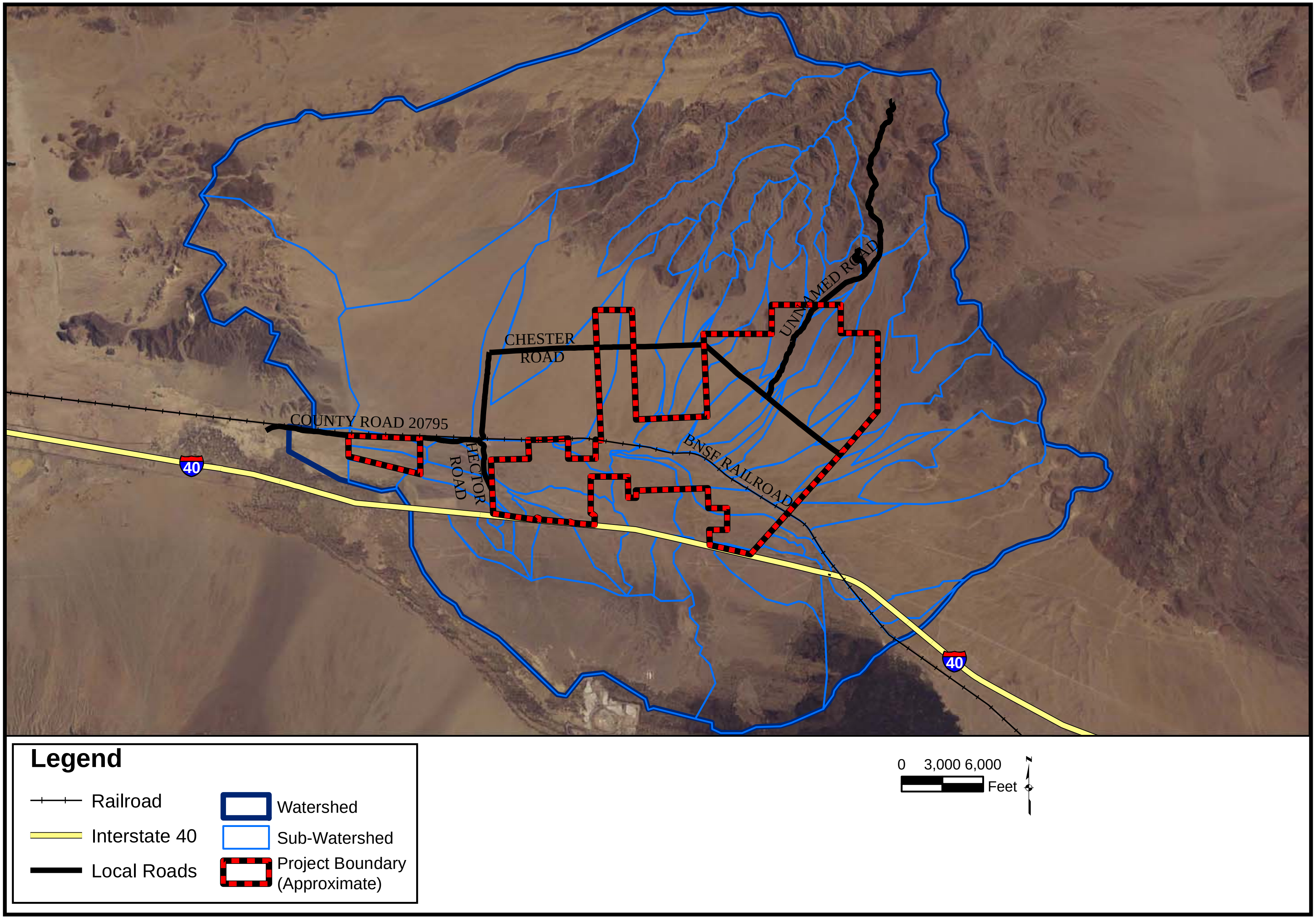
SOIL AND WATER RESOURCES - FIGURE 1
Calico Solar Project - Site Topography



SOURCE: Winzler & Kelly

SOIL AND WATER RESOURCES - FIGURE 2

Calico Solar Project - Regional Watersheds

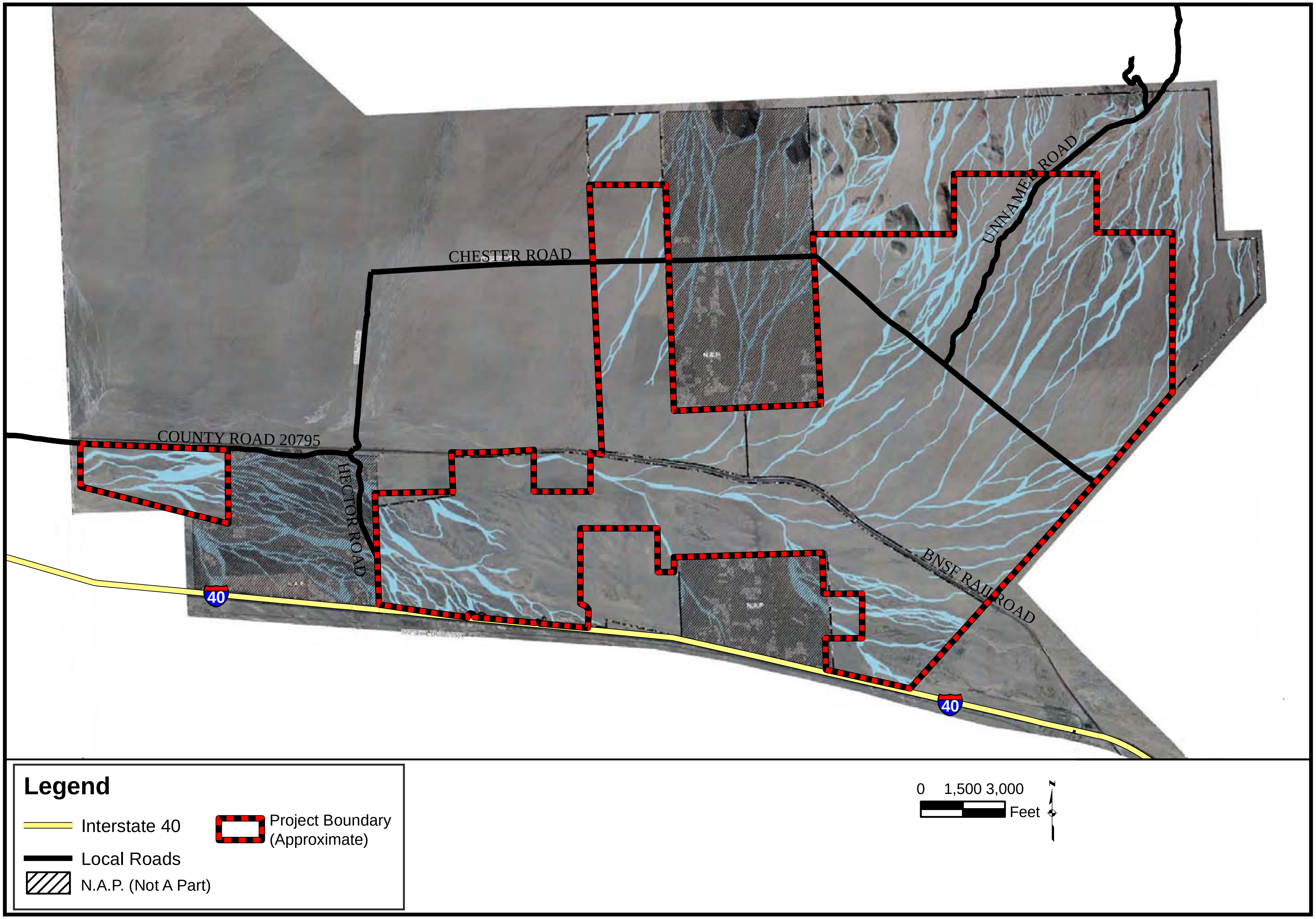


SOIL AND WATER RESOURCES

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Winzler & Kelly, URS, 2008 and Huitt-Zolairs, 2009

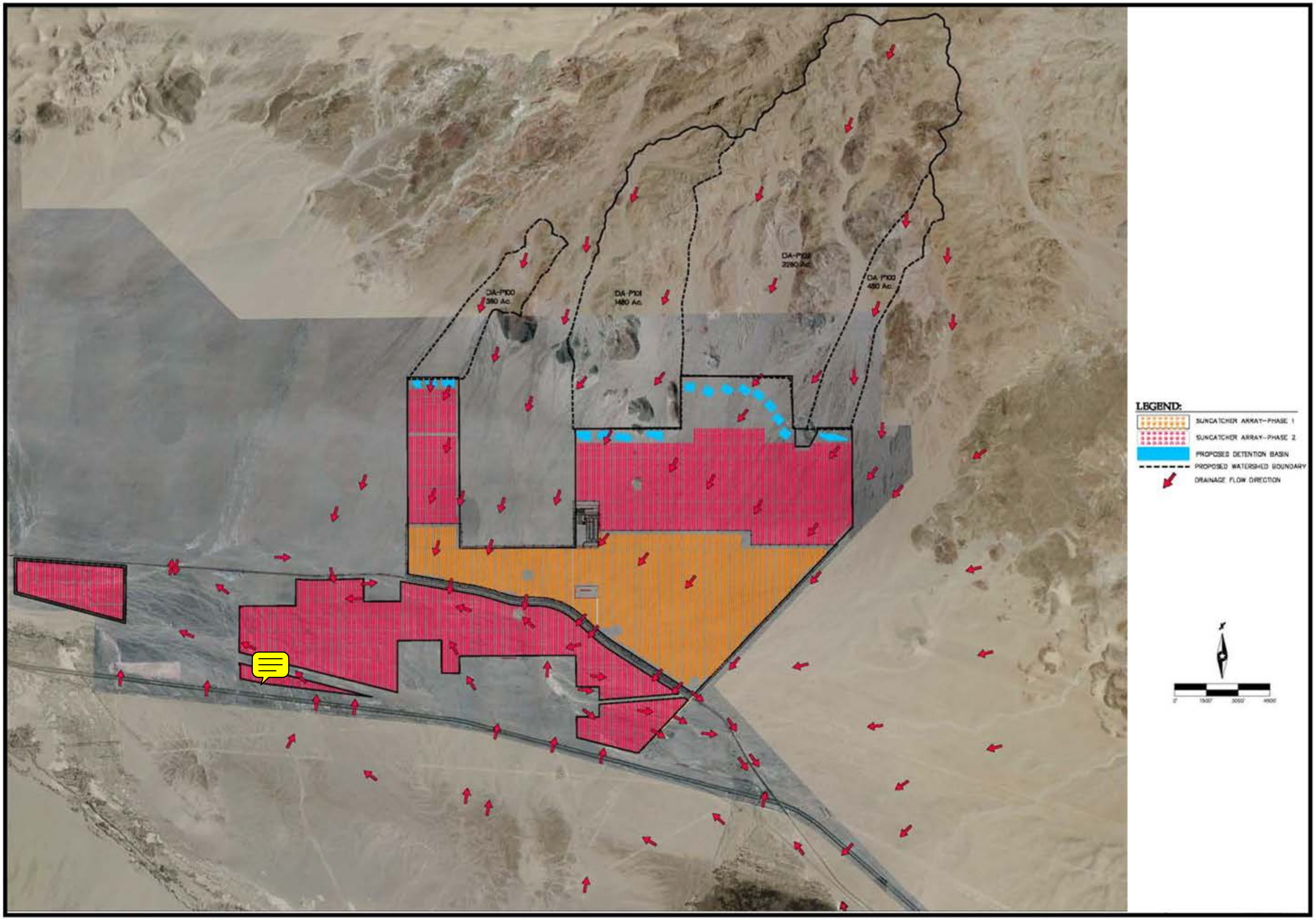
SOIL AND WATER RESOURCES - FIGURE 3
Calico Solar Project - Existing CDFG Flow Paths



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: Winzler & Kelly, URS 2010

SOIL AND WATER RESOURCES - FIGURE 4

Calico Solar Project - Proposed Pond Drainage Area Map

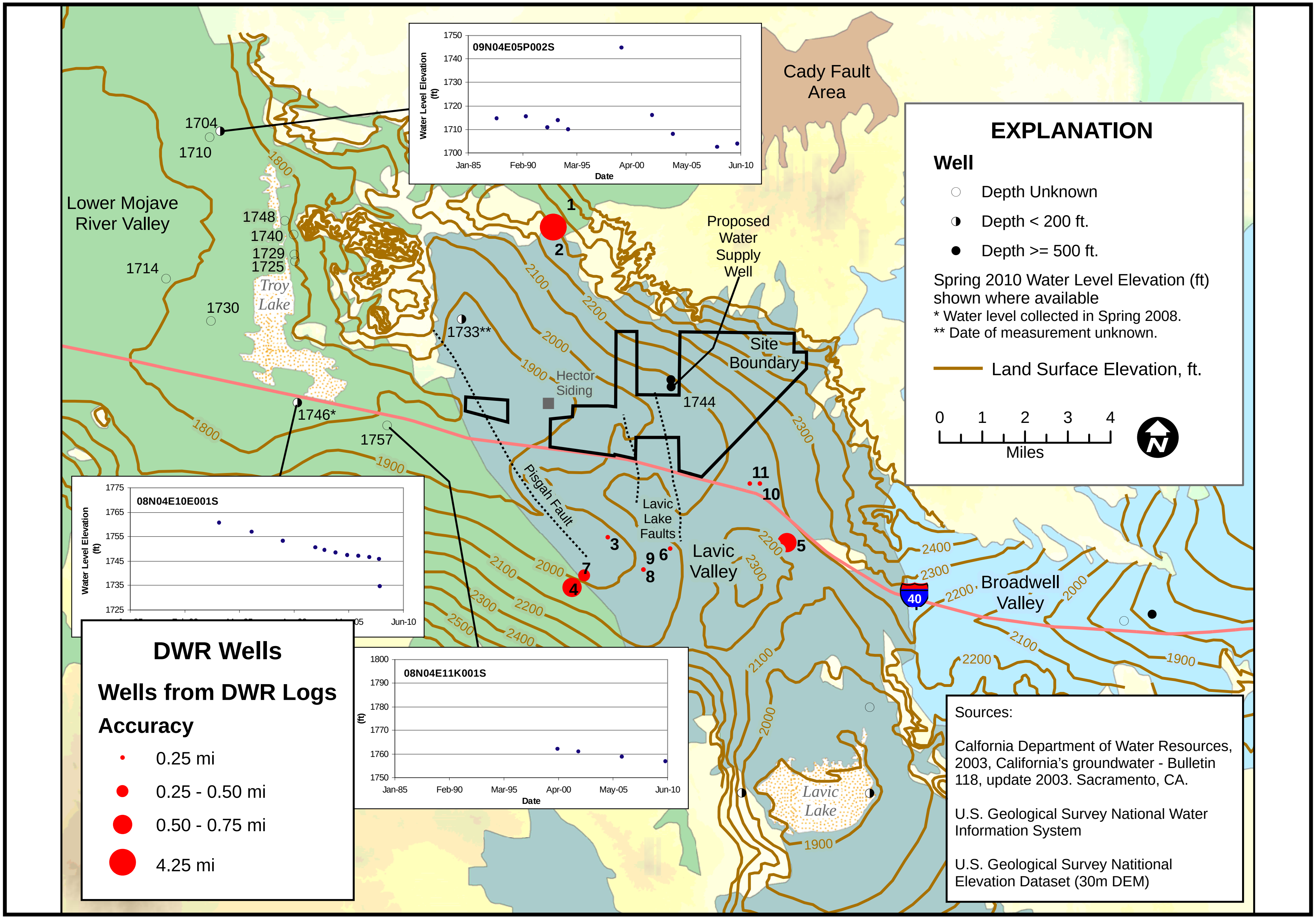


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: URS, 6/17/2010

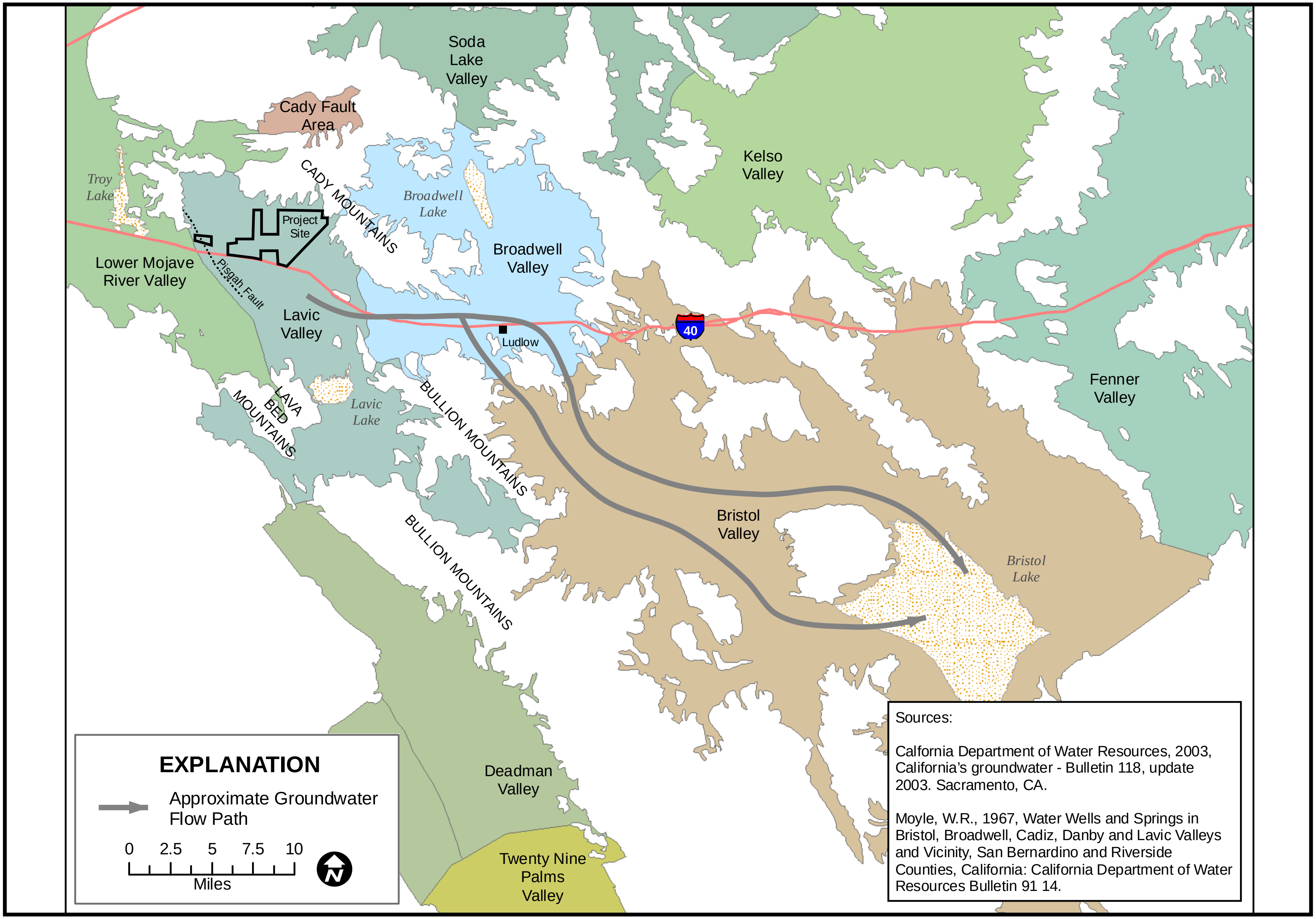
SOIL AND WATER - FIGURE 5

Calico Solar Project - Well Locations and Recent Water Level Data



SOIL AND WATER RESOURCES - FIGURE 6

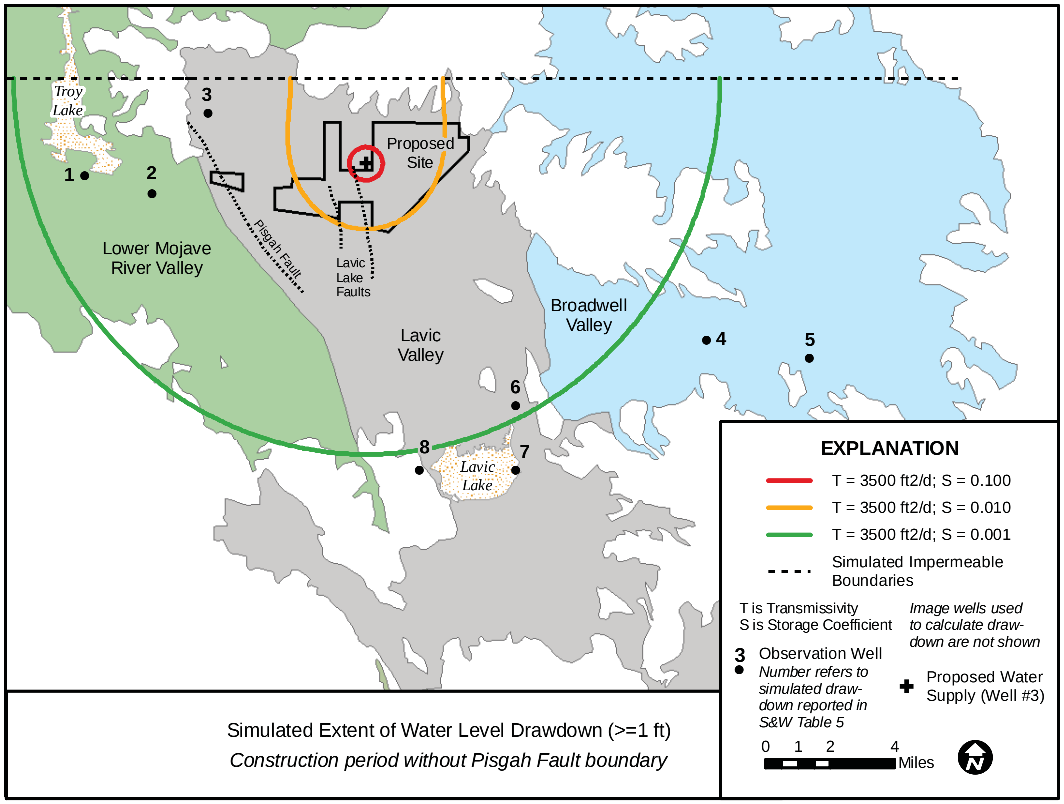
Calico Solar Project - Regional Groundwater - Flow System



SOURCE: HydroFocus, Inc.

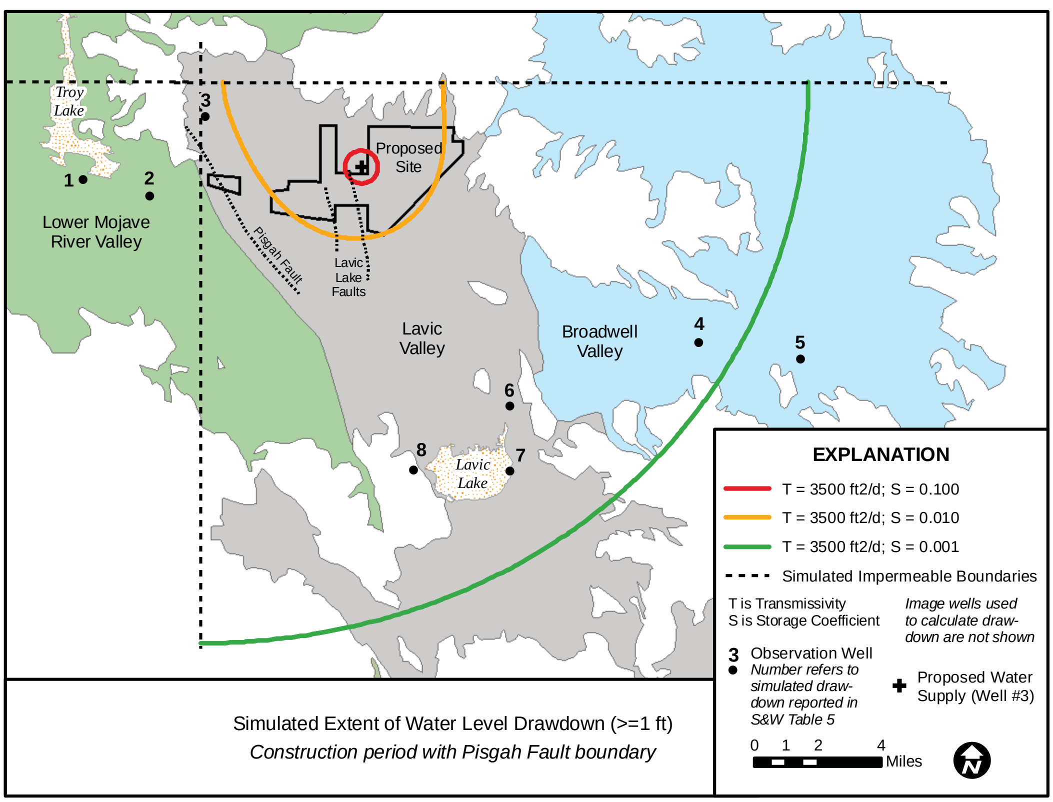
SOIL AND WATER - FIGURE 7A and 7B
Calico Solar Project - Drawdown

7A



Simulated Extent of Water Level Drawdown (>=1 ft)
Construction period without Pisgah Fault boundary

7B



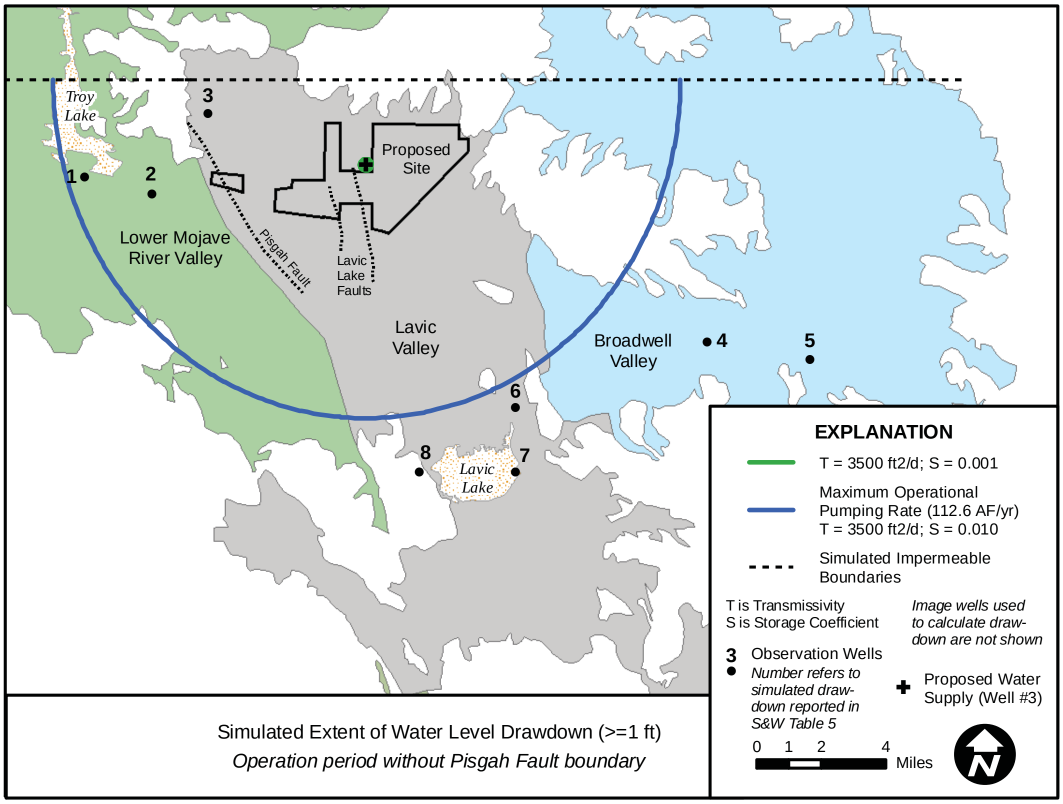
Simulated Extent of Water Level Drawdown (>=1 ft)
Construction period with Pisgah Fault boundary

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: HydroFocus, Inc.

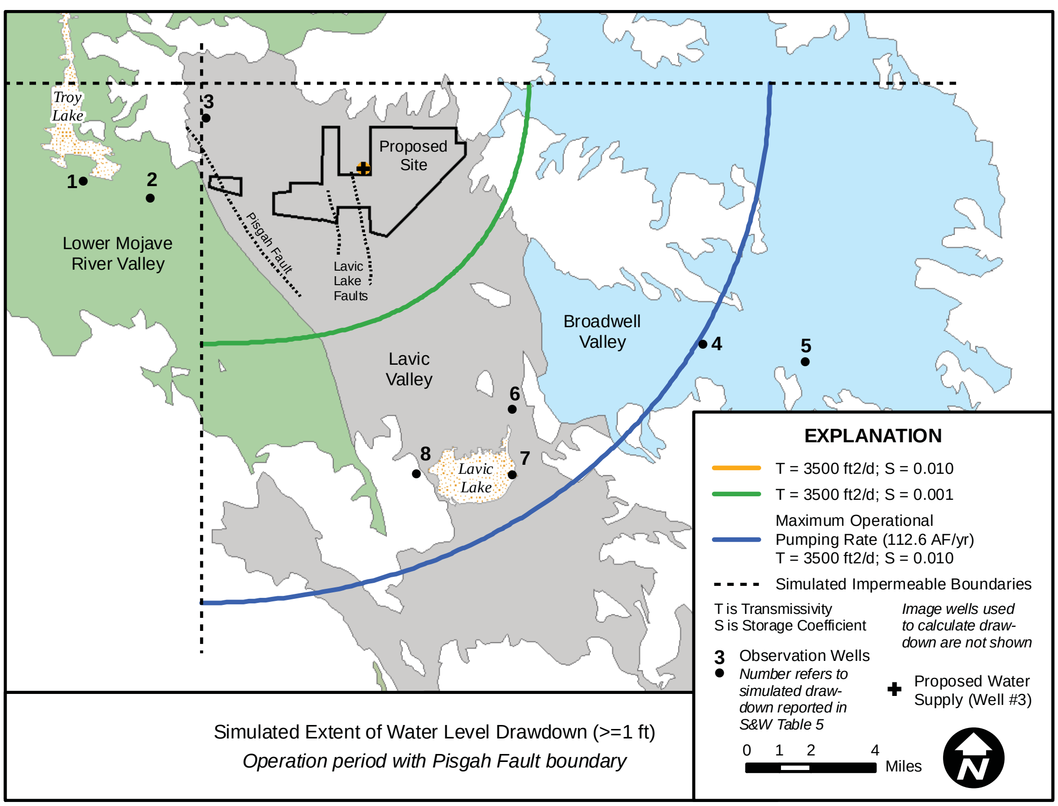
SOIL AND WATER - FIGURE 8A and 8B

Calico Solar Project - Drawdown

8A



8B



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SOURCE: HydroFocus, Inc.

C.8 – LAND USE, RECREATION, AND WILDERNESS

Testimony of Negar Vahidi and Susanne Huerta

C.8.1 SUMMARY OF CONCLUSIONS

Energy Commission staff (hereafter referred to as “staff”) have reviewed the proposed Calico Solar Project (formerly the Stirling Energy Systems Solar One Project) in accordance with the requirements of the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). This section addresses land use issues related to agriculture and rangeland resources; wilderness and recreation resources; horses and burros; and compatibility with existing land uses and consistency with the applicable laws, ordinances, regulations, and standards (LORS).

Implementation of the proposed Calico Solar Project (Calico Solar or “proposed project”) would not result in adverse impacts to agricultural lands, rangeland resources, or horses and burros. The conversion of approximately 6,215 acres of land to support the proposed project’s components and activities could disrupt wilderness resources and recreational activities in established federal, state, and local recreation areas. Potential impacts from the proposed project would indirectly affect the Cady Mountains Wilderness Study Area (WSA); however, numerous wilderness and recreation areas surround the project site. Therefore, this indirect impact would not be adverse.

The applicant has submitted an application to the BLM requesting a right-of-way (ROW) to construct the proposed project and its related facilities. Pursuant to the California Desert Conservation Area (CDCA) Plan (1980, as amended), sites associated with power generation or transmission not identified in the CDCA Plan are considered through the Plan Amendment process. Therefore, the proposed project would require a BLM ROW grant and a project-specific plan amendment for consistency with the CDCA Plan. However, in an interim policy dated May 28, 2009, the State Director of the BLM issued an Instruction Memorandum regarding management of donated land and lands acquired by Land and Water Conservation Funds (LWCF), which requires LWCF lands to be managed as avoidance/exclusion areas for land use authorizations that could result in surface disturbing activities (BLM 2009a). Construction and operation of the proposed project (i.e., the revised 6,215-acre project site) would not comply with this policy, as the revised project boundary still includes LWCF lands. Although, the exact acreage of the LWCF lands affected is unclear.

In May 2010, the applicant submitted a supplemental report for modifications to the primary water supply, which would require a pipeline that would traverse two private parcels located within the San Bernardino County (county) Resource Conservation (RC) zoning designation. The county recently adopted Development Code Chapter 84.29 (Renewable Energy Generating Facilities), which allows for development of solar energy facilities in the RC zone. Therefore, the proposed project’s water supply pipeline is consistent with San Bernardino County’s General Plan and Development Code.

For purposes of CEQA compliance, the level of significance of each impact of the proposed project on land use resources has been determined and is discussed in detail in Section C.8.4.3 (CEQA Level of Significance). In summary, impacts on agricultural lands and rangelands would be less than significant, and there would be no impacts related to Williamson Act contracts. Impacts to recreation and wilderness resources would be less than significant. Impacts to horses and burros would be less than significant. Impacts related to LORS compliance would be significant and unavoidable.

Under NEPA, impacts to land use, recreation and wilderness would be minimal. No Herd Management Area is affected by the proposed project.

The Reduced Acreage Alternative would be approximately 2,600 acres or 42% of the lands affected by the proposed project, and would eliminate any construction on LWCF lands. In contrast to the proposed project, this alternative would comply with all applicable LORS, in particular the BLM's Interim Policy Memorandum regarding management of donated LWCF mitigation lands. Otherwise, in general, the impacts associated with the alternative would be similar to the proposed project, but proportionally less intense.

Because the Calico Solar Project would have no impacts on agricultural resources, rangelands, horses and burros, it would have no potential to contribute to cumulative impacts in this respect. However, the proposed project would combine with other past and reasonably foreseeable future projects to substantially reduce scenic values of wilderness areas and recreational resources in the Mojave Desert and southern California desert region and therefore, would result in a significant and unavoidable cumulative land use impact in this regard.

C.8.2 INTRODUCTION

The land use analysis focuses on the project's consistency with environmental resources, land use plans, ordinances, regulations, policies, and the project's compatibility with existing or reasonably foreseeable land uses. In addition, an energy generating system and its related facilities generally have the potential to create impacts in the areas of air quality, noise, dust, public health, traffic and transportation, and visual resources. These individual resource areas are discussed in detail in separate sections of this document.

C.8.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

The analysis of proposed project effects must comply with both CEQA and NEPA requirements given the respective power plant licensing and land jurisdictions of the California Energy Commission and U.S. Bureau of Land Management (BLM). CEQA requires that the significance of individual effects be determined by the Lead Agency; however, the use of specific significance criteria is not required by NEPA. Because this document is intended to meet the requirements of both NEPA and CEQA, the methodology used for determining environmental impacts of the proposed project includes a consideration of guidance provided by both laws. 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).

In comparison, NEPA states that "'Significantly' as used in NEPA requires considerations of both context and intensity…" (40 CFR 1508.27). Therefore, thresholds serve as a benchmark for determining if a project action will result in a significant adverse environmental impact when evaluated against the baseline. NEPA requires that an Environmental Impact Statement (EIS) is prepared when the proposed federal action (project) as a whole has the potential to "significantly affect the quality of the human environment."

Thresholds for determining 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. In addition, staff's evaluation of the environmental effects of the proposed project on land uses (i.e., those listed below) includes an assessment of the context and intensity of the impacts, as defined in the Council on Environmental Quality Regulations for implementing the Procedural Provisions of the NEPA (see regulations 40 CFR Part 1508.27). Effects of the proposed project on the land uses and the environment (and in compliance with both CEQA and NEPA) have been determined using the thresholds listed below.

Agricultural Lands and Rangeland Management

- Conversion of Farmland or Rangeland.
- Conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide 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.
- Conflict with existing zoning for agricultural use, or a Williamson Act contract.
- Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural uses.

Wilderness, Areas of Critical Environmental Concern (ACEC) and Recreation

- Directly or indirectly disrupt activities in established federal, state, or local recreation areas and/or wilderness areas.
- Substantially reduce the scenic, biological, cultural, geologic, or other important factors that contribute to the value of federal, state, local, or private recreational facilities or wilderness areas.

Horses and Burros

- Involve changes in the existing environment which, due to their nature or location, result in interference with BLM's management of Herd Management Areas (HMAs).

Land Use Compatibility and LORS Compliance

- Directly or indirectly divide an established community or disrupt an existing or recently approved land use.
- 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.

Land Use Table 1 provides a general description of the land use LORS applicable to the proposed project. The proposed project's consistency with these LORS is discussed in **Land Use Table 2**.

Land Use Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	Description
Federal	
Federal Land Policy and Management Act (FLPMA), 1976 – 43 CFR 1600	Establishes public land policy; guidelines for administration; and provides for the management, protection, development, and enhancement of public lands. In particular, the FLPMA's relevance to the proposed project is that Title V, Section 501 establishes BLM's authority to grant rights-of-way for generation, transmission, and distribution of electrical energy (FLPMA 2001).
Bureau of Land Management - California Desert Conservation Area (CDCA) Plan, 1980 as Amended (BLM 1980)	The 25 million-acre CDCA contains over 12 million acres of public lands spread within the area known as the California Desert, which includes the following three deserts: the Mojave, the Sonoran, and a small portion of the Great Basin. The 12 million acres of public lands administered by the BLM are half of the CDCA. The CDCA Plan is a comprehensive, long-range plan with goals and specific actions for the management, use, development, and protection of the resources and public lands within the CDCA, and it is based on the concepts of multiple use, sustained yield, and maintenance of environmental quality. The plan's goals and actions for each resource are established in its 12 elements. Each of the plan elements provides both a desert-wide perspective of the planning decisions for one major resource or issue of public concern as well as a more specific interpretation of multiple-use class guidelines for a given resource and its associated activities.
Public Rangelands Improvement Act (1978) (PRIA 1978)	Establishes and reaffirms the national policy and commitment to inventory and identify current public rangeland conditions and trends; manage, maintain and improve the condition of public rangelands so that they become as productive as feasible for all rangeland values in accordance with management objectives and the land use planning process; and continue the policy of protecting wild free-roaming horses and burros from capture, branding, harassment, or death, while at the same time facilitating the removal and disposal of excess wild free-roaming horses and burros which pose a threat to themselves and their habitat and to other rangeland values.
Wild and Free-Roaming Horse and Burro Act (1971) (BLM 2009j)	The BLM protects, manages, and controls wild horses and burros under the authority of the Wild Free-Roaming Horses and Burros Act of 1971 (Act) to ensure that healthy herds thrive on healthy rangelands. The BLM manages these animals as part of its multiple-use mission under the 1976 Federal Land Policy and Management Act. One of the BLM's key responsibilities under the Act is to determine the "appropriate management level" (AML) of wild horses and burros on the public rangelands.

Applicable LORS	Description
State	
None	
Local	
County of San Bernardino 2007 General Plan (CSB 2007a)	The policies and programs of the County of San Bernardino General Plan, adopted March 13, 2007, are intended to serve as a blueprint for most land use decisions. Preparing, adopting, implementing, and maintaining a general plan serves to: identify the community's land use, transportation, environmental, economic, and social goals and policies as they relate to land use and development; form the basis for local government decision-making, including decisions on proposed development; provide residents with opportunities to participate in the planning and decision-making processes of their community; and inform residents, developers, decision makers, and other cities and counties of the ground rules that guide development within the community.
County of San Bernardino 2007 Development Code, Title 8 of the San Bernardino County Code (CSB 2007b; CSB 2010d)	San Bernardino County has adopted a "one-map approach" for both the General Plan land use designations and zoning classifications to assure land use consistency between the General Plan and Development Code. The Development Code was adopted March 13, 2007, and amended August 20, 2009 and February 2010. The purpose of this Development Code is to implement the San Bernardino County General Plan by classifying and regulating the uses of land and structures within unincorporated San Bernardino County. In particular, the purposes of the Development Code are as follows: to provide standards and guidelines for continuing orderly growth and development; to conserve and protect the County's important agriculture, cultural, natural, open space and scenic resources; to create a comprehensive and stable pattern of land uses upon which to plan transportation, water supply, sewerage, energy, drainage/flood control and other public facilities and utilities; to encourage the most appropriate uses of land in order to prevent overcrowding of land and avoid undue concentration of population, and maintain and protect the value of property; and to ensure compatibility between different types of development and land use. The Development Code was most recently amended on February 9, 2010, to include Chapter 84.29 (Renewable Energy Generation Facilities) for the purpose of establishing "...standards and permit procedures for the establishment, maintenance and decommissioning of renewable energy generation facilities" (CSB 2010).

Cumulative Land Use Effects

- 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.

C.8.4 PROPOSED PROJECT

C.8.4.1 SETTING AND EXISTING CONDITIONS

Proposed Project

The proposed Calico Solar site is approximately 6,215 acres and is located in San Bernardino County approximately 37 miles east of Barstow. The site consists primarily of public land administered by the BLM. Within the site boundaries are 2,246 acres of undeveloped private land under the jurisdiction of San Bernardino County; however, the private land would not be a part of the proposed project. This private land, as well as non-BLM lands within 1 mile of the project, is designated as Resource Conservation by county zoning. The southern boundary of the proposed project site is adjacent to Interstate Highway 40 (I-40), and the northern side of the project site borders the Cady Mountains.

The applicant submitted updated project boundaries maps dated August 12, 2009 and June 2, 2010. Subsequent to the applicant's August 12, 2009 filing, staff requested the applicant to submit a formal description of the new boundaries, which has not been provided. As such, the project boundaries described above are from the AFC, and the June 2, 2010 filing and will be revised upon receipt of any updated description.

The Calico Solar site primarily consists of undeveloped desert land. Existing onsite land uses include the Burlington Northern Santa Fe (BNSF) railroad right-of-way (ROW), which traverses the site from east to west; several underground high pressure gas pipelines generally parallel to I-40 and the railroad; Hector Road which enters the site from I-40 and traverses it for approximately 0.5 mile; and Southern California Edison's (SCE) Pisgah Substation and overhead transmission line which are adjacent to the southeast border of the project site. In addition, approximately 775 acres on the northeast portion of the original project site (i.e., the original 8,230-acre project site proposed in the AFC) are designated as Land and Water Conservation Fund (LWCF) mitigation lands (BLM 2009a). Based on a review of maps provided in the applicant's June 2, 2010 filing, it appears that LWCF lands are still located within the revised project site boundary. However, at time of the writing of this Supplemental Staff Assessment (SSA), the exact acreage of the affected LWCF lands within the proposed project site boundary have not been provided by the applicant.

The proposed project would occur in two phases. Phase I would consist of the construction of up to 11,000 SunCatchers and would require approximately 2,327acres of BLM land. Phase II would expand the project to a total of 34,000 SunCatchers and would require approximately an additional 3,888 acres of BLM land. These acreage numbers were provided by the applicant in its June 2, 2010 filing (which indicated a revised project boundary). It should be noted that in this filing the applicant did not provide specific revised information regarding the number of SunCatchers that would be developed in each phase. As such, staff assumes that each phase would be developed with the number of SunCatchers indicated by the applicant in its original AFC filing. In addition to the proposed project site and construction areas, there are other features and facilities associated with the proposed project (the majority of which are located on the proposed project site or construction laydown areas), including:

- approximately 34,000, 38-foot solar dish Stirling systems (i.e., SunCatchers) and associated equipment and infrastructure within a fenced boundary;
- a 220-kV substation in the center of the project site;
- approximately 1 mile within the project site of twelve to fifteen 220-kV transmission line structures (90 to 110 feet tall) from the proposed Calico Solar Substation to SCE's Pisgah Substation;
- a Main Services Complex including an administration building (30,000 sq. ft.) and a maintenance building (45,000 sq. ft.);
- two 175,000-gallon water storage tanks (40 feet in diameter) and two17,000-gallon water storage tanks (18 feet in diameter);
- main roads with a combination of roadway dips and elevated sections across drainage features;
- a buried septic tank system with a dual sanitary leach field; and
- permanent access to the project site to be provided by a bridge over the BSNF railroad along Hector Road.

In May 2010, the applicant submitted a supplemental report (i.e., Supplement to its original AFC) for modifications to the project site boundary, the onsite hydrogen system, and the primary water supply. The modification to the project site boundary would move the northern boundary south approximately 0.55 mile and eliminate approximately 1,100 acres of the Project site, which would reduce the proposed project area from 8,230 acres to 7,130 acres. Again, on June 2, 2010, the applicant provided revised project boundary maps showing a reduction in the overall proposed project site to 6,215 acres. The purpose of the project boundary modifications is to avoid several sensitive plant species and distance the proposed project farther south from bighorn sheep habitat in the Cady Mountains. The May 2010 supplemental report provides details on two alternate hydrogen supply systems, which would not affect existing land uses. The modifications to the water supply would require a pipeline that would traverse two private parcels (APNs 052928134 and 052928123) that were previously not within the project boundary. These private parcels are within San Bernardino County's Resource Conservation zoning designation. Compliance with the county's general plan and development code are discussed in the LORS analysis below and in **Land Use Table 2**.

Surrounding Area

The surrounding area consists of undeveloped desert land and mountain terrain with small rural communities in the vicinity. The closest community is Newberry Springs located approximately 10 miles west of the project site, and the closest residence is located approximately 2 miles east of the project site. In addition, north of the BNSF railway is private land, which has been accessed by Hector Road where it crosses the BNSF railroad ROW. This includes the private properties in Section 1, Township 8 North, Range 5 East, and Section 36, Township 9 North, Range 5 East (Jackson 2009b). Since the summer of 2008, BNSF and Calico Solar entered into an Agreement for Private Crossing. Because this crossing is private, gates and barricades have been placed at this crossing to ensure public safety and prevent public use of this crossing (SES 2009x).

Agricultural Lands and Rangelands

The project site is located within the desert region of central San Bernardino County, which is not notable for productive agricultural land. The United States Department of Agriculture's (USDA) Natural Resource Conservation Service (NRCS) provides information on the designation of soils in areas with agricultural lands, including farmland classifications such as Prime Farmland and Farmland of Statewide Importance (NRCS 2009). However, data for the project site was not available through the NRCS's Web Soil Survey (WSS). Similarly, the California Department of Conservation's (DOC) Farmland Mapping and Monitoring Program (FMMP) provides designations and statistics on the conversion of farmland to non-agricultural uses throughout the State. However, the proposed project site is not within the survey boundaries of the FMMP. As such, no agricultural land is within the project boundaries.

Rangeland allotments are designated BLM pastures for wildlife and livestock (BLM 2009b). The majority of the proposed project is located within the Cady Mountains rangeland allotment. According to BLM's online GIS mapping program (Geocommunicator), the southwest boundary of this allotment follows the BNSF railroad. As such, approximately 6,400 acres of the project site that is north of the BNSF railroad is within the Cady Mountains rangeland allotment (BLM 2009c). There is currently no grazing permit issued within the proposed project area. In addition, the northern boundary of the Ord Mountain allotment is approximately 0.75 mile south of the project site.

Wilderness and Recreation

Wilderness land in San Bernardino County is administered by the BLM. According to the federal Wilderness Act, a designated Wilderness Area is defined as having four primary characteristics, including the following:

- a natural and undisturbed landscape;
- extensive opportunities for solitude and unconfined recreation;
- at least 5,000 contiguous acres; and
- feature(s) of scientific, educational, scenic, and/or historic value (US Code 2009).

As noted in the AFC, adjacent to the northern boundary of the project site is the Cady Mountains Wilderness Study Area (WSA). This is an area designated and managed by the BLM, where limited recreational activities are permitted including camping and off-road vehicle use (SES 2008a). Each WSA has been documented by wilderness study reports that show the location of the individual WSAs, a description of its wilderness values, and BLM's recommendation for its future suitability as wilderness as proposed by the Secretary of Interior on June 12, 1991 (BLM 2009c). In addition, as noted above, the northwest border of the Pisgah ACEC is adjacent to the southeast boundary of the proposed project site along the SCE transmission line ROW. The Pisgah ACEC contains the Pisgah Crater and lava flow, and supports several sensitive species. While no direct impacts would occur to this ACEC, indirect impacts may occur. The Ord-Rodman Desert Wildlife Management Area (DWMA) is located adjacent to the southwest portion of the project site. This DWMA, which includes federally designated critical habitat for the desert tortoise, was established by the Western Mojave Plan.

Public lands within DWMAs are designated as ACECs. While no direct project impacts would occur to this DWMA, indirect impacts may occur to this ACEC.

The wilderness areas in the vicinity of the proposed project site are the Rodman Mountains Wilderness located approximately 8 miles southwest of the project site, the Bristol Mountains Wilderness and Kelso Dunes Wilderness located approximately 10 miles east of the project site, and the Newberry Mountains Wilderness located approximately 15 miles southwest of the project site. The Rodman Mountains Wilderness are approximately 34,320 acres where a series of ridges and valleys climbing from 2,000 feet to almost 5,000 feet are the result of faults which cross this wilderness (BLM 2009e). Camping, hunting, fishing, and horseback riding are allowed in the Rodman Mountains Wilderness. The Bristol Mountains Wilderness is approximately 71,385 acres and the adjacent Kelso Dunes Wilderness is approximately 144,915 acres. This area provides ample space for recreation activities including hiking, horseback riding, hunting, camping, rockhounding, and photography (BLM 2009f, 2009g). The Newberry Mountains Wilderness is approximately 26,102 acres and are noted for rugged volcanic mountains and deep, maze-like canyons, where camping, hunting, fishing, and horseback riding are allowed (BLM 2009h).

Approximately 32 miles east of the project site is the Mojave National Preserve which is a 1.6-million acre park managed by the U.S. National Park Service (NPS 2009). Within the Mojave National Preserve is the Providence State Recreation Area (SRA) which is managed by California State Parks. This area also provides space for recreational activities; in particular, nature hikes and cavern tours are the main attractions of this park.

As noted above, various recreational activities occur throughout the wilderness areas surrounding the project site. In addition, the Cady Mountains and Pisgah Crater are known destinations for rockhounding. The Cady Mountains are characterized by agate, chalcedony, geodes, and jasper, and the Pisgah Crater is characterized by lava and volcanic bombs (BLM 2009i). Off-highway vehicle recreational use is also a recreational activity within the boundaries of the project site. In general, off-highway vehicles are limited to designated routes of travel in Limited use areas. OHV use is also allowed in designated Open OHV Areas. The Rasor Off-Highway Vehicle Area is a 22,500-acre state designated area for off-highway vehicle use located adjacent to and west of the Mojave National Preserve. There are no designated open OHV use areas within the project site.

Horses and Burros

The BLM administers wild horses and burros as guided by the Wild and Free-Roaming Horse and Burro Act of 1971. This includes the management of Herd Areas (HA) and Herd Management Areas (HMAs), which are geographic areas where wild horse or burro populations were found at the passage of the Act in 1971 (BLM 2009j). California contains 33 HAs and 22 HMAs. According to BLM maps, the Granite-Providence Mountains is the closest HA located approximately 32 miles east of the project site within the Mojave Preserve. In addition, the Cima Dome, Lava Beds, and Woods-Hackberry HAs are located within the Mojave Preserve approximately 40 to 45 miles east of the proposed project site (BLM 2009k). No HMAs are within the vicinity of the project site. As such, the proposed project would not traverse any established HMAs or HAs.

Land Use and LORS Compliance

The majority of the proposed project site is located within the “Moderate” (Class M) use category of the BLM’s CDCA Plan, with some areas designated as “Limited” (Class L) (SES 2008a). Multiple Use Class M (Moderate Use) is based upon a controlled balance between higher intensity use and protection of public lands. This class provides for a wide variety of present and future uses such as mining, livestock grazing, recreation, energy and utility development. Class M management is also designed to conserve desert resources and mitigate damage to those resources which permitted uses may cause. Multiple Use Class L (Limited Use) protects sensitive, natural, scenic, ecological and cultural resource values. Public lands designated as Class L are managed to provide for generally lower-intensity, carefully controlled multiple use resources, while ensuring that sensitive values are not significantly diminished (CDCA Plan, 1999 reprint). In addition, approximately 2,246 acres of the private lands under San Bernardino County jurisdiction would be surrounded by the proposed project site. In May 2010, the applicant submitted a supplemental report for modifications to the water supply plans requiring a pipeline that would traverse two private parcels. Both parcels are within San Bernardino County’s Resource Conservation (RC) zoning designation. The RC zone is within the Agricultural and Resource Management Land Use Zoning Districts, and the purpose of this zoning district is to provide sites for open space and recreational activities, single-family homes on very large parcels and similar and compatible uses (CSB 2007b).

C.8.4.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Construction and Operation

Agricultural Lands and Rangelands

As described in detail above under the section entitled **Agricultural Lands**, multiple governmental agencies at the federal, state, and local level have information regarding the agricultural lands relating to the proposed project and the surrounding area. To summarize, the following is a list of the various designations or categorizations these multiple governmental agencies have provided for the proposed project site and construction laydown area:

- **USDA NRCS:** The NRCS’s Web Soil Survey does not have data for the project site, and therefore does not provide a farmland classification.
- **California DOC:** The project site is not with the survey boundaries of the FMMP mapping criteria.
- **San Bernardino County:** The private land adjacent to the project site is under the county’s jurisdiction, and is within the Resource Conservation zoning district.
- **Williamson Act**: The project site is not located in an area that is under a Williamson Act contract.

Based on the lack of federal, state or local farmland/agricultural designations, the proposed project would not convert important farmland, would not conflict with agricultural zoning designations or Williamson Act contracts, and would not result in a change in the existing environment that would lead to a conversion of farmland. Therefore, the proposed project would not adversely impact agricultural land.

However, as noted in the "Setting and Existing Conditions," the project would be located within the Cady Mountains grazing allotment. This allotment consists of 177,293 acres which is designated by BLM as available for grazing livestock (BLM 2009l, BLM 2009m). According to the West Mojave Plan, the allotment was identified as an area that would benefit from voluntary relinquishment. Therefore, grazing is not currently authorized on this allotment. The proposed project would convert approximately 6,400 acres of the Cady Mountains rangeland allotment to another use, which accounts for approximately 3% of the allotment. Therefore, the proposed project is not expected to result in an adverse impact to inactive livestock grazing. For discussion of impacts to the desert bighorn sheep, please see the **Biological Resources** section of this document.

Wilderness and Recreation

Recreational activities, including camping and off-road vehicle use, are permitted in the Cady Mountains WSA located just north of the project site. In addition, the project would be approximately 8 miles north of the closest wilderness area (the Rodman Mountains). As such, the proposed project would not directly disrupt wilderness or recreation activities. However, the proposed project could indirectly impact the recreational and wilderness values of the Cady Mountains WSA by changing the natural and undisturbed landscape; and construction and operation activities would have the potential to degrade the qualities of solitude and unconfined wilderness and recreation in this remote area of the Mojave Desert. The CDCA Plan amendment associated with the proposed project would not affect the wilderness characteristic values of the WSA since the proposed project site is not located within the WSA area. Nonetheless, as described in the "Setting and Existing Conditions," numerous wilderness and recreation areas are in the vicinity of the project site, which provide alternative options for recreation and wilderness destinations. Therefore, potential indirect impacts from the proposed project would not be adverse from a land use perspective. Please refer to the **Biological Resources**, **Cultural Resources**, and **Visual Resources** sections for detailed discussions of proposed project effects on scenic, biologic, and cultural amenities.

Horses and Burros

The proposed project would not contain or traverse any established BLM HAs or HMAs. As discussed in the "Setting and Existing Conditions," the Granite-Providence HA is the closest HA, which is located approximately 32 miles east side of the proposed project site. Therefore, the proposed project would not result in an interference with BLM's management of an HMA or HA. For a discussion of the proposed project's consistency with Chapter 3 of the BLM's CDCA Plan, Wild Horses and Burros Element, please see **Land Use Table 2** (below). Please refer to the **Biological Resources** section.

Land Use Compatibility and LORS Compliance

Physical Division of an Existing Community

The proposed project site is located on undeveloped lands under the jurisdiction of the BLM, which is not located within or near an established community. Therefore, neither the size nor the nature of the project would result in a physical division or disruption of an established community. In addition, due to the temporary nature of construction activities, construction generated nuisances such as dust and noise are not expected to adversely affect existing land uses in the area. For a detailed analysis of construction-related nuisance impacts, please see the **Air Quality, Public Health, Traffic and Transportation,** and **Noise** sections of this document**.**

Conflict with any Applicable Land Use Plan, Policy, or Regulation

As required by California Code of Regulations, Title 20, Section 1744, Energy Commission staff evaluates the information provided by the project owner 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 (Public Resources Code section 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 (Public Resources Code section 25525).

In addition, the applicant has submitted an application to the BLM requesting a ROW to construct the proposed project and its related facilities. Pursuant to the

California Desert Conservation Area (CDCA) Plan (1980, as amended), sites associated with power generation or transmission not identified in the CDCA Plan are considered through the Plan Amendment process. Under Federal law, BLM is responsible for processing requests for ROWs to authorize such proposed projects and associated transmission lines and other appurtenant facilities on land it manages. The CDCA Plan, while recognizing the potential compatibility of solar generation facilities on public lands, requires that all sites associated with power generation or transmission not identified in the Plan be considered through the Plan Amendment process. BLM would use the following Planning Criteria during the Plan Amendment process:

- The plan amendment process would be completed in compliance with the Federal Land Policy and Management Act (FLPMA), NEPA, and all other relevant Federal law, executive orders, and management policies of the BLM;
- The plan amendment process would include an EIS to comply with NEPA standards;
- Where existing planning decisions are still valid, those decisions may remain unchanged and be incorporated into the new plan amendment;
- The plan amendment would recognize valid existing rights;

- Native American Tribal consultations would be conducted in accordance with policy, and Tribal concerns would be given due consideration. The plan amendment process would include the consideration of any impacts on Indian trust assets (please see the **Cultural Resources** section);
- Normally, consultation with the State Office of Historic Preservation (SHPO) would be conducted throughout the plan amendment process. At the time of the writing of this SSA, it appears that the BLM may address cultural resources issues through the BLM's Statewide Protocol, whereby BLM does not conduct a public section 106 process or SHPO consultation (please see the **Cultural Resources** section for details regarding this issue); and
- Consultation with the US Fish and Wildlife Service (USFWS) would be conducted throughout the plan amendment process (please see the **Biological Resources** section).

If the ROW and proposed land use plan amendment are approved by BLM, the proposed solar thermal power plant facility on public lands would be authorized in accordance with Title V of the FLMPA of 1976 and the Federal Regulations at 43 CFR part 2800. The BLM's Environmental Impact Statement (EIS) acts as the mechanism for meeting NEPA requirements, and also provides the analysis required to support a Plan Amendment identifying the site location within the Plan.

An additional LORS compliance issue was raised by the public during the scoping process for this document. According to some private landowners, the public and private landowners have been using Hector Road at the railway crossing to access the land north of the BNSF railway for over fifty years. This includes the private properties in Section 1, Township 8 North, Range 5 East, and Section 36, Township 9 North, Range 5 East (Jackson 2009b). However, according to these private landowners, recently-placed gates and barricades at the crossing have blocked access to these lands. Private landowners assert that Hector Road has been in use prior to the passage of the FLPMA, and therefore, is a county road, and blocking access is a violation of the Unlawful Enclosures of Public Lands Act of 1885 and the CDCA Plan, which classifies the project site as an "open area" (Jackson 2009a).

As the proposed project developer, Tessera Solar responded to the private landowners by explaining that due to additional safety requirements, BNSF requires gates to be installed at all crossings where an entity other than BNSF (i.e., the applicant) would have access (SES 2009x). The private crossing granted to Calico Solar/Tessera is for the purposes of establishing an access to the western side of the proposed project site. As such, in addition to installation of the gate and barricades, the applicant had to acquire insurance for potential damage to BNSF property and attend a safety course. Tessera complied with these conditions and was granted access, which established the need for gates and barricades (SES 2009x). In addition, at the December 22, 2009 Staff Workshop, BLM representatives stated that the crossing was established as a BNSF ROW for access to, and maintenance of, the rail line and, and therefore, the crossing is not a legal road with authorized access for the public (CEC 2009). As such, the crossing is a physical access and not a legal access, and has been used in a passive and unauthorized manner. Therefore, the recent blockage of this crossing does not result in a conflict with any applicable LORS. For a detailed discussion of impacts related to access and public safety, please refer to the **Traffic and Transportation** and **Public Health and Safety** sections (respectively) of this document.

Staff's analysis of the proposed project's (and project alternatives) consistency with applicable federal land use LORS is presented in **Land Use Table 2.** Note that there are no State or local land use LORS applicable to the proposed project. Based on staff's independent review of applicable LORS documents, the proposed project would not be consistent with certain applicable land use LORS; in particular the current BLM Interim Policy Memorandum regarding LWCF mitigation lands (see discussion in the table below). However, implementation of the Reduced Acreage Alternative would avoid LWCF lands and would be consistent with the BLM Interim Policy (see Sections C.8.5 and C.8.6, below, for a discussion of these alternatives).

Land Use Table 2
Project Compliance with Adopted Land Use LORS

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
Federal			
Federal Land Policy and Management Act, 1976 – 43 CFR 1600, Sec. 501. [43 U.S.C. 1761]	(a) The Secretary, with respect to the public lands … are authorized to grant, issue, or renew rights-of-way over, upon, under, or through such lands for: (4) systems for generation, transmission, and distribution of electric energy, except that the applicant shall also comply with all applicable requirements of the Federal Energy Regulatory Commission under the Federal Power Act, including part I thereof (41 Stat. 1063, 16 U.S.C. 791a-825r) [P.L. 102-486, 1992]	YES	The FLPMA authorizes the issuance of a right-of-way grant for electrical generation facilities and transmission lines. In addition, based on staff's review of the Federal Power Act, the requirements would not be applicable to the proposed project as they are not related to renewable resources, and are otherwise related to administrative procedures. Therefore, the proposed project would be in compliance with this policy.
Farmland Protection Policy Act, Section 658.1	As required by section 1541(b) of the [Farmland Protection Policy] Act, 7 U.S.C. 4202(b), Federal agencies are (a) to use the criteria to identify and take into account the adverse effects of their programs on the preservation of farmland, (b) to consider alternative actions, as appropriate, that could lessen adverse effects, and (c) to ensure that their programs, to the extent practicable, are compatible with State and units of local government and private programs and policies to protect farmland.	YES	As discussed above in detail in Section C.8.4.2 (under the subsection entitled "Agricultural Lands and Rangelands"), the farmland conversion impacts of the proposed project would not be adverse. In addition, construction of the proposed project and its onsite linear facilities would be temporary, and the project would not involve other changes in the existing environment that could result in conversion of farmland, to non-agricultural uses. Therefore, proposed project would be consistent with the FPPA.

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
Bureau of Land Management – California Desert Conservation Area (CDCA) Plan (BLM 1980)	**Chapter 2 – Multiple-Use Classes MULTIPLE-USE CLASS GUIDELINES** **MULTIPLE-USE CLASS L (Limited Use)** 6. Electrical Generation Facilities – Electric generation may be allowed. (See wind/solar/ geothermal, below) – Wind/Solar May be allowed after NEPA requirements are met. 7. Transmission Facilities – New gas, electric, and water facilities and cables for interstate communication may be allowed only within designated corridors (see Energy Production and Utility Corridors Element). NEPA requirements will be met. [#5,85]	YES (with BLM's project-specific CDCA Plan Amendment)	The proposed project site is administered by the BLM and is managed under multiple use Class L (Limited Use) categories in conformance with the CDCA Plan (SES 2008a). The proposed project consists of an electrical generating facility, a substation, a transmission line, and ancillary facilities. As such, development of the proposed project is an allowed use under the Multiple-Use Class Guidelines. In addition, the CDCA Plan, while recognizing the potential compatibility of solar generation facilities on public lands, requires that all sites associated with power generation or transmission not identified in the Plan be considered through the Plan Amendment process. Therefore, the BLM would undertake a project-specific CDCA Plan amendment along with the ROW grant for the proposed Calico Solar Project. Upon BLM's amendment of the CDCA plan for the Calico Solar Project, the proposed project would be fully compliant with the CDCA Plan. The BLM's Environmental Impact Statement (EIS) acts as the mechanism for meeting NEPA requirements, and also provides the analysis required to support a Plan Amendment identifying the facility within the Plan.

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
	MULTIPLE-USE CLASS M (Moderate Use) 6. Electrical Generation Facilities All types of electrical generation plants may be allowed in accordance with State, Federal, and local laws. —Wind/Solar May be allowed after NEPA requirements are met. 7. Transmission Facilities — New gas, electric, and water facilities and cables for interstate communication may be allowed only within designated corridors (see Energy Production and Utility Corridors Element). NEPA requirements will be met. [#5,85]	YES (with BLM's project-specific CDCA Plan Amendment)	The proposed project site is on lands administered by the BLM, and is located within the "Moderate" (Class M) use category of the BLM's CDCA Plan, with some areas designated as "Limited" (Class L). These lands are managed under the Multiple-Use Class M and Class L categories in conformance with the CDCA Plan (SES 2008a). The proposed project consists of an electrical generating facility, a substation, a transmission line, and ancillary facilities. As such, development of the proposed project is an allowed use under the Multiple-Use Class Guidelines. In addition, The CDCA Plan, while recognizing the potential compatibility of solar generation facilities on public lands, requires that all sites associated with power generation or transmission not identified in the Plan be considered through the Plan Amendment process. Therefore, the BLM would undertake a project-specific CDCA Plan amendment along with the ROW grant for the proposed Calico Solar Project. Upon BLM's amendment of the CDCA plan for the Calico Solar Project, the proposed project would be fully compliant with the CDCA Plan. The BLM's Environmental Impact Statement (EIS) acts as the mechanism for meeting NEPA requirements, and also provides the analysis required to support a Plan Amendment identifying the facility within the Plan.
	Chapter 3 **Wild Horse and Burros Element** Goal 2. Protect wild horses and burros on public lands by conducting surveillance to prevent unauthorized removal or undue harassment of animals.	YES	As noted in the "Setting and Existing Conditions" subsection above, the proposed project site is not in the vicinity of an HA or HMA; therefore, the project site and surrounding area are not notable for the presence of wild horses or burros. As such, the proposed project would not result in any interference with BLM's management of an HMA, and would be consistent with this element of the CDCA Plan.

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
	Chapter 3 **Energy Production and Utility Element** Goal 1. Fully implement the network of joint-use planning corridors to meet projected utility needs to the year 2000. Specific electrical and natural gas right-of-way or power plant site applications made under the provisions of this element should be consistent with adopted California Energy Commission forecasts, which are reviewed biennially. Decision criteria are to: (1) Minimize the number of separate rights-of-way by utilizing existing rights-of-way as a basis for planning corridors; (2) Encourage joint use of corridors for transmission lines, canals, pipelines, and cables; (3) Provide alternative corridors to be considered during processing of applications; (4) Avoid sensitive resources wherever possible; (5) Conform to local plans whenever possible; (6) Consider wilderness values and be consistent with final wilderness recommendations; (7) Complete the delivery-systems network; (8) Consider ongoing projects for which decisions have been made, for example, the Intermountain Power Project; and (9) Consider corridor networks which take into account power needs and alternative fuel resources.	YES	The proposed project's linear facilities would be within the project site, and would interconnect at the SCE Pisgah Substation which is adjacent to the eastern boundary of the project site. Therefore, the proposed project would utilize existing ROWs, and would be consistent with this element of the CDCA Plan.

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
	Addendum B: Interim Management Guidelines Chapter III. Guidelines for Specific Activities Lands Actions – Disposal, Rights-of-Way, Access and Withdrawals 2. Rights-of-Way: Existing rights-of-way may be renewed if they are still being used for their authorized purpose. New rights-of-way may be approved only for temporary uses that satisfy the non-impairment criteria. 3. Right-of-Way Corridors: Right-of-way corridors may be designated on lands under wilderness review.	YES	The non-impairment standard, directs that "until Congress has determined otherwise" the lands under review be managed so as not to impair their suitability as wilderness (CRS 2004). As the proposed project would not traverse an established Wilderness Area or Wilderness Study Area, the project would be in compliance with this guideline of the CDCA Plan.
Federal Wilderness Act, 16 U.S.C. § 1131-1136	(a) Establishment; Congressional declaration of policy; wilderness areas; administration for public use and enjoyment, protection, preservation… provisions for designation as wilderness areas In order to assure that an increasing population, accompanied by expanding settlement and growing mechanization, does not occupy and modify all areas within the United States and its possessions, leaving no lands designated for preservation and protection in their natural condition, it is hereby declared to be the policy of the Congress to secure for the American people of present and future generations the benefits of an enduring resource of wilderness.	YES	As the proposed project would not traverse an established Wilderness Area, the project would be consistent with this guideline.
Public Rangelands Improvement Act	Establishes and reaffirms the national policy and commitment to inventory and identify current public rangeland conditions and trends; manage, maintain and improve the condition of public rangelands so that they become as productive as feasible for all rangeland values in accordance with management objectives and the land use planning process; and continue the policy of protecting wild free-roaming horses and burros.	YES	As noted in "Setting and Existing Conditions," the project site would be located within the Cady Mountains rangeland allotment. However, according the BLM's Rangeland Specialist from the Barstow Field Office, the land is currently permitted for grazing, and is identified in the West Mojave (WEMO) Plan, for voluntary relinquishment (BLM 2009n). Therefore, the proposed project would not interfere with the Cady Mountains rangeland allotment.

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
Wild and Free-Roaming Horse and Burro Act	Establishes BLM's authority to protect, manage, and control wild horses and burros to ensure that healthy herds thrive on healthy rangelands. BLM determines the "appropriate management level" (AML) of wild horses and burros on the public rangelands.	YES	As discussed above in detail in Section C.8.4.2, the proposed project would not contain or traverse an established HMA. As such, the proposed project would be consistent with this Act.
LM Interim Policy Memorandum (CA-2009-020)	• Lands acquired by BLM under donation agreements, acquired for mitigation/ compensation purposes and with LWCF funds, are to be managed as avoidance/ exclusion areas for land use authorizations that could result in surface disturbing activities. • Should BLM–California managers have use authorizations applications pending, or receive new applications on lands that meet the above criteria, they are required to notify the State Director and set up a briefing to address how to respond to those applications. • Should managers have inquiries related to pre-application activities for any land use authorizations on lands that meet the above criteria, please notify applicants regarding the location of these lands as soon as possible and advise them to avoid these lands or provide details on how they would plan to operate or mitigate their project in a manner consistent with the values of the lands donated or acquired for conservation purposes.	INCONSISTENT (for the proposed project) CONSISTENT (for Reduced Acreage Alternative)	As noted in the "Setting and Existing Conditions," the proposed project site still includes lands that have been acquired for mitigation/ compensation purposes by LWCF funds. The applicant has not provided the exact acreage of the affected LWCF mitigation lands that currently occur within the revised project site boundary. Nonetheless, based on staff's review of the applicant's June 2, 2010 filing (which includes the revised project boundary maps), it appears that LWCF lands still occur within the project site. In an Interim policy dated May 28, 2009, the State Director of the BLM issued an Instruction Memorandum regarding management of donated land and lands acquired by LWCF funds. As a result, LWCF lands are to be managed as avoidance/exclusion areas for land use authorizations that could result in surface disturbing activities (BLM 2009a). Construction and operation of the proposed project would not be in compliance with this policy, because even with the revised project boundary, these mitigation lands would still be affected by the proposed project. However, the Reduced Acreage Alternative (discussed below in Sections C.8.5) would avoid LWCF lands, and therefore, would not result in surface disturbing activities in the avoidance/exclusion areas. As such, this alternative would be consistent with this BLM Interim Policy and its requirements.

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
State			
None			
Local			
San Bernardino County General Plan (CSB 2007a)	**COUNTYWIDE GOALS AND POLICIES OF THE LAND USE ELEMENT** LU 1.2 The design and siting of new development will meet locational and development standards to ensure compatibility of the new development with adjacent land uses and community character. **COUNTYWIDE GOALS AND POLICIES OF THE CONSERVATION ELEMENT** CO 10.2 The location of electric facilities should be consistent with the County's General Plan, and the General Plan should recognize and reflect the need for new and upgraded electric facilities. **DESERT REGION GOALS AND POLICIES OF THE OPEN SPACE ELEMENT** D/OS 1.3 Maintain Rural Living (RL) and Resource Conservation (RC) Land Use Zoning Districts or zoning on steep slopes and remote areas to minimize hillside grading and to protect the rural and natural environment.	YES	In May 2010, the applicant submitted a supplemental report for modifications to the primary water supply, which would require a pipeline that would traverse two private parcels (APNs 052928134 and 052928123) that were previously not within the project boundary. The private parcels are undeveloped land located within the county's Resource Conservation (RC) zoning designation. The county has a "one-map approach" for both the General Plan land use designations and zoning classifications to assure land use consistency between the county's General Plan and its zoning code. As noted in **Land Use Table 1**, the county recently adopted Development Code Chapter 84.29 (Renewable Energy Generating Facilities); therefore, the county recognizes the need for renewable power generating facilities. Refer to the discussion below for the proposed project's consistency with Chapter 84.29. Given the allowances for development of solar power in the RC zone in the county's newly adopted Development Code Chapter 84.29 (Renewable Energy Generating Facilities), the proposed water pipeline would be consistent with these goals and policies.

Applicable LORS	Description of Applicable LORS	Consistent?	Basis for Consistency
	DESERT REGION GOALS AND POLICIES OF THE CONSERVATION ELEMENT GOAL D/CO 2. Encourage utilization of renewable energy resources. **COUNTYWIDE GOALS AND POLICIES OF THE CONSERVATION ELEMENT** CO 8.3 Assist in efforts to develop alternative energy technologies that have minimum adverse effect on the environment, and explore and promote newer opportunities for the use of alternative energy sources.	YES	The proposed water pipeline is a component for the development of a solar energy farm that would produce up to a nominal 500 MW net of power. The power generated by the proposed project would be conveyed into SCE's electric grid to provide electricity supply for the area's population. Because the proposed project makes use of a renewable resource (i.e., sun light), it is consistent with this goal of the General Plan. In addition, the county recently adopted Development Code Chapter 84.29 (Renewable Energy Generating Facilities). Therefore, the county recognizes the need for renewable power generating facilities and has adopted a code to support renewable energy development; and as a component of the proposed project, the water pipeline would be consistent with this goal and policy.
County of San Bernardino 2007 Development Code (CSB 2007b)	**CHAPTER 84.29 RENEWABLE ENERGY GENERATION FACILITIES** **84.29.020 Applicability and Land Use Zoning Districts** The Land Use Zoning Districts that allow renewable energy facilities are limited to the following: RC (Resource Conservation) AG (Agriculture) FW (Floodway) RL (Rural Living) Note: If a facility is proposed solely in the Rural Living land use zoning district, it must include a minimum of 20 acres in the development proposal. IR (Regional Industrial)	YES	This chapter of the county Development Code was recently adopted in February of 2010 in recognition of the State's need for Renewable Power Generating Facilities. The proposed water pipeline is within the RC zone, and as a facility associated with development of solar power is consistent with the county's Development Code.

Project Closure and Decommissioning

According to Section 3.12 of the applicant's project description, the solar generating facility is expected to have a lifespan of 40 years. At any point during this time, temporary or permanent closure of the solar facility could occur. Temporary closure would be a result of necessary maintenance, hazardous weather conditions, or damage due to a natural disaster. Permanent closure would be a result of damage that is beyond repair, adverse economic conditions, or other significant reasons.

Both temporary and permanent closures would require the applicant to submit to the Energy Commission a contingency plan or a decommissioning plan, respectively. A contingency plan would be implemented to ensure compliance with applicable LORS, and appropriate shutdown procedures depending on the length of the cessation. A decommissioning plan would be implemented to ensure compliance with applicable LORS, removal of equipment and shutdown procedures, site restoration, potential decommissioning alternatives, and the costs and source of funds associated with decommissioning activities.

Upon closure of the facility or decommissioning, it is likely that the applicant would be required to restore lands affected by the project to their pre-project state. Given the fact that the proposed project site is located on undeveloped land, staff anticipates that project decommissioning would have impacts similar in nature to proposed project construction activities. Therefore, given the temporary nature of decommissioning activities and the eventual return of the lands to their current state, the effects of decommissioning on land use is not expected to be adverse.

C.8.4.3 CEQA LEVEL OF SIGNIFICANCE

For the purposes of CEQA compliance, the level of significance of each identified impact of the proposed project has been determined. The CEQA Lead Agency is responsible for determining whether an impact is significant and is required to adopt feasible mitigation measures to minimize or avoid each significant impact. Conclusions in this section are presented to identify the level of significance of each identified impact (as required by CEQA) as follows: less-than-significant (i.e., adverse, but not significant); less-than-significant with mitigation (i.e., can be mitigated to a level that is not significant); or significant and unavoidable (i.e., cannot be mitigated to a level that is not significant).

Agricultural Lands and Rangelands

As discussed above in detail in Section C.8.4.2 (under the subsection entitled "Agricultural Lands and Rangelands"), the farmland conversion impacts of the proposed project would "not result in an adverse impact," and the project would not involve other changes in the existing environment which could result in conversion of Farmland to non-agricultural uses. In addition, the proposed project would not be located on lands under Williamson Act contracts or zoned for agriculture. Therefore, proposed project impacts on agricultural lands would be less-than-significant.

In regards to rangelands, as noted in the "Setting and Exiting Conditions," the northeastern portion of the proposed project would be located within the Cady Mountains rangeland. The allotment is not currently permitted for grazing, and is identified in the West Mojave (WEMO) Plan for voluntary relinquishment (BLM 2009n). Therefore, the proposed project is not expected to interfere with the Cady Mountains rangeland allotment. However, the rangeland is currently vacant and scheduled for voluntary relinquishment at some time in the future. Therefore, impacts to rangelands due to construction or operation of the proposed project would be less than significant under CEQA.

Finally, the project site is not located in an area that is under a Williamson Act Contract, and there would be no impacts.

Wilderness and Recreation

As discussed above in detail in Section C.8.4.2 (under the subsection entitled “Wilderness and Recreation”), wilderness, wilderness study areas, or recreation lands would not be directly affected by the project, but would be in the vicinity, and therefore, could be indirectly affected. In particular, potential impacts from the proposed project would indirectly affect the Cady Mountains WSA. Nonetheless, as described in the “Setting and Existing Conditions,” there are numerous wilderness and recreation areas surrounding the project site, which would be available to the public. Therefore, potential indirect impacts from the proposed project would be less than significant.

Horses and Burros

As discussed above in detail in Section C.8.4.2 (under the subsection entitled “Horses and Burros”), the proposed project would not contain or traverse any established BLM HMAs. Therefore, the proposed project would not result in any interference with BLM’s management of an HMA. There would be no impacts.

Land Use Compatibility and LORS Compliance

As discussed above in detail in Section C.8.4.2 (under the subsection entitled “Land Use Compatibility”), the project would not physically divide or disrupt an established community, and there would be no impact.

Staff’s analysis of the proposed project’s consistency with applicable federal land use LORS is presented in **Land Use Table 2** (state and local LORS are not applicable). With BLM’s issuance of a project-specific CDCA Plan Amendment, the proposed project would fully comply with the Plan. However, the proposed project would not be in compliance with BLM Interim Policy Memorandum; therefore, impacts associated with compliance with this federal land use LORS would be significant and unavoidable.

Cumulative Land Use Effects

Section C.8.8 (below) provides a detailed analysis of cumulative impacts. As discussed below, the potential combined development of approximately one million acres of land, would all combine to result in adverse effects on agricultural lands (one of the state’s most important resources), and recreational resources. Although the development of renewable resources in compliance with federal and state mandates is important and required, the conversion of thousands of acres of open space would result in a significant and unavoidable impact. In general, the land conversion impacts to these lands would preclude numerous existing land uses including recreational activities, rangeland management, and open space.

Because the Calico Solar Project would have no impacts on agricultural resources or rangelands, horses and burros, it would have no potential to contribute to cumulative impacts in this respect. However, the proposed project would combine with other past and reasonably foreseeable future projects to substantially reduce scenic values of wilderness areas and recreational resources in the Mojave Desert and southern California desert region and therefore, would result in a significant and unavoidable cumulative land use impact in this regard.

C.8.5 REDUCED ACREAGE ALTERNATIVE

The Reduced Acreage Alternative would be located within the central portion of the proposed 850 MW project site. This alternative's boundaries and the revised locations of the transmission line, substation, laydown, and control facilities are shown in **Alternatives Figure 1**. The Energy Commission–proposed configuration of the Reduced Acreage Alternative avoids BLM acquired (LWCF) and donated lands, and minimizes impacts to biological and cultural resources.

C.8.5.1 SETTING AND EXISTING CONDITIONS

The setting for this alternative would be approximately 2,600 acres or 42% of the lands affected by the proposed project. Lands affected by this alternative would be located generally in the center of the proposed project site, and would be entirely under the jurisdiction of the BLM. In addition, as this alternative would retain 31% of the SunCatchers proposed under the proposed project, the net generating capacity would be approximately 275 MW. This alternative would require SCE to expand the existing Pisgah Substation, and install a fiber optic communications link along the existing e 65-mile Pisgah-Lugo and Pisgah-Gale transmission lines. Please see the discussion existing conditions within affected BLM lands under Section C.8.4.1.

C.8.5.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Agricultural Lands and Rangelands

With a 58% reduction in the site, any land conversion impact would also be proportionately less. As discussed above in detail in Section C.8.4.2 (under the subsection entitled "Agricultural Lands and Rangelands") the proposed project would not result in a conversion of farmland. Similarly, this alternative would not affect farmlands, and would not be located on land under Williamson Act contracts.

Similar to the proposed project, this alternative would not adversely affect the Cady Mountains rangeland allotment since the allotment is currently vacant and is scheduled for voluntary relinquishment. Therefore, the types of effects on agricultural lands and rangelands resulting from this alternative would be similar to the proposed project.

Wilderness and Recreation

The conversion of 2,600 acres of land to support the components and activities associated with this alternative would indirectly disrupt current wilderness areas and recreational activities in established federal and state areas, which would result in adverse effects on recreational users of these lands. However, this effect would be proportionally less than the 6,215 acres affected by the proposed project.

Horses and Burros

Similar to proposed project, this alternative would not contain or traverse any established BLM HMAs. Therefore, this alternative would not result in any interference with BLM's management of an HMA.

Land Use Compatibility and LORS Compliance

Similar to the proposed project, this alternative would not physically divide or disrupt an established community.

Staff's analysis of the proposed project's consistency with applicable federal land use LORS is presented in **Land Use Table 2.** These federal LORS would apply to this alternative. This alternative would be consistent with applicable federal land use LORS, including BLM's Interim Policy Memorandum (CA-2009-020) for avoiding LWCF lands. With BLM's issuance of a project-specific CDCA Plan Amendment, the proposed project would fully comply with the Plan. As discussed in **Land Use Table 2,** the proposed project would not be consistent with this policy. Therefore, this alternative would have no land use LORS inconsistencies compared to the proposed project, which is not consistent with BLM's Interim Policy Memorandum for avoiding LWCF lands.

Cumulative Land Use Effects

This alternative would result in the conversion of 2,600 acres of undeveloped open space with an industrial utility use (i.e., a 275 MW power plant and associated infrastructure). When compared to the proposed project, this alternative would result in 58% less land conversion to industrial uses; nonetheless, the cumulative effects of this amount of land conversion along with all other existing, planned, and proposed projects would result in adverse cumulative land conversion. Section C.8.8 (below) provides a detailed analysis of cumulative impacts. The potential combined development of approximately one million acres of land, would all combine to result in adverse effects on agricultural lands (one of the state's most important resources), and recreational resources. Although the development of renewable resources in compliance with federal and state mandates is important and required, the conversion of thousands of acres of open space would result in a significant and unavoidable impact. In general, the land conversion impacts to these lands would preclude numerous existing land uses including recreational activities, rangeland management, and open space. Because the Calico Solar Project would have no impacts on agricultural resources, rangelands, horses and burros, it would have no potential to contribute to cumulative impacts in this respect. However, the proposed project would combine with other past and reasonably foreseeable future projects to substantially reduce scenic values of wilderness areas and recreational resources in the Mojave Desert and southern California desert region and therefore, would result in a significant and unavoidable cumulative land use impact in this regard.

C.8.5.3 CEQA LEVEL OF SIGNIFICANCE

Agricultural Lands and Rangelands

As discussed above in subsection C.8.5.2, and similar to the proposed project, there would be no impacts on agricultural and rangelands resulting from this alternative.

Wilderness and Recreation

As discussed above in subsection C.8.5.2, and similar to the proposed project, impacts resulting from this alternative to wilderness and recreation would be less-than-significant.

Horses and Burros

As discussed above in subsection C.8.5.2, and similar to the proposed project, there would be no impacts on horses and burros resulting from this alternative.

Land Use Compatibility and LORS Compliance

This alternative would comply with all federal LORS, including the BLM Interim Policy Memorandum (CA-2009-020), and any land use LORS consistency impacts would be less-than-significant.

Cumulative Land Use Effects

As discussed above in subsection C.8.5.2, and similar to the proposed project, the cumulative land use impacts of this alternative would be significant and unavoidable.

C.8.6 AVOIDANCE OF DONATED AND ACQUIRED LANDS ALTERNATIVE

Due to the reduction in project size and impacts associated with the northern portion of the originally proposed project layout, the Avoidance of Donated and Acquired Lands Alternative shown in **Alternatives Figure 2** will be addressed in the **Alternatives** section of this SSA.

C.8.7 NO PROJECT/NO ACTION ALTERNATIVE

NO PROJECT/NO ACTION ALTERNATIVE #1:

No Action on the Calico Solar Project Application and on CDCA Land Use Plan Amendment

With the No Project/No Action Alternative, the proposed action would not be undertaken. The BLM land on which the project is proposed would continue to be managed within BLM’s framework of a program of multiple use and sustained yield, and the maintenance of environmental quality [43 U.S.C. 1781 (b)] in conformance with applicable statutes, regulations, policy and land use plan.

The results of the No Project/No Action Alternative would be the following:

- The impacts of the proposed project would not occur;
- The land on which the project is proposed may or may not become available to other uses (including another solar project), depending on BLM's actions with respect to the amendment of the California Desert Conservation Area Plan;
- The benefits of the proposed project in reducing greenhouse gas emissions from gas-fired generation would not occur. Both State and Federal law support the increased use of renewable power generation.

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM, and BLM would not amend the CDCA Plan. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because there would be no amendment to the CDCA Plan and no solar project approved for the site under this alternative, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no new ground disturbance. As a result, no loss or degradations to land use resources (including agricultural lands, rangelands, wilderness, recreation resources, horses and burros, and issues related to land use compatibility and LORS compliance) from construction or operation of the proposed project would occur. However, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, including another solar project requiring a land use plan amendment. In addition, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

If this project is not approved, renewable projects would likely be developed on other sites in the California Desert or in adjacent states as developers strive to provide renewable power that complies with utility requirements and State/Federal mandates. For example, there are large solar and wind projects proposed on BLM land along the Interstate 40 corridor within a few miles of the Calico Solar Project site. In addition, there are currently over 70 applications for solar projects covering over 650,000 acres pending with BLM in California.

NO PROJECT/NO ACTION ALTERNATIVE #2:

<u>No Action on Calico Solar Project and Amend the CDCA Land Use Plan to Make the Area Available for Future Solar Development</u>

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM, and BLM would amend the CDCA Land Use Plan of 1980, as amended, to allow for other solar projects on the site. As a result, it is possible that another solar energy project could be constructed on the project site.

Because the CDCA Plan would be amended, it is possible that the site would be developed with a different solar technology. As a result, ground disturbance would result from the construction and operation of the facility providing different solar technology and would likely result in a loss or degradation to land use resources. Different solar technologies require different amounts of grading and maintenance; however, it is expected that all solar technologies require some grading and ground disturbance. As such, this No Project/No Action Alternative could result in impacts to land use resources similar to the impacts under the proposed project.

NO PROJECT/NO ACTION ALTERNATIVE #3:

No Action on the Calico Solar Project Application and Amend the CDCA Land Use Plan to Make the Area Unavailable for Future Solar Development

Under this alternative, the proposed Calico Solar Project would not be approved by the Energy Commission and BLM, and the BLM would amend the CDCA Plan to make the proposed site unavailable for future solar development. As a result, no solar energy project would be constructed on the project site and BLM would continue to manage the site consistent with the existing land use designation in the CDCA Land Use Plan of 1980, as amended.

Because the CDCA Plan would be amended to make the area unavailable for future solar development, it is expected that the site would continue to remain in its existing condition, with no new structures or facilities constructed or operated on the site and no corresponding land disturbance. As a result, the land use resources of the site are not expected to change noticeably from existing conditions and, as such, this No Project/No Action Alternative would not result in impacts to land use resources. However, in the absence of this project, other renewable energy projects may be constructed to meet State and Federal mandates, and those projects would have similar impacts in other locations.

C.8.7.1 SETTING AND EXISTING CONDITIONS

The land use setting for the No Project/No Action Alternative would include lands that would contain the proposed project site, which would become available for other uses that are consistent with BLM's land use plans. Subsection C.8.4.1 (above) describes the existing setting of these lands in detail.

C.8.7.2 ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

With the No Project /No Action Alternative, the construction- and operation-related impacts of the proposed project would not occur. However, if the No Project/No Action Alternative #2 were approved, the land on which the project is proposed would become available to other uses that are consistent with BLM's land use plan, potentially including other renewable energy projects, recreational activities, etc. For example, according to **Cumulative Impacts Table 1A,** there are 35 solar energy projects and 33 wind energy projects proposed on BLM land within the area served by the BLM Barstow and Needles Field Offices, and there are currently 125 applications for solar projects covering approximately one million acres pending with BLM in the California Desert District.

Under the No Project/No Action alternative, the land use-related impacts of the Calico Solar project would not occur at the proposed site. The conversion of 6,215 acres of land that would be converted as a result of the proposed project would not occur, and a project-specific CDCA Plan amendment would not be necessary. Although, it is possible that the proposed project site could be developed with power generation and/or utility uses in the future given the existing and planned energy-related infrastructure in the area (i.e., SCE Pisgah Substation), the specific size, type, and timing of such use would be unknown. With the No Project/No Action Alternative, the effects on land use would be similar to what is currently occurring (undeveloped open space) at the proposed project site and in the surrounding area.

C.8.7.3 CEQA LEVEL OF SIGNIFICANCE

Under the No Project/No Action alternative land use impacts to the proposed project site and area would be similar to those currently occurring under the existing conditions in the area. Given that there would be no significant change over the existing conditions, there would be no land use impacts related to the No Project/No Action alternative.

C.8.8 PROJECT-RELATED FUTURE ACTIONS – LAND USE, RECREATION, AND WILDERNESS

This section examines the potential impacts of future transmission line construction, line removal, substation expansion, and other upgrades that may be required by Southern California Edison (SCE) as a result of the Calico Solar project. The SCE upgrades are a reasonably foreseeable event, if the Calico Solar project is approved and constructed as proposed.

The SCE project will be fully evaluated in a future EIR/EIS prepared by the BLM and the California Public Utilities Commission (CPUC). Because no application has yet been submitted and the SCE project is still in the planning stages, the level of impact analysis presented is based on available information. The purpose of this analysis is to inform the Energy Commission and BLM, interested parties, and the general public of the potential environmental and public health effects that may result from other actions related to the Calico Solar project.

The project components and construction activities associated with these future actions are described in detail in Section B.3 of this SSA. This analysis examines the construction and operational impacts of two upgrade scenarios

- The **275 MW Early Interconnection Option** would include upgrades to the existing SCE system that would result in 275 MW of additional latent system capacity. Under the 275 MW Early Interconnection option, Pisgah Substation would be expanded adjacent to the existing substation, one to two new 220 kV structures would be constructed to support the gen-tie from the Calico Solar project into Pisgah Substation, and new telecommunication facilities would be installed within existing SCE ROWs.
- The **850 MW Full Build-Out Option** would include replacement of a 67-mile 220 kV SCE transmission line with a new 500 kV line, expansion of the Pisgah Substation at a new location and other telecommunication upgrades to allow for additional transmission system capacity to support the operation of the full Calico Solar project.

C.8.8.1 ENVIRONMENTAL SETTING

The environmental setting described herein incorporates both the 275 MW Early Interconnection and the 850 MW Full Build-Out options. The setting for the 275 MW Early Interconnection upgrades at the Pisgah Substation and along the telecomm corridors is included within the larger setting for the project area under the 850 MW Full Build-Out option, which also includes the Lugo-Pisgah transmission corridor.

The transmission line would follow a generally southwesterly route between the SCE Pisgah Substation (near Interstate 40 [I-40]) and the SCE Lugo Substation (south of the City of Hesperia) for approximately 67 miles. The line would be built within the existing SCE ROW of the Lugo-Pisgah 220 kV No. 2 transmission line except for approximately the last 10 miles south of Hesperia where a new ROW would be required. Under the 275 MW Early Interconnection option, the existing Pisgah Substation (approximately 5 acres) would be expanded to the northwest by an area approximately 270 feet by 100 feet within SCE's existing 220 kV ROW. Under the 850 MW Full Build-Out, the Pisgah Substation would be expanded from 40 to 100 acres adjacent or nearby to the existing substation to accommodate new electrical and communication facilities and future growth.

The early interconnection option would be located within existing SCE facilities and ROWs and the full build-out would be located primarily within SCE ROW on BLM land within the Barstow Field Office. The area where the new 500 kV transmission line would be constructed is primarily open, undeveloped land within the Mojave Desert. Communities near the proposed transmission line include Hesperia, Apple Valley, and Victorville at the southwestern end of the line, and Hector, Pisgah, Lavic, and Ludlow along the northeastern portion.

The project area is located within the Desert Planning Region identified in the County of San Bernardino 2007 General Plan (San Bernardino 2007). The Desert Planning Region includes about 93% (18,735 square miles) of the land within San Bernardino County and much of the Mojave Desert. Approximately 81% of the County’s total land area is controlled by federal or State agencies, with the BLM managing approximately 47% of the county’s land base. Publicly-owned lands are distributed throughout the Desert Planning Region and tend to be interspersed with privately owned lands. Approximately 4% of the county land area is within one of 24 incorporated communities, with the remaining 15% or 1.9 million acres of private land distributed throughout the unincorporated parts of the county (San Bernardino 2007). In addition to the County of San Bernardino General Plan, the southwesterly portion of the proposed upgrades area may fall within the City of Hesperia General Plan. Where possible, the line would be constructed within existing ROWs.

The transmission line route would traverse open desert where agricultural land is not prevalent. According to the DOC’s FMMP, the majority of land traversed by the proposed transmission line is designated as “Other Land,” with smaller areas within “Urban and Built-Up Land” designations (DOC 2008). The transmission route also would border the Rodman Mountains Wilderness Area, as well as the Ord Mountain and Johnson Valley rangeland allotments (BLM 2009o).

C.8.8.2 ENVIRONMENTAL IMPACTS

The proposed upgrades would not physically divide an existing community. Most of the transmission route and telecommunication facilities upgrades are proposed to be sited within or adjacent to existing SCE ROWs. The upgrades would require access to the existing ROWs by construction vehicles and equipment, which would use existing access roads, where possible. However, SCE would need to acquire rights for any new spur or access roads. Any additional impacts to land use would be temporary and confined to the work areas. There likely would be no displacement of any existing land uses given the undeveloped nature of the majority of the proposed ROW. The development of spur roads would not be considered a significant impact to land uses in the area, because the spur roads would be along an existing ROW. Furthermore, since the utility corridor and the substations are established land uses, upgrading most of the Lugo-Pisgah line and installing the 220/500 kV switchrack are not expected to conflict with applicable LORS.

In addition, the approximately 10 miles of new ROW would be in communities with planning and zoning requirements that would likely prevent any physical divisions. The upgrades would likely be constructed in accordance with the applicable land use plans, including, but not limited to the San Bernardino County and City of Hesperia planning and zoning requirements as defined in the respective General Plans. Access to all uses would be fully restored once construction of the upgrades is complete.

The linear route of the proposed transmission line would not be expected to affect agricultural lands since the majority of the transmission line would traverse open desert areas that are not designated as Important Farmland by the DOC. However, the route would traverse the Ord Mountain and Johnson Valley rangeland allotments. Nonetheless, any permanent disturbance to agricultural or rangeland would be limited to the tower footings, and it is assumed that agricultural/rangeland activities would be allowed within the transmission line ROW.

The transmission route would border the Rodman Mountains Wilderness Area, and the existing ROW corridor would pass through the Johnson Off-Highway Vehicle Area, the largest open area for OHVs in California. The noise and presence of heavy equipment associated with project construction may temporarily reduce visitation to these wilderness and recreational areas. Recreationists may cancel or schedule their visits to avoid construction periods thereby resulting in temporarily reduced visitation where construction could pose a safety hazard to OHV users and other recreationists. However, due to the size and available stock of the recreation areas in this desert region, and the relatively small portion crossed by the proposed upgrades, it is assumed that recreationists would not be precluded from recreational activities.

From an operational perspective, presence of the transmission line and associated facilities would not disrupt actual use of existing residential properties or structures. Access to all uses would be fully restored once construction of the upgrades is complete.

C.8.8.3 MITIGATION

To minimize land use impacts, the transmission line route should follow existing SCE ROWs where feasible, and any new ROWs should be developed along parcel edges and in accordance with all applicable land use LORS. Authorization and use would be subject to administrative review at the time of issuance of a final BLM decision regarding the authorization or use.

SCE should post notices on the ROW or at other sites where the public would be affected by construction activities. Notices should be posted approximately one month prior to commencing work. At ROW ingress and egress points, postings should be placed along the ROW and at work sites approximately two weeks prior to the closing of public access. Recommended mitigation should require SCE to identify and provide a public liaison person before and during construction to respond to public concerns about construction disturbances.

C.8.8.4 CONCLUSION

The SCE upgrades would not cause a significant change in land use. Once construction is completed, there would not be a change in access for recreation in and across the transmission line corridor. Since the transmission line and telecommunication upgrades would mostly be within an existing and established ROW, on existing, retrofitted, or replaced towers, or would be underground, the project components would not permanently disrupt or divide the physical arrangement of an established community. Also for these reasons, the SCE upgrades would not restrict existing or future land uses along the route.

C.8.9 CUMULATIVE IMPACT ANALYSIS

C.8.9.1 AGRICULTURAL LANDS AND RANGELANDS

Section B.3, Cumulative Scenario, provides detailed information on the potential cumulative solar and other development projects in the project area. Together, these projects comprise the cumulative scenario which forms the basis of the cumulative impact analysis for the proposed project. In summary, these projects are:

- Renewable energy projects on BLM, State, and private lands, as shown on **Cumulative Figures 1 and 2** and in **Cumulative Tables 1A and 1B.** Although not all of those projects are expected to complete the environmental review processes, or be funded and constructed, the list is indicative of the large number of renewable projects currently proposed in California.
- Foreseeable future projects in the immediate area, as shown on **Cumulative Impacts Figure 3 and Cumulative Tables 2 and 3**. Table 2 presents existing projects in this area and Table 3 presents future foreseeable projects in the Newberry Springs/ Ludlow area. Both tables indicate project name and project type, its location and its status.

These projects are defined within a geographic area that has been identified by the Energy Commission and BLM as covering an area large enough to provide a reasonable basis for evaluating cumulative impacts for all resource elements or environmental parameters. Most of these projects have, are, or will be required to undergo their own independent environmental review under CEQA and/or NEPA. Even if the cumulative projects described in Section B.3 have not yet completed the required environmental processes, they were considered in the cumulative impacts analyses in this SSA.

Geographic Extent

The geographic scope for the analysis of cumulative impacts related to agricultural lands and rangelands includes the desert region of San Bernardino County. The county's community plans map defines the desert region as the entire area north and northeast of the San Bernardino National Forest, which accounts for the majority of the county (CSB 2009a).

Cumulative impacts include the conversion of agricultural land and/or rangelands that would conflict with existing land uses. Projects related to agriculture and rangelands consist of all construction activities, and residential, and industrial developments within the region. For the purpose of this analysis, in addition to the projects listed in **Cumulative Impacts Tables 2 and 3,** data obtained from the DOC and the BLM's online GIS maps were considered when identifying activities that could contribute to cumulative impacts.

As noted above in the "Setting and Existing Conditions," agricultural lands are not present on the proposed project site, and the nearest area with agricultural development is approximately 10 miles west in the community of Newberry Springs. In addition, according to DOC's Important Farmland maps of San Bernardino County, the majority of the desert region is outside of the survey boundaries; and the areas that are surveyed include the valley region south of the San Bernardino National Forest and the southwestern portion of the desert region. Designations for the desert region primarily consist of "Grazing Land," with a concentration of "Urban and Built-Up Land" designations within the cities of Barstow, Victorville, and Hesperia. The area surrounding Newberry Springs is mostly designated as "Other Land"; and isolated "Prime farmland" and "Farmland of Statewide Importance" designations are located throughout the surveyed area, with a few small areas of concentration.

The proposed project would be located within the Cady Mountains rangeland allotment; in addition, numerous rangeland allotments are located throughout the desert region of San Bernardino County. The Cronese Lake allotment is located directly north of Cady Mountains, and the following allotments are located on the west side of the desert region: Ord Mountain, Johnson Valley, Stoddard Mountain, Rattlesnake Canyon, Round Mountain, Shadow Mountains, Buckhorn Canyon, Shadow Mountains, Goldstone, Superior Mountains, Harper Lake, Gravel Hills, Monolith Cantil, Pilot Knob, Lava Mountains, Spangler Hills, Boron Sheep, and Cantil Common. The following allotments are located on the east side of the desert region: Valley View, Kessler Springs, Valley Wells, Clark Mountain, Jean Lake, Horsethief Springs, Lanfair Valley, Crescent Peak, Piute Valley, and Lazy Daisy (BLM 2009o).

Existing Cumulative Conditions

Agricultural land is not prevalent within the desert region of San Bernardino County; however, north of I-40, within the communities of Daggett and Newberry Springs, FMMP-designated Farmland is present. According to the San Bernardino County General Plan maps, the primary land use zoning designation in this area is Rural Living with intermittent areas with Agriculture designations (CSB 2009b). As such, the existing development described in **Cumulative Impacts Table 2,** which includes solar energy facilities, has potentially interfered with agricultural activities. In addition, as noted above, BLM rangeland allotments are located throughout the desert region of the county. Existing development is located either within an allotment or in the vicinity of an allotment. As a result, past and present development has contributed to the conversion of existing rural and open space land uses, including agriculture and rangeland.

Future Foreseeable Projects

Foreseeable Projects in the Project Area. As described in **Cumulative Impacts Figure 3** and **Cumulative Impacts Table 3**, four solar and three wind energy projects are proposed in the Newberry Springs/Ludlow area which would convert approximately 90,000 acres of desert lands to industrial uses. Also, the U.S. Marine Corps is expected to expand the existing 596,000-acre Twentynine Palms military base by 400,000 acres. Although this desert region is not a highly productive agricultural area, there are areas designated by the State and county for agricultural land uses.

In addition, as described in **Cumulative Impacts Figure 2** and **Table 1A,** the desert region of San Bernardino County is within the jurisdiction of BLM's Barstow and Needles District Offices. Cumulative impacts to rangeland allotments would be significant, since 35 solar energy projects and 33 wind energy projects have been proposed in or near designated allotments noted in the "Geographic Extent" subsection. As such, future foreseeable development would contribute to the conversion of existing rural and open space land uses, including agriculture and rangeland.

Foreseeable Renewable Projects in the California Desert. As shown on **Cumulative Impacts Figures 1** and **2** and **Table 1**, a total of 63 projects and 567,882 acres are proposed for development of solar energy, and 62 projects and 433,721 acres of wind energy development in the California Desert. This represents a worst-case scenario and not all of these projects would be ultimately developed. Nonetheless, multiple projects would result in the conversion of rangeland allotments to industrial uses.

Conclusion

Although, the proposed project by itself would not convert agricultural land to nonagricultural uses, the conversion of lands due to past and present projects, and the potential development of the approximately one million acres of land, would all combine to result in adverse effects on agricultural lands (one of the state's most important resources) and rangeland. Therefore, although the development of renewable resources in compliance with federal and State mandates is important and required, this conversion would contribute to a significant and unavoidable cumulative impact to agricultural resources.

C.8.9.2 WILDERNESS AND RECREATION

Geographic Extent

The geographic scope for the analysis of cumulative impacts related to wilderness and recreation includes the local and regional wilderness areas and recreation facilities within the desert region of San Bernardino County. **Cumulative Impacts Figure 2** illustrates the wilderness areas and major State and national parks in this desert region.

As noted above in the “Setting and Existing Conditions” subsection, adjacent to the northern boundary of the project site is the Cady Mountains WSA, and wilderness areas in the vicinity of the proposed project site include the Rodman Mountains, Bristol Mountains, Kelso Dunes, and Newberry Mountains. Wilderness areas provide ample opportunities for recreation activities. In addition, approximately 32 miles east of the project site is the Mojave National Preserve which is a 1.6-million acre park managed by the U.S. National Park Service (NPS 2009). Within the Mojave Preserve is the Providence State Recreation Area (SRA), which is managed by the California State Parks. This area also provides space for recreational activities; in particular, nature hikes and cavern tours are the main attractions to this park. Other recreational facilities primarily include OHV and camping sites located throughout the county.

Existing Cumulative Conditions

As illustrated in **Cumulative Impacts Figure 2**, existing projects in the Newberry Springs/ Ludlow area, in particular the Department of Defense expansion, occupy significant portions of land in the project area.

Future Foreseeable Projects

Foreseeable Projects in the Project Area. As shown in **Cumulative Impacts Figure 3** and **Cumulative Impacts Table 3**, four solar and three wind energy projects are proposed in the Newberry Springs/Ludlow area which would convert approximately 90,000 acres of desert lands to industrial uses. Also, the U.S. Marine Corps is expected to expand the existing 596,000-acre Twentynine Palms military base by 400,000 acres.

In addition, as shown in **Cumulative Impacts Figure 2** and **Table 1A,** the desert region of San Bernardino County is within the jurisdiction of BLM’s Barstow and Needles District Offices, where 35 solar energy projects and 33 wind energy projects have been proposed in project area. As such, future foreseeable development would contribute to the conversion of existing rural and open space land uses, including wilderness and recreation.

Foreseeable Renewable Projects in the California Desert. As shown on **Cumulative Impacts Figures 1** and **2** and **Table 1**, a total of 63 projects and 567,882 acres are proposed for development of solar energy, and 62 projects and 433,721 acres of wind energy development in the California Desert. This represents a worst-case scenario and not all of these projects would be ultimately developed. Nonetheless, multiple projects would result in the conversion of rangeland allotments to industrial uses.

Conclusion

In addition to the proposed Calico Solar facility, there are many past, present, or reasonably foreseeable future actions that contribute to impacts to recreation and wilderness areas. Regionally, there have been both positive and negative impacts to recreational and wilderness resources as a result of development projects within San Bernardino County. Development of highway access to the region has provided direct vehicular access to open desert scenery for residents throughout southern California.

This increased access has improved the recreational experience for some users by making the area more accessible, but has also detracts from the recreational experience for other users who prefer remote camping, hiking, and hunting away from populated areas.

Presently, as noted above, numerous energy-related development projects, including the proposed project, would remove large acreages of land from potential recreational use, and would have adverse effects on the viewscape that would result in some users seeking out other areas of the desert for their activities (see the cumulative analysis in the **Visual Resources** section). Similarly, within wilderness areas, the attraction of hiking, camping, and other outdoor activities is likely to decrease due to the increased human activity in the region, and the consequent impact of development on the viewscape. The proposed project would permanently change the nature of land use at the proposed project site from Government Special Public Limited Use and Moderate Use to an intensive utility use for the generation of power. Therefore, the combined effect of the overall cumulative past, present, and proposed and reasonably foreseeable projects, including the proposed project, in the desert region of San Bernardino County would adversely affect recreation and wilderness resources, resulting in a significant and unavoidable under CEQA.

C.8.9.3 HORSES AND BURROS

Geographic Extent

Cumulative impacts would result in changes in the existing environment which, due to their nature or location, result in interference with BLM's management of HMAs. The cumulative analysis of wild horses and burros was conducted using BLM maps of HMAs within San Bernardino County.

Existing Cumulative Conditions

The Chemehuevi HMA is the closest management area and is the only HMA within San Bernardino County. The HMA is located approximately 100 miles southeast of the project site near the California-Nevada border. This area is not notable for significant past or present development.

Future Foreseeable Projects

Foreseeable Projects in the Project Area. As shown in **Cumulative Impacts Figure 3** and **Cumulative Impacts Table 3**, four solar and three wind energy projects are proposed in the Newberry Springs/Ludlow area which would convert approximately 90,000 acres of desert lands to industrial uses. Also, the U.S. Marine Corps is expected to expand the existing 596,000-acre Twentynine Palms military base by 400,000 acres. However, as no HMAs are in the vicinity of the proposed project, it is unlikely that future projects within the project area would impact horses or burros.

Foreseeable Renewable Projects in the California Desert. As shown on **Cumulative Impacts Figures 1** and **2** and **Table 1,** solar and wind applications for use of BLM and private land, cover approximately 1 million acres of the California Desert Conservation Area. However, as shown on BLM maps of the HMAs, there are only three HMAs in the

California Desert, of which Chocolate Mule Mountains would be the only HMA in the vicinity of proposed renewable energy projects (BLM 2009k).

Conclusion

Although the proposed Calico Solar facility would not adversely impact horses or burros, there are other present or reasonably foreseeable future actions that could contribute to impacts to HMAs within the region. Authorized and unauthorized vehicle use, and maintenance and construction of utility rights-of-way can have a slight impact to burros by removal of vegetation utilized for forage, and there is always a danger of vehicles colliding with burros. The impact of the proposed and probable development projects would cumulatively remove and isolate potential grazing sites for burros. However, in areas of close proximity to HMAs, development projects would be required to consider impacts related to wild horses and burros. Therefore, cumulative impacts would be less than significant.

C.8.9.4 LAND USE COMPATIBILITY AND LORS COMPLIANCE

Geographic Extent

The geographic scope for the analysis of cumulative impacts related to land use compatibility and LORS compliance are the local and regional communities and sensitive receptors. Cumulative impacts could result from the physical division of an established community or conflict with any applicable land use plan, policies, or regulation adopted for the purpose of avoiding or mitigating environmental impacts.

Existing Cumulative Conditions

As described in **Cumulative Impacts Table 2,** past and present projects occurring in the vicinity of the proposed project site include two solar energy generating facilities, the expansion of the Twentynine Palms Marine base, and two aggregate mining operations. In addition, the surrounding area consists of undeveloped desert land and mountain terrain with small rural communities in the vicinity. The closest community is Newberry Springs located approximately 10 miles west of the project site, where the dominant land use designation is Rural Living and intermittent areas of agricultural activities.

Future Foreseeable Projects

Foreseeable Projects in the Project Area. As shown in **Cumulative Impacts Figure 3** and **Cumulative Impacts Table 3**, four solar and three wind energy projects are proposed in the Newberry Springs/Ludlow area which would convert approximately 90,000 acres of desert lands to industrial uses. Also, the U.S. Marine Corps is expected to expand the existing 596,000-acre Twentynine Palms military base by 400,000 acres.

In addition, as shown in **Cumulative Impacts Figure 2** and **Table 1A,** the desert region of San Bernardino County is within the jurisdiction of BLM's Barstow and Needles District Offices, where 35 solar energy projects and 33 wind energy projects have been proposed in the project area. As such, future foreseeable development would contribute to the conversion of existing rural and open space land uses.

Foreseeable Renewable Projects in the California Desert. As shown on **Cumulative Impacts Figures 1** and **2** and **Table 1**, a total of 63 projects and 567,882 acres are proposed for development of solar energy, and 62 projects and 433,721 acres of wind energy development in the California Desert. This represents a worst-case scenario and not all of these projects would be ultimately developed. Nonetheless, multiple projects would result in the convert existing land uses to an industrial use.

Conclusion

Proposed developments near the project site that would have the potential to induce cumulative impacts include solar and wind energy generation projects, and the expansion of the existing military base. In consideration of cumulative land use compatibility impacts, the implementation of renewable projects in southern California would occur mostly in undeveloped desert lands or areas of rural development and open space, and therefore, would not create physical divisions of established residential communities. Nonetheless, as noted above, approximately one million acres of land are proposed for solar and wind energy development in the southern California desert lands. The conversion of these lands would preclude numerous existing land uses including recreation, wilderness, rangeland, and open space, and therefore, would result in a significant cumulative land conversion impact. The proposed project's conversion of approximately 6,215 acres in an undeveloped portion of San Bernardino County and on BLM lands in combination with the land conversion impacts of past, present, and reasonably foreseeable future projects in the area would be cumulatively considerable, and a significant and unavoidable impact under CEQA.

C.8.10 COMPLIANCE WITH LORS

A detailed discussion of the proposed project's compliance with LORS applicable to land use, recreation, and wilderness is provided above in subsection C.8.4.2, and **Land Use Table 2** (Project Compliance with Adopted Land Use LORS).

C.8.11 NOTEWORTHY PUBLIC BENEFITS

The proposed project would permanently change the nature of land use at the project site from open space lands, to an intensive utility for the generation of power. Therefore, from a land use perspective, development of the proposed project would not result in any noteworthy public benefits because:

- the Calico Solar Project site would be developed with 34,000 SunCatchers and associated ancillary facilities and linear components on approximately 6,215 acres of undeveloped land in San Bernardino County, which would result in the conversion of BLM-administered public land to an industrial use;
- the proposed project would disturb LWCF (donated) lands that have been prohibited from development by the BLM and intended to mitigate the impacts of past projects; and
- the proposed project would contribute to the cumulative conversion of approximately one million acres of open space, recreation, wilderness, and agricultural lands in the southern California desert for the purposes of renewable energy development.

Therefore, although the development of the proposed project is intended to address the requirements of federal and State mandates for renewable energy, the land conversion and associated land use impacts would not yield any noteworthy public benefits related to land use, recreation, or wilderness resources.

C.8.12 PROJECT CLOSURE AND DECOMMISSIONING

According to Section 3.12 of the applicant's project description, the solar generating facility is expected to have a lifespan of 40 years. At any point during this time, temporary or permanent closure of the solar facility could occur. Temporary closure would be a result of necessary maintenance, hazardous weather conditions, or damage due to a natural disaster. Permanent closure would be a result of damage that is beyond repair, adverse economic conditions, or other significant reasons.

Both temporary and permanent closures would require the applicant to submit to the Energy Commission a contingency plan or a decommissioning plan, respectively. A contingency plan would be implemented to ensure compliance with applicable LORS, and appropriate shutdown procedures depending on the length of the cessation. A decommissioning plan would be implemented to ensure compliance with applicable LORS, removal of equipment and shutdown procedures, site restoration, potential decommissioning alternatives, and the costs and source of funds associated with decommissioning activities.

Upon closure of the facility or decommissioning, it is likely that the applicant would be required to restore lands affected by the project to their pre-project state. Given the fact that the proposed project site is located on undeveloped land, staff anticipates that project decommissioning would have impacts similar in nature to proposed project construction activities. Therefore, given the temporary nature of decommissioning activities and the eventual return of the lands to their current state, the effects of decommissioning on land use is not expected to be adverse.

C.8.13 RESPONSE TO COMMENTS

Responses to comments provided on the SA/DEIS **Land Use** section are provided below. Note that comments have been summarized by the types of issues raised in the comments.

C.8.13.1 PUBLIC AND AGENCY COMMENTS

Comments on the SA/DEIS **Land Use** section were provided regarding discussion of LORS, including the following.

Comment: The applicant entered into an Agreement for Private Crossing with the BNSF Railway Company and added gates and barricades at the railway crossing at Hector Road. The gated crossing prevents the public and private landowners from using Hector Road, which has been in use for over fifty years, and would landlock the private properties.

Response: As discussed in detail above in Section C.8.4.2 (Assessment of Impacts and Discussion of Mitigation), and at the April 14, 2010 Staff Assessment Workshop, the proposed project developer, Tessera Solar responded to the private landowners by explaining that due to additional safety requirements, BNSF requires gates to be installed at all crossings where an entity other than BNSF (i.e., the applicant) would have access (SES 2009x). The private crossing granted to Calico Solar/Tessera is for the purposes of establishing an access to the western side of the proposed project site. As such, in addition to installation of the gate and barricades, the applicant had to acquire insurance for potential damage to BNSF property and attend a safety course. Tessera complied with these conditions and was granted access, which established the need for gates and barricades (SES 2009x). In addition, at the December 22, 2009 Staff Workshop, BLM representatives stated that the crossing was established as a BNSF ROW for access to, and maintenance of, the rail line and, and therefore, the crossing is not a legal road with authorized access for the public (CEC 2009). As such, the crossing is a physical access and not a legal access, and has been used in a passive and unauthorized manner. Therefore, the recent blockage of this crossing does not result in a conflict with any applicable LORS.

C.8.13.2 APPLICANT'S COMMENTS

Comment: Comments were received from the project applicant stating that the BLM's Instruction Memorandum regarding the LWCF lands should not be elevated to the status of applicable LORS and the determination of consistency should be left to the BLM's jurisdictional power.

Response: As discussed in the Staff Workshop on December 22, 2009 (and summarized above in **Land Use Table 2**), this is a BLM policy; therefore, the BLM will decide its applicability. In addition, Energy Commission staff directly responded to this issue at the April 14, 2010 Staff Workshop. In that workshop, staff indicated to the applicant, that the LORS consistency discussion provided in **Land Use Table 2** of the DEIS/SA was based on information provided by the BLM's State Director, which asked staff to analyze consistency of the proposed project in two ways: considering the proposed project to include the LCWF lands; considering the project to exclude the LCWF lands so that the BLM could review relative merits of both options. In fact, the BLM developed and asked staff to analyze the Avoidance of Donated and Acquired Lands Alternative in the SA/DEIS with this specific intent in mind. It should be noted that even though this alternative has been eliminated since the SA/DEIS publication, the applicability of the BLM policy regarding LWCF donated lands still needs to be determined by the BLM, because some LWCF lands are still within the revised project site boundary. As such, staff believes that the analysis of the proposed project's consistency with the BLM policy regarding LWCF lands should remain in the SSA in the event that this policy is determined to be applicable to the proposed project by the BLM.

C.8.14 PROPOSED CONDITIONS OF CERTIFICATION/MITIGATION MEASURES

No Conditions of Certification/Mitigation Measures are proposed for the area of Land Use, Recreation, and Wilderness.

C.8.15 CONCLUSIONS

- No farmland or rangeland conversion impacts are expected as a result of the proposed project, and the project would not involve other changes in the existing environment which could result in conversion of farmland to non-agricultural uses.
- The proposed project would indirectly impact the recreational and wilderness values of the Cady Mountains WSA. However, due to the numerous wilderness and recreation areas throughout the county and in the vicinity of the project site, this indirect impact would not be adverse. .
- The proposed project would not contain or traverse any established BLM HAs or HMAs.
- The proposed project would not disrupt or divide the physical arrangement of an established community.
- The applicant has submitted an application to the BLM requesting a right-of-way (ROW) to construct the proposed project and its related facilities. Pursuant to the California Desert Conservation Area (CDCA) Plan (1980, as amended), sites associated with power generation or transmission not identified in the CDCA Plan are considered through the Plan Amendment process. Under Federal law, BLM is responsible for processing requests for ROWs to authorize such proposed projects and associated transmission lines and other appurtenant facilities on land it manages. If the ROW and proposed land use plan amendment are approved by BLM, the proposed solar thermal power plant facility on public lands would be authorized in accordance with Title V of the FLMPA of 1976 and the Federal Regulations at 43 CFR part 2800.
- Based on staff's independent review of applicable federal, state, and local LORS documents, the proposed project would not be consistent with a BLM Interim Policy prohibiting surface disturbing activities on LWCF lands within the proposed project boundaries. However, implementation of the Reduced Project Alternative would avoid this LORS inconsistency.
- In May 2010, the applicant submitted a supplemental report for modifications to the primary water supply, which would require a pipeline that would traverse two private parcels located within the county's Resource Conservation (RC) zoning designation. The county recently adopted Development Code Chapter 84.29 (Renewable Energy Generating Facilities), which allows for development of solar energy facilities in the RC zone. Therefore, the proposed project's water supply pipeline is consistent with San Bernardino County's General Plan and Development Code.
- The implementation of renewable projects in Southern California would occur mostly in undeveloped desert lands or areas of rural development, and therefore, would not create physical divisions of established residential communities. Nonetheless, approximately one million acres of land are proposed for solar and wind energy development in the Southern California desert lands. Because the Calico Solar Project would have no impacts on agricultural resources, rangelands, horses and burros, it would have no potential to contribute to cumulative impacts in this respect. However, the proposed project would combine with other past and reasonably foreseeable future projects to substantially reduce scenic values of wilderness areas

and recreational resources in the Mojave Desert and southern California desert region and therefore, would result in a significant and unavoidable cumulative land use impact in this regard.

- The land use impacts associated with the Reduced Acreage Alternative would be similar to the proposed project, but less intense given that less land acreage would be affected. In addition, this alternative would not result in the disturbance of LWCF mitigation lands, and therefore, would be in compliance with the BLM's Interim Policy Memorandum.

C.8.16 REFERENCES

BLM 1980. U.S. Bureau of Land Management – California Desert Conservation (CDCA) Plan, 1980 as Amended.

BLM 2009a. U.S. Bureau of Land Management – Interim Policy on Management of Donated Lands and Lands Acquired with Land and Water Conservation Funds (LWCF). May 28, 2009.

BLM 2009b. U.S. Bureau of Land Management – Rangeland Administration System. [online]: http://www.blm.gov/ras. Accessed November 13, 2009.

BLM 2009c. U.S. Bureau of Land Management – Geocommunicator. [online]: http://www.geocommunicator.gov/blmMap/Map.jsp?MAP=GA. Accessed December 2, 2009.

BLM 2009d. U.S. Bureau of Land Management – California BLM Wilderness Study Reports. [online]: http://www.blm.gov/ca/pa/wilderness/wsa/wsa_report_final.html#Top. Accessed December 2, 2009.

BLM 2009e. U.S. Bureau of Land Management – Rodman Mountains Wilderness. [online]:http://www.blm.gov/ca/pa/wilderness/wa/areas/rodman_mountains.html. Accessed December 2, 2009.

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C.9 – NOISE AND VIBRATION

Testimony of Erin Bright

C.9.1 SUMMARY OF CONCLUSIONS

California Energy Commission staff concludes that the Calico Solar Project (formerly the Stirling Energy Systems Solar One Project) can be built and operated in compliance with all applicable noise and vibration laws, ordinances, regulations, and standards and, if built in accordance with the conditions of certification proposed below, would produce no significant adverse noise impacts on people within the affected area, either direct, indirect, or cumulative.

C.9.2 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 combine to determine whether the facility would meet applicable noise control laws and ordinances and whether it would cause significant adverse environmental impacts under the California Environmental Quality Act (CEQA). In some cases, vibration may be produced as a result of power plant construction practices, such as blasting or pile driving. The groundborne 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 Calico Solar 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) and to avoid creation of significant adverse noise or vibration impacts. For an explanation of technical terms and acronyms employed in this section, please refer to **Noise Appendix A** immediately following.

C.9.3 METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

California Environmental Quality Act

The California Environmental Quality Act (CEQA) requires that significant environmental impacts be identified and that such impacts be eliminated or mitigated to the extent feasible. Section XI of Appendix G of CEQA Guidelines (See Cal. Code Regs., tit. 14, Section 15063) sets forth some characteristics that may 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 groundborne vibration or groundborne 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 5 dBA or more at the nearest sensitive receptor.

Staff considers it reasonable to assume that an increase in background noise levels up to 5 dBA in a residential setting is insignificant; an increase of more than 10 dBA is considered significant. An increase between 5 and 10 dBA should be considered adverse, but may be either significant or insignificant, depending on the particular circumstances of the case.

Factors to be considered in determining the significance of an adverse impact as defined above include:

1. the resulting combined noise level;[1]
2. the duration and frequency of the noise;
3. the number of people affected;
4. the land use designation of the affected receptor sites; and
5. public concern or controversy as demonstrated at workshops or hearings or by correspondence.

Noise due to construction activities is usually considered to be insignificant in terms of CEQA compliance if:

- the construction activity is temporary;
- use of heavy equipment and noisy activities are limited to daytime hours; and
- all industry-standard noise abatement measures are implemented for noise-producing equipment.

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 likely be insignificant.

Laws, Ordinances, Regulations, and Standards

Noise Table 1
Laws, Ordinances, Regulations, and Standards

Applicable Law	Description
Federal (OSHA): 29 U.S.C. § 651 et seq.	Protects workers from the effects of occupational noise exposure.
State (Cal/OSHA): Cal. Code Regs., tit. 8, §§ 5095–5099	Protects workers from the effects of occupational noise exposure.
Local	
San Bernardino County General Plan Noise Element	Establishes noise limits as specified in the Development Code (below)
San Bernardino County Development Code, Ch. 83.01	Establishes property line noise limits for various receiving uses. Exempts construction noise during certain hours. Establishes vibration limits.

FEDERAL

Under the Occupational Safety and Health Act of 1970 (29 USC § 651 et seq.), the Department of Labor, Occupational Safety and Health Administration (OSHA) has adopted regulations designed to protect workers against the effects of occupational noise exposure (29 CFR § 1910.95). 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.

There are no federal laws governing off-site (community) noise.

The only guidance available for evaluation of power plant vibration is guidelines published by the Federal Transit Administration (FTA) for assessing the impacts of groundborne vibration associated with construction of rail projects. These guidelines have been applied by other jurisdictions to assess groundborne vibration of 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 groundborne vibration. The FTA measure of the threshold of perception is 65 VdB,[2] 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.

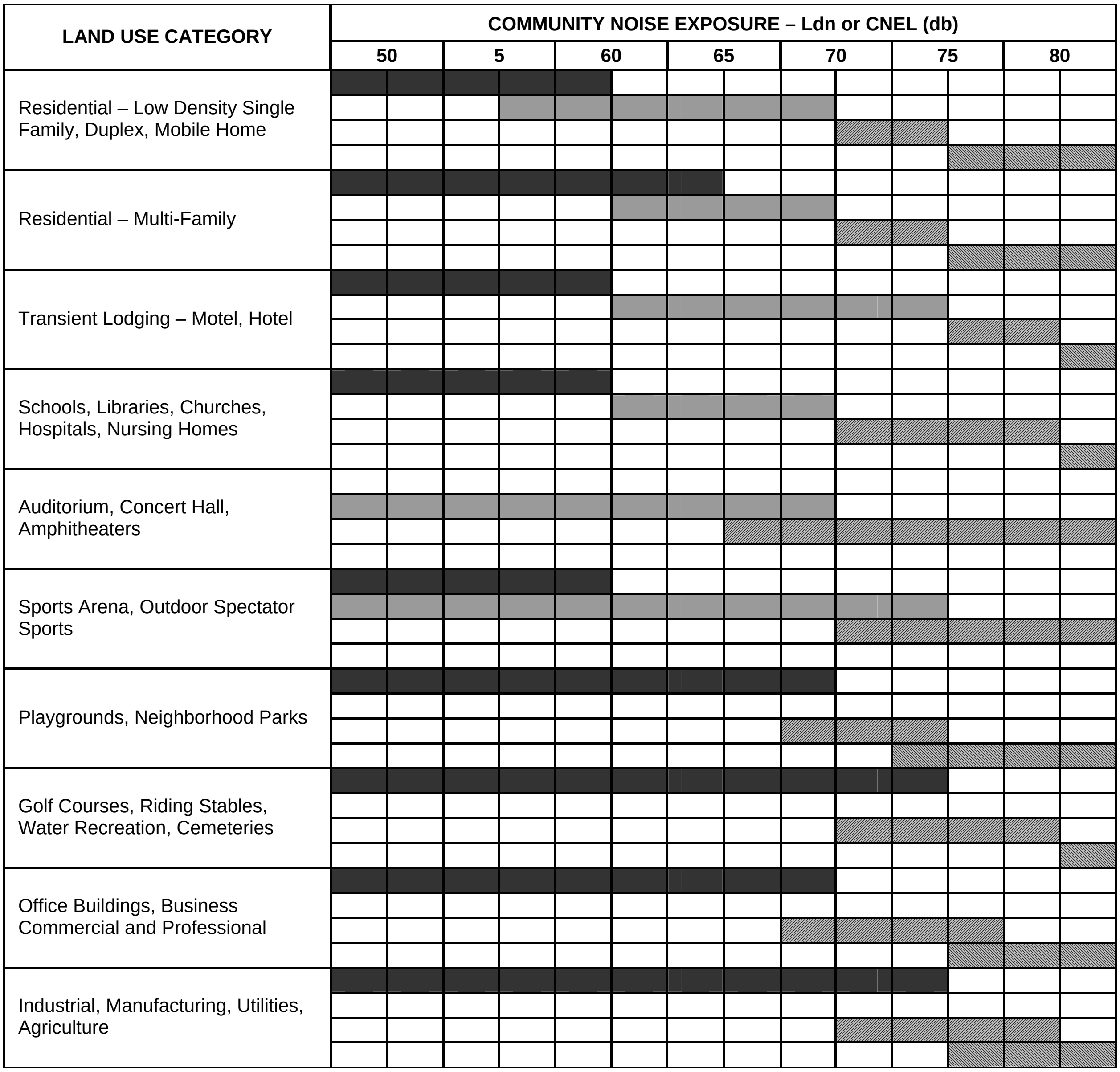
STATE

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

[2] VdB is the common measure of vibration energy.

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 land use compatibility guidelines are listed in **Noise Table 2**.

Noise Table 2
Land Use Compatibility for Community Noise Environment



	Normally Acceptable	Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.
	Conditionally Acceptable	New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features are included in the design.
	Normally Unacceptable	New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirement must be made and needed noise insulation features included in the design.
	Clearly Unacceptable	New construction or development generally should not be undertaken.

Source: State of California General Plan Guidelines, Office of Planning and Research, June 1990.